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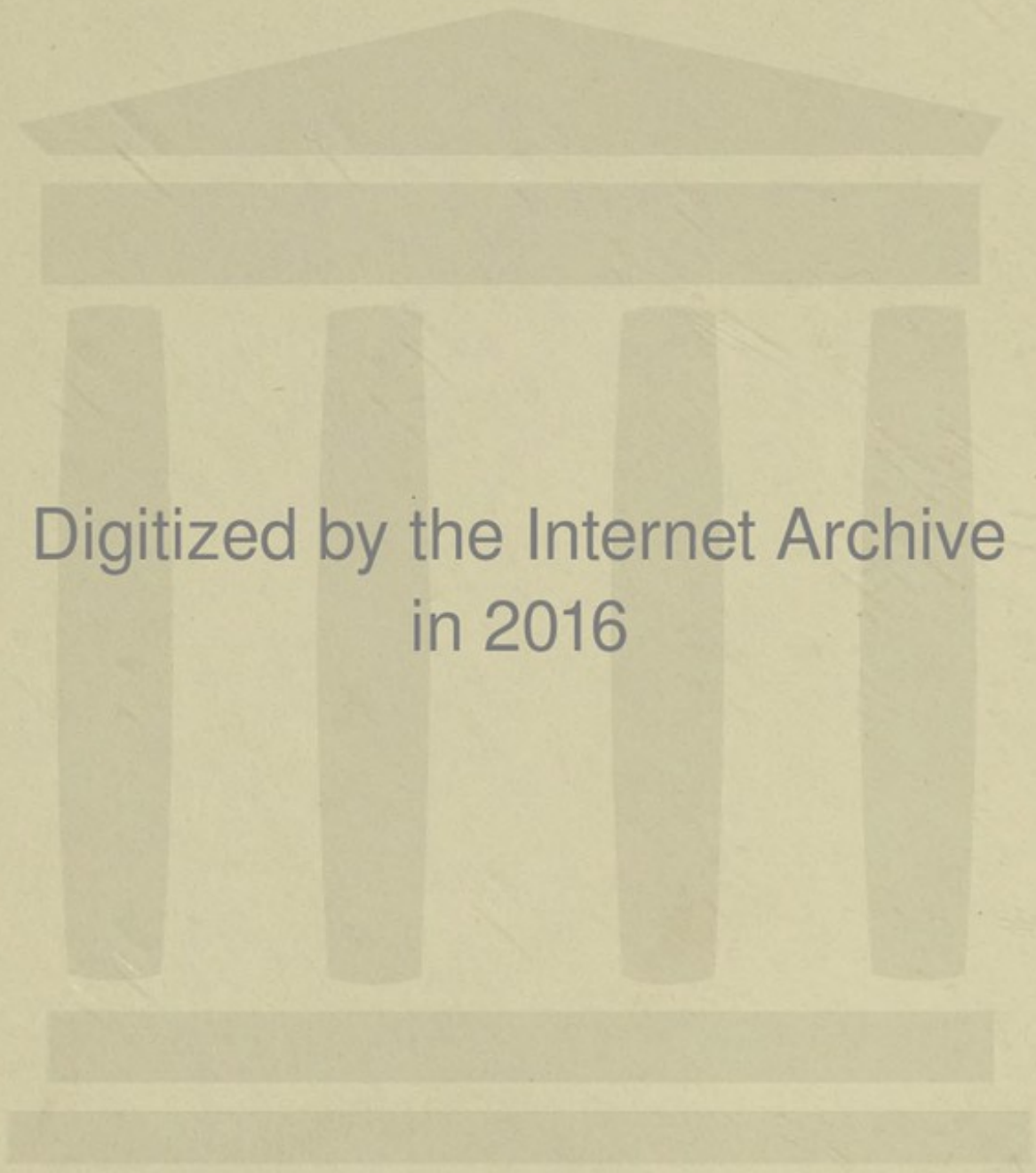
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THE

OLDIER'S POCKET-BOOK

FOR FIELD SERVICE.

THE

SOLDIER'S POCKET-BOOK

FOR FIELD SERVICE

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BY

GENERAL VISCOUNT WOLSELEY.

K.P. G.C.B. G.C.M.G.

ADJUTANT-GENERAL TO THE FORCES

FIFTH EDITION, REVISED AND ENLARGED

WITH ILLUSTRATIONS

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MACMILLAN AND CO.

1886

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PREFACE TO FIFTH EDITION.

HAVE added considerably to this edition, hoping to increase its practical lue to soldiers of all ranks ; it is specially intended for the use of men the field. It is very desirable to keep its bulk down to small dimensions, t it should bely its title and cease to be easily portable. But the number subjects to be dealt with in a pocket-book of this kind is considerable, and ving to the varying climatic and other conditions of our great empire, they ve to be examined under many aspects. Some are difficult to dispose of a few sentences, and compression often robs of its real utility the lesson nich it is sought to teach. I have, however, throughout endeavoured to ard against the over expansion of this little volume, and, by the extensive e of contractions, to limit the number of its pages as far as possible.

It is hoped that all those for whom this work is intended may have carely studied the theory of their profession in the pages of Military works, ch as, "The Operations of War," by Lt.-Genl. Sir E. Hamley, and Colonel eary's "Modern Tactics." "The Soldier's Pocket-Book" is exclusively actical in its teaching, and intended to meet a want which theory cannot ake good. On active service all officers, Generals as well as Subalterns, on find there is as much difference between theory and practice, as there between the art of teaching soldiers during peace, and the great natural t of being able to lead them in war.

WOLSELEY.

6, HILL STREET, W.
19th March, 1886.

PREFACE TO FIRST EDITION.

DURING many campaigns, and particularly at the outset of my career as soldier, I felt the great want of a practical and portable book upon th ordinary duties that fall to the lot of soldiers when in presence of an enem Much useful information can be obtained from the Queen's Regulation and from the Field Exercise Book ; but as the instructions published b authority for the use of our army are almost exclusively intended for peac service, they are likely to lead one into difficulties if adhered to in the fiel Some few years ago, when Sir R. Airey was Q.M.G, of the army, he pr posed to have a practical handbook for the staff, compiled by experience officers of his department, and published for the use of the army. A litt money was required for the purpose, which the War Office, from economic motives, would not allow. I was to have been one of those employed write ; so when the scheme failed, I resolved to bring out a work of th description on my own responsibility. The following pages are the resu of that determination, and of my leisure hours for the last four years. N claim is made for them on the score of literary merit. Almost everythi in them is deduced from my own personal experiences ; whereas it is curious circumstance, that nearly all the English books upon war, includi the only one intended as an *aide mémoire* for field service, are from t pens of men who have never seen a shot fired in anger. Some of the books teach the theory of war admirably. It is most essential that eve officer should have a good knowledge of his science, based upon the histo of former wars ; but to know how to apply that knowledge to any goo purpose in the field cannot be acquired from such works. This Pocke Book is intended to be a guide to officers from the moment war is declared : enters into the most minute details on everything connected with the wi life one has to lead in the field, when cut adrift, perhaps entirely, fro civilisation, but, at any rate, from cooks, clubs, tailors, and bootmakers. make no apologies for its shortcomings, but publish it in the hope that may be found useful by soldiers of all ranks in Her Majesty's army.

G. J. W.

MONTREAL,
March, 1869.

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LIST OF ABBREVIATIONS.

' over a figure indicates feet ; " indicates inches.

A.A.G. —Assistant Adjutant General.
A.C.G. — ,, Commissary ,,
A.D.A. —Army Discipline Act.
A.D.C. —Aide de Camp.
Advd. Gd.—Advanced Guard.
A.G. —Adjutant General
A.M.D. —Army Medical Department.
A.P.D. —Army Pay Department.
A.Q.M.G.—Assistant Quarter-Master-General.
A. & S. —Ammunition and Store.
B. —Breadth.
Battn. —Battalion.
B.C. —Bursting Charge.
B.L.R. —Breech Loading Rifle.
B.M. —Brigade Major.
B. of O. —Base of Operations.
Brigd. —Brigade.
Cal. —Calibre.
Cavly. —Cavalry.
C. of B. —Commandant of Base.
C.G. —Commissary General.
C.G. of O.— ,, of Ordnance.
C.-in-C. —Commander-in-Chief.
C.M. —Court Martial.
C.O. —Commanding Officer.
C. of the S.—Chief of the Staff.
C.R.A. —Commanding Royal Artillery.
C.R.E. —Commanding Royal Engineers.
Ct. —Court.
C. & T. —Commissariat and Transport Corps.
Cub. —Cubic.
D. —Depth.
D.A.A.G. —Deputy Assistant Adjutant General.
D.C.G. —Deputy Commissary General.
D.A.C.G. —Deputy Assistant Commissary General.
Divn. —Division.
D.J.A.G. —Deputy Judge Advocate General.
Fd. Hospl.—Field Hospital.
F.O. —Field Officer.
Ft. —Feet.
G.A. —Gun Ammunition.
G.C. —Gun Cotton.
G.C.M. —General Court Martial.
G.O. —General Order.
G.O.C. —General Officer Commanding.
G. of C. —General of Communication.
G.S.Wagon—General Service Wagon.
H. —Height.
H.A. —Horse Artillery.
Hd. Qrs. —Head Quarters.
H.M. —Her Majesty's.
I.G. —Inspector General.

.V.S. —Inspecting Veterinary Surgeon.
n. —Inches.
nfy. —Infantry.
.A.G. —Judge Advocate General.
. —Length.
. of C. —Line of Communication.
I.H. —Martini Henry.
I.L. —Muzzle Loader.
I.L.O. —Military Landing Officer.
I.O. —Medical Officer.
I.S. Corps.—Medical Staff Corps.
ltd. Infy. —Mounted Infantry.
I.V. —Muzzle Velocity.
N.C.O. —Non-Commissioned Officer
N.T.O. —Naval Transport Officer.
O.C. —Officer Commanding.
O.C.R.A. —Officer Commanding Royal Artillery.
ffr. —Officer.
O.S.D. —Ordnance Store Department.
O.S.O. —Ordnance Store Officer.
c. —Per Cent.
P.M. —Provost-Marshal.
P.M.O. —Principal Medical Officer.
P.O. —Post Office.
r. —Pounder.

P.V.S. —Principal Veterinary Surgeon.
Q.M. —Quarter-Master.
Q.M.G. — ,, ,, General.
R.A. —Royal Artillery.
R.B.L. —Rifle Breech Loader.
R.E. —Royal Engineers.
R. & F. —Rank and File.
R.L.G. —Rifle Large Grain Powder.
R.M.L. —Rifle Muzzle Loader.
R.N. —Royal Navy.
Rr. Gd. —Rear Guard.
S.A.A. —Small Arm Ammunition.
S.B. —Smooth Bore.
S.C. —Station Commandant.
S.G. —Surgeon General.
S.M. —Surgeon Major.
S.N.O. —Senior Naval Officer.
S.O. —Staff Officer.
S.S.forWar—Secretary of State for War.
S. Serjt. —Staff Serjeant.
T. —Tonnage.
V.D. —Veterinary Department.
V.S. —Veterinary Surgeon.
W.D. —War Department.
W.O. —War Office.
W. —Weight.

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SOLDIERS' POCKET BOOK.

PART I.

Advice to Officers on Service as regards their bearing towards eir Men.—The relation existing between the rank and file and the officers our army, although peculiar, is not a subject upon which much reflection common. To offrs. brought up in regiments, accustomed to see the linary routine of military life go on as a machine, it seldom occurs that change could be made for the better. In fact, many pass their lives hout discovering that the military career has any higher aim than that noving men on parade by a most complicated process called drill, and t of keeping order amongst them at all times by a system of severe nishments and a rigid espionage, which is believed to be discipline. There ut little real sympathy between them and their men. Forgetting that the dal system has passed away, as long as they do their duty by their soldiers, y expect to find them always ready to obey their nod, and to stand by them ll moments of peril. Pages might easily be filled in narrating the gallant ds of our offrs. and in recounting instances of their reckless personal osure to save the lives of those under their command. Creditable as h conduct is, more still is expected of them. They must make them-es loved as well as respected. In our intercourse with the rank and file, must make them realise that all our interests are identical, causing the st-joined recruit to feel that success is of as much real moment to him it can be to the general. Let us sink as far as possible the respective s of officers, sergeants, and privates, merging them into the one great fessional cognomen of soldier, causing all ranks to feel that it is a noble , of which the general as well as the private may well be proud. Let us e up the phrase 'officer and gentleman,' substituting that of 'soldier' it; let the word officer be used as seldom as possible, so that the private

may really feel that there is no gulf between him and his commander, bu that they are merely separated by a ladder, the rungs of which all ca equally aspire to mount.

The only rewards that are justly our due are the gratitude of our country and the praise of our superiors. Company offrs. should remember that i is always in their power to bestow the latter, and they should never lose a opportunity of calling attention publicly to the gallantry of their men, dis tinguishing individuals and holding them up to the admiration of others In an army praise is the greatest of all moral levers, if administered with discrimination ; it is a trump card, costing nothing, that is always at th disposal of the offr., be he commander or captain, which enables him t win if he knows how to use it. The bestowal of praise creates an intimac between the giver and receiver which it is most desirable to establish be tween all ranks. Study to be familiar without being vulgar, and habit, not intuition, will soon enable you to be gracious and intimate with you men without any loss of dignity. In all regts. some offrs. are immens favourites with their men, and others the reverse. This is especiall the case on active service, where community of danger, and constant asso ciation create comradeship unknown in peace. Many privates only kno their offrs. as men who award them punishment, and although they kno they are always treated with justice, such a condition of affairs must eve be prejudicial to the interests of our service ; you must be intimate wit your men before they will love you, and they must love you before yo can hope to get the most out of them. You should study their prejudice learn their individual characters, and by a knowledge of their respecti sensitiveness, guard against wounding their feelings, for in every compan there will be men of actual refinement in comparison to others. Strive t raise the majority to a level with that small minority.

The offr. should take a lively interest in their amusements, encouragi them in the practice of all manly sports. In fine, he should sympathise wit their likes and dislikes, their pleasures and annoyances, being ready at a times to listen attentively to their grievances, be they supposed or rea until at last they regard him as one of themselves, a companion and friend. For and with such a man they will brave any danger or endu any amount of privation. Upon all occasions appeal to their honour an chivalrous feelings : show them that you have confidence in them and tru them. Cease to treat them as unreasoning children unable to take care themselves. You will thus develop and create in their breasts feelings honour even if they had previously been devoid of them. In your punis ments make the most marked distinction between ordinary offences ar those committed when on duty, treating the latter with great severity. fact, spare no pains to create and foster the growth of military spirit, impressing upon all ranks the importance of their duties. Whatever m

e the reason of it, it is nevertheless a fact that up to the present time we ave never had an English commander who succeeded in calling forth any reat enthusiasm for himself or the cause in hand. We are too prone to all down before the great Duke, and think that everything he did was ight, and that his method with soldiers was the best. Without wishing or a moment to depreciate either the General or his great services, let any ne read the history of his wars, and what he accomplished, and then picture o himself what the Duke might have done if his soldiers had had for him he feelings that the French had for their Emperor. Napoleon was above ll a student of character and of the passions and feelings that influence nen's conduct. By means of spirit-stirring proclamations, by appeals to neir love of glory and all those points upon which he knew Frenchmen to e susceptible, he was able to extract from his soldiers everything that they ere capable of. It is not true that Englishmen are utterly devoid of such igh sentiments, but it is only special nourishment and treatment that will levelop feelings so long ignored. Let any General arise who knows how o do so, and a new era of victory will be arrived at in British history. Let ffrs. of all ranks ponder on this subject, and in their own sphere, no natter how humble that may be, let them endeavour to call out the finer nd better qualities of those serving under them. No man can respond ith greater alacrity than the British soldier will, when an offr. who nderstands him makes an appeal to his honour, his love of country, his oyalty, and to all those subtle but powerful influences which alone can onvert mobs into armies. 'The greatest talent of a General,' says Plu-rch, 'is to secure obedience through the affection he inspires.' In fact, you want to win battles, make yourself loved by those who serve under ou.

MILITARY SPIRIT AND DISCIPLINE.—There has been a tendency to ake all regts. alike in their outward appearance, and to consider them so their feelings. Machines into which the individual talents and disposition f men enter so largely, as into those called regts., are never calculated to eep time alike as watches do. The idiosyncrasies of C.Os., historical raditions, and established customs, affect the character of regts. more than ight be imagined by those who draw their idea of our service from 'H. M. egulations.' The endeavour to assimilate them has not been happy; like emocracy, it has had a tendency to pull down the best to a level with the orst, instead of raising the latter. Military spirit is made up of trifles; rose by any other name smells differently to military nostrils. The uardsman reduced to a linesman is not the fine guardsman any longer. ake the best Rifle battalion and clothe it in red, it would soon cease to e the dashing body it is now. No man who knew soldiers or their peculiar ay of thinking, or who was acquainted with the many little trifles that go make up pride of Regiment, and that form as it were the link between it

and discipline, would ever deprive a soldier of any peculiarity that h prided himself on, without having some overpowering reasons for doing so.

The soldier is a peculiar animal that can alone be brought to the highes efficiency by inducing him to believe that he belongs to a regt. which infinitely superior to the others around him. In their endeavours to foste this spirit, colonels are greatly aided by being able to point to some pecu liarity in dress or title, and for this reason it is most unwise to take from regt. any device or peculiarity of any sort in which the men take a pride The spirit of general assimilation that has for some years past found suc favour with our clothing department, was borrowed from abroad; but i carrying it out we have gone into extremes, as is our wont. An attempt t change the dress of the Madras army led to the mutiny of Vellore. Th Duke of Wellington said of his offrs. in Spain, that many of his best me were the greatest dandies. The better you dress a soldier, the more high he will be thought of by women, and consequently by himself. Dress is much more consequence than civil ministers imagine. Before the Crimea war our dress regulations, which were opposed to all comfort and a common sense, had been carried out so strictly to the letter of the law, tha there was a rebound as soon as men got free from the surveillance of town majors. This feeling was fostered, amongst the younger offrs. especiall by the spirit of the public press, which went towards inculcating the ide that everything old was bad. Many men before Sebastopol seemed pride themselves upon looking as little like soldiers as possible. To l unshaven, and to be dirty, was supposed by some to be the sure sign of good offr. Such views and ideas run like wildfire through an army, its serious injury. Whatever the offrs. think fine, the men will think too. It is not easy to make an Englishman at any time look like soldier. He is fond of longish hair and uncut whiskers. Men who ha never worn beards are apt to think that to wear one saves a great de of trouble. It does so, if you do not clean it; but to wear a long on and keep it clean, demands more time and trouble than shaving. C service discipline deteriorates when but little attention is paid to dress, an when the men wear almost what they like. It is an incalculable drawba to an offr. who is ordered on active service in command of a regt., nev to have had experience of real war and actual campaigning; he is a loss how to act; to keep up the strict discipline of the home garriso town in all its minutiæ, would be as impossible as it would be mad attempt it. To know where to relax, where to remain firm, and where tighten the reins, requires the exercise of great common sense, aided

* *Since writing the above, I have read a passage in 'Kinglake's Crimea,' whi embodies my idea in such good language, that I beg to refer to it. See page No. of Vol. III., beginning at, 'In the capital of many a State,' &c.*

experience in the customs of war. Allowance under all circumstances must be made for men who march daily. They cannot be expected to be shaved and have their clothes as well brushed as if in barracks: but without wearying, or in any way bullying them, a great deal may be done by offrs. acting upon a good system. The greater the individuality you give to the soldier himself and to his company and to his battn., the more he feels that his individual conduct is of importance. No pains should be spared by officers in impressing upon their men the consequence that attaches itself to the behaviour of each of them. Make a man proud of himself and of his corps, and he can always be depended upon. He must believe that his duties are the noblest that fall to man's lot. He must be taught to despise all those of civil life. Soldiers, like missionaries, must be fanatics. An army thoroughly imbued with fanaticism can be killed, but never suffer disgrace; Napoleon, in speaking of it, said, 'Il en faut pour se faire tuer.'

Officers should make a point of treating their wounds with indifference, and except unable to continue in action through loss of blood, or breakage of bones, they should struggle on, and not quit the ranks as long as their strength admits of their standing up. They owe it to themselves as gentlemen to do this; the offr. who quits the field before he is absolutely forced to do so from physical weakness, is a very poor creature.

It is difficult to devise punishments for all crimes not punishable by death. This is particularly the case on the march. All the dirty fatigue-duties about a camp should be performed by defaulters. Care is required that punishments awarded may not in any way whatever affect the men's health or reduce their strength. When a force is marching daily, all extra drills must be avoided, lest the men to be punished should be overworked by them. Soldiers, particularly old soldiers, are naturally grumblers. The self-abnegation which is necessary on service finds a safety-valve in a 'good growl.' The best and most faithful servants are often the greatest grumblers. This disposition cannot be treated too cautiously and with too light a hand. The tendency should be checked in young offrs., for if they grumble, the privates will follow in a chorus that will soon grow too loud.

The only European war of which this generation of our soldiers know anything, is that against Russia. It taught us many useful lessons, not the least of which was the necessity that exists for watching over the morale of our men. We are apt to think that if the Briton is well fed, well looked after, and well led by his offrs., everything he is capable of has been given a fair field, and will in consequence be brought out. During the siege of Sebastopol, I verily believe that a large proportion of our men did not know the name of the G.O.C. They seldom saw him; he did not live amongst them. If he had feelings in common with them, they did not know it. No touching appeals were made to their feelings of honour and patriotism. All our attention was bestowed on their stomach; and the result

was we never got much out of our men, and that in August 1855, our army was in a discreditable condition of demoralisation.

VOLUNTEERING FOR DANGEROUS SERVICES.—It is common for men to say that volunteers in war 'come to no good,' that the system of calling for them when there is any particularly dangerous service to be performed is pernicious, that men should content themselves with doing what they are ordered, &c. Such expressions were invented, and are still repeated, by men who do not like danger—men whom no glorious impulse could ever induce to volunteer for anything—men who have no courage for deeds that bring fame and honour with them, and who are consequently jealous of men who have. They are therefore anxious to prevent others availing themselves of opportunities that occur for acquiring distinction. Let no soldier be deceived by such twaddle. If you are ambitious and 'covet honour,' never lose a chance of leading or taking part in storming parties and all enterprises that put you in contact with the enemy. If this reasoning of timid men once gets hold of an army, it is enough of itself to stifle all enthusiasm and noble daring, without which no one can be a good soldier, and without which an army of the most talented men in the world is useless; it is a dead body, incapable perhaps of cowardice, but powerless for great deeds. Love of country, disregard of personal comfort, and the constant exposure of one's life for the safety of others and the honour of our Sovereign, are sentiments and actions without which no army can long exist. We have been too much educated to believe that the British soldier is simply a machine, incapable of noble impulses. Let us eradicate such an impression, and foster the wish for distinction, by calling for volunteers to perform all services of unusual danger, or those that require more than ordinary courage. The offr., be he general or captain, who acts upon the principle that all his soldiers are equally brave, will some day find out his error to his cost. The longing for distinction, which is, one may say, the mainspring to all military feeling, enters largely into this subject. If volunteers are called for, and succeed in their undertaking, they must be petted and rewarded. It is to be hoped that in our next war the G.O.C. may have the power to confer the ribbon of the Victoria Cross on the spot, subject to Her Majesty's approval afterwards. It is a great stifler to military enthusiasm that a man who has distinguished himself must wait a long tedious reference to England before he can obtain any formal recognition of his service. A reward conferred on the spot is doubly efficacious; it is more highly prized by the recipient, and has a greater influence upon others to go and do likewise. A general should rather seek for instances of courage to reward, than wait until they are reported to him: courage in a man is the highest of all virtues, and it should be fostered in an army in every possible way. One man who volunteers for any special service of danger, is worth two men taken at hazard from the ranks.

In action, to be cool and to seem ignorant that any danger exists, is of the first consequence; you must at the same time, however, evince a lively interest in all that is going on: come what may, have a smiling face. If your men are under a fire to which they are not replying, walk about in front of them as they are lying down. I do not mean that you are never to avail yourself of cover, for when skirmishing it is your duty to do so; but under the above-mentioned circumstances the best troops are prone to become unsteady, and it is then the especial duty of offrs. to set an example of coolness and steadiness, and an outward contempt for danger. When wounded, offrs. should take a pride in refusing the assistance of their men to take them to the rear; men are only too fond of helping their wounded comrades out of fire, and when once away, it is difficult to get them back again. All must learn to wait for the ambulance. It should be impressed upon them by their offrs., that the wounded of a victorious army are always taken care of, whilst those of the beaten side fare badly. It is more essential, therefore, for the wounded than for others, that their army should win, and the fewer men withdrawn from the front line to take charge of wounded the greater is their chance of success.

Advice to Officers ordered on Service.—The army having been distributed into its several Divns., &c., the generals to command them, and the staff having been carefully selected, it behoves all offrs. ordered to take part in the operations, to decide upon their field-kit, and make arrangements for living beyond the reach of shops and tradesmen. If they have not been vaccinated, they should be so at once. In the Article on Field Kit will be found the result of the author's personal experience in several campaigns. Previous to embarkation, the best maps of the intended theatre of war should be procured and studied at every spare moment. All good works throwing light upon its history, resources, geography, the manners and customs of the people, its climate, its military and naval strength, &c., are to be carefully studied, and a précis made of all such information, particularly as regards the military events that have taken place in it; the positions taken up by opposing parties, and those where battles were fought, sieges carried on, to be noted down in the pocket-book, so that such places may be examined whenever the subsequent movements of the army enable it to be done. The nature and description of rivers, where navigable and where fordable, the bridges over them, the chains of mountains, with the passes through them, the railroads, routes, and other communications. The natural productions, the nature of the timber, &c., &c., to be studied. The same pocket-book to have noted in it the dates when the respective seasons begin and end. The composition and distribution of the enemy's forces; a page in the pocket-book should be devoted to each army corps, giving all details as to divns., brigds., and regts., &c., and the names of C.Os. as far as possible; this will be of incalculable service when prisoners are taken, as the fact of a

certain corps being there would indicate that such and such a divn. was i your immediate front. The description of his guns should be noted, as als whether the numbers given in his Returns, include offrs., N.C.Os. and nor combatants, or only the R. and F. of bayonets and sabres. It is almost need less to add that at least a colloquial knowledge of the language is of incalcul able value. All S.Os. are expected to speak French. If the war is to b carried on in a country whose language is unknown to an offr., he can at leas do much towards acquiring a partial knowledge of it ; he can learn from vocabulary the names of things, and a few easy sentences. There is no wa by which a man of very inferior ability can obtain a reputation amongst u for cleverness and learning so easily as by the study of languages. Th same amount of application bestowed upon them, as is frequently give without any result to other subjects, will often secure good posts fo men who are wise enough to make languages their study. This fact come home to all who have served much in India. Where the language o a country in which war is being carried on is not generally known i an army, the services of those men who can speak it are of such value tha they cannot be neglected.

FIELD EQUIPMENT FOR OFFICERS.—It should be of the least possibl weight, and contain the fewest articles compatible with the maintenance c health. Comfort must be disregarded when men take the field, as it is onl a personal matter ; but it is essential for the good of the State that offrs should keep themselves in such good health as to be ready at all times to d the hardest work. Englishmen are so fond of their tub, and so particula as to the cleanliness of their persons, that many think it impossible t forego such luxuries ; but it is surprising how soon one can learn to d without them. We are too prone to overload ourselves with baggage i the field ; it is a saying abroad that 'chaque officier anglais a sa bassinoire. This 'chaff' comes home to us with only too much truth. Formerly, me went campaigning prepared to lead a gipsy life, independent of all supplie in the way of clothes ; wars lasted for years then, and the means of obtain ing shirts, boots, &c., from home were small. Now, a few weeks is th utmost one can be separated from railway communication, and a few month will probably be about the duration of active operations carried on b regular armies. Supplies of socks, boots, trousers, shirts, soap, towels, &c. should be pushed well to the front in bulk, to be issued as required. Th infy. must be content with less than mounted offrs., who can carry extr things on their second chargers.

Officers' Baggage in the field is now restricted to 80 lbs. for each F.O. 50 lbs. for other mounted offrs. having only one charger ; and 40 lbs. fo all dismounted offrs., as proposed in the first edition of this Pocket-book. The Cooking for offrs. will in future be done by Companies and Troops cooking utensils not to exceed 20 lbs. in weight, will be carried for th

offrs. of each Troop and Company,* or for every 3 other offrs. who may elect to mess together. In addition to the valise or kit-bag, which is to be looked upon as the light equipment of offrs., there will be allowed to every offr. a bullock-trunk to carry about 100 lbs. wt. of personal baggage. This trunk to be embarked with offrs., but to be left at the B. of O. during active movements in the field, and to be brought up only when it may be deemed advisable by the C. in C.† An Infantry offr.'s kit should be as follows :—

Worn or carried on the Person.—Helmet, tunic, trousers, shooting-boots, socks (woollen), silk drawers, flannel shirt, silk pocket-handerchief, gaiters, clasp-knife (with a tweezers in it), drinking-cup and water-bottle,‡ pocket-book,§ telescope or field-glass (having compass attached to it), watch, water-proof-coat, haversack, and a map of the country.

To be carried in Valise, forming Bed.—A great-coat with cape (8lbs.), 1 blanket (4½ lbs.), 1 pr. of trousers (2 lbs. 2 oz.), 1 pr. of shooting-boots and 6 spare boot-laces (2 lbs. 14 oz.), 2 pr. of worsted socks (8 oz.), 1 pr. of silk drawers (10 oz.), 1 flannel shirt (13 oz.), 1 silk pocket-handkerchief (1½ oz.), 1 woollen nightcap (4 oz.), 2 towels (1 lb.), a holdall containing 1 comb, 1 small hair-brush, 1 tooth-brush, 1 small clothes-brush, 1 pr. of scissors, and a metal soap-box (1 lb. 6 oz.), 1 small sponge in bag (3 oz.), 1 housewife (4 oz.), 1 tin of dubbing (3 oz.), 1 portfolio, containing pen, ink, and paper (15 oz.), 1 journal book (9 oz.), 1 cholera belt (6 oz.), 1 calico bandage ‖ (3 oz.), 1 candle lamp with a few candles (1 lb.), 1 tin match-box ¶ (3 oz.), 2 tin plates (14 oz.), 1 cup (in leather bag), containing knife, fork, spoon, pepper and salt pots (1 lb.), 1 India rubber basin (1 lb.), some tobacco, and 'The Soldiers' Pocket Book' (1 lb.). The total wt. of these articles is 29 lbs. 14 oz., and as the valise in which they are contained weighs 9 lbs., the whole kit weighs, say 40 lbs. The valise forming the bed and holding the above detailed kit measures, when packed, 10″ in diameter, and is 28″ long, as shown in sketch (p. 10).

Fig. 1 shows the valise rolled up, in plan when opened out for use as a bed, and a longitudinal section through it then. It consists of a waterproof sheet 26″ wide, ending in a cylindrically-shaped bag which holds the kit and

* *A pattern set of cooking utensils weighing about 20 lbs., can be had from Mr. T. White, Military Outfitter, Aldershot.*

† *One of these bullock-trunks is to be seen in the pattern-room, Horse Guards.*

‡ *The best water-bottles are those made of ebonite, and covered with felt: they can be had of Silver & Co., Cornhill; those holding a little less than 1⅓ pints, weigh when empty 13¼ oz.; when full 2 lbs. 3¾ oz. Our regulation water-bottle, that is of wood, holds 1⅓ pints, weighs when empty 1 lb. ¼ oz.; when full, 2 lbs. 10 oz.*

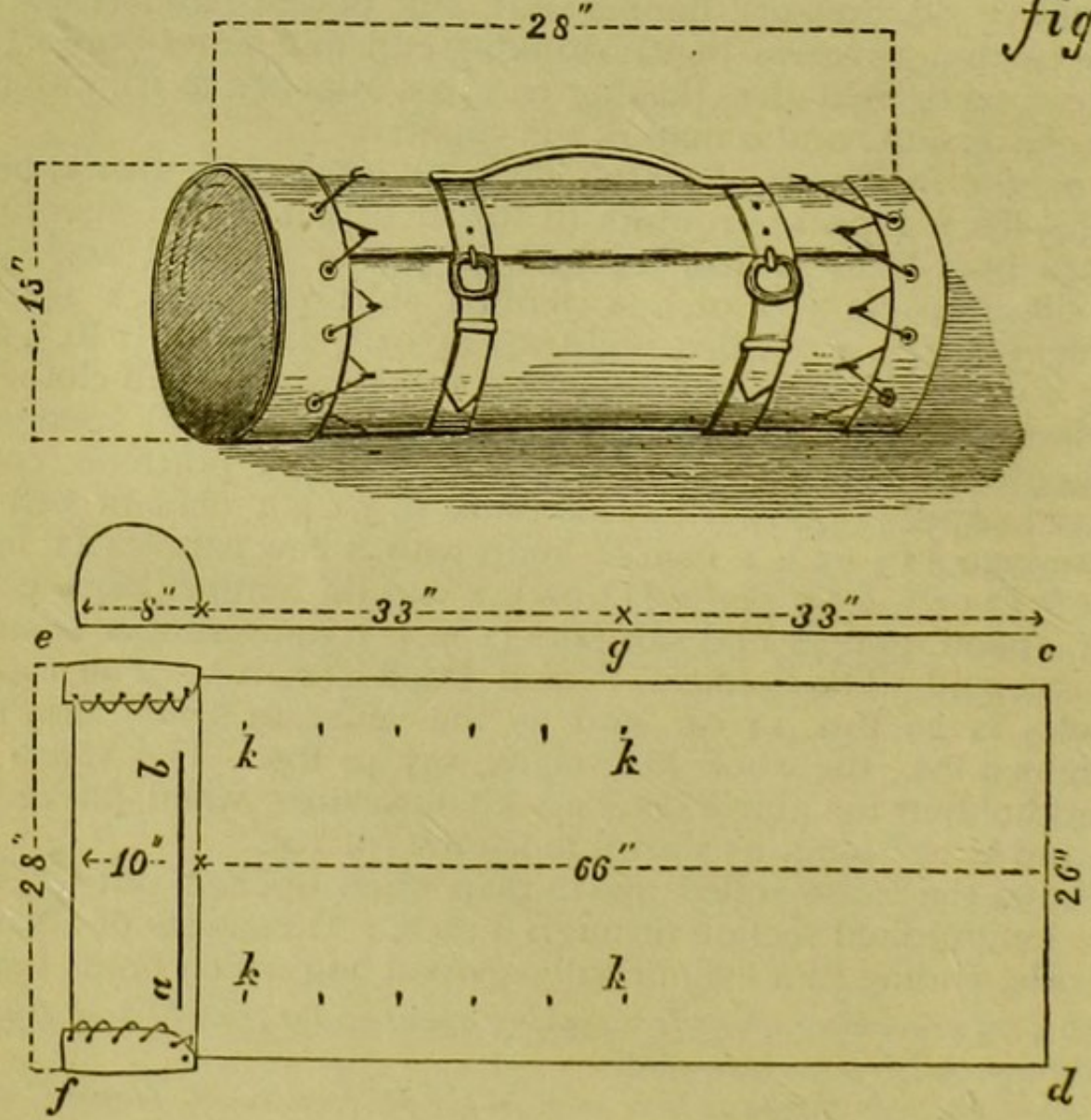
§ *The most convenient size is 7″ by 4″. I strongly recommend metallic memorandum books ruled, with the corners rounded off, as the best for field service.*

‖ *To be carried on persons when in actual presence of the enemy.*

¶ *In damp climates, matches having sulphur on them should be selected.*

forms the pillow. The opening in this bag (*a b* in sketch) is secured b a couple of straps or strings of soft cord. The bag should be made o light waterproof material, except the portion of it (8″) which will rest on th ground when the bed is opened out, which is in one piece with the groun sheet that is made of stout waterproof stuff (such as is now used for ma bags) as far as *g*, the portion *g c* (33″) being, for the sake of lightness, o less heavy waterproof material. In folding up the bed, the end *c d* is firs

fig.1



doubled back on the pillow at *e f*, the ground sheet in that condition being then rolled round the valise or pillow. In this way no part of the sheet tha may have been dirtied from contact with the ground is brought next th bedding. A piece of light serge, 66″ long and 30″ wide, is fastened along the sides and the valise end of the sheet ; being open at the end *c d*, a sor of bag is thus formed, which if filled with straw, hay, leaves, &c., &c., form a good palliasse ; it is necessary for health to have a woollen substance o

is kind between the body and the waterproof sheet. The valise and bed-ing when rolled up are secured by two leather straps, which are sewn to e sheet for 30″ from *g* towards *e*; they are united close to *g* by a cross rap, which forms a handle (when the valise is rolled up), after the fashion the straps commonly used to fasten railway rugs, &c. The valise ends at ch side in a cap with edges 3″ deep, pierced with seven brass-bound eyelet les. This cap is of the same strong material that the portion of the ground eet near the valise is made of. Beginning at *g*, at 4″ from each edge of e ground sheet, is a line of strong brass hooks, *k k* in sketch, 6″ apart, d extending to the end of the stout waterproof material under valise. ove loose through the eyelet holes in the cap at end of the valise is a strong ft cord about as thick as a pipe-stopper: this is kept there permanently, that each time the bed is rolled up there is no lacing in and out through elet holes, but the caps are secured to the ground sheet by the slack tween every two eyelet holes being passed over the hooks already described attached to it. Another method for securing the cap, is by substituting ops of a similar cord for these hooks: they are permanently fastened to e ground sheet in the positions indicated for the hooks in the sketch, and e lacing in the other method is dispensed with. The valise and caps are cured by passing the loops through their corresponding eyelet holes in the p, and then through one another, the end one being fastened by a small ather strap fixed for that purpose to the ground sheet.

The caps may also be entirely dispensed with by making the ground eet with side flaps of light waterproof material, which, being about 4″ ide, are turned inwards before rolling it up, so that when secured by the raps already described the ends of the cylindrical package thus formed are aterproof. The bed in this form, although not quite so proof against wet s when the valise is provided with caps, is much simplified, and a little eaper. When used in bivouac, the ground should be scraped away to rm a hollow for the hips; this adds greatly to comfort. When time or rcumstances enable you to raise your bed off the ground, never fail to o so: a couple of planks or a hurdle raised at one or both ends upon me stones are sufficient for this purpose. For ordinary climates one lanket with a good great-coat reaching down to the ankles is sufficient. strongly recommend having the blanket doubled, and sewed together long one end, and two-thirds along the side. I have always found it a ood plan to sleep in a silk or woollen cap of some sort, particularly when ivouacking. I should like to see one served out to every soldier. When nts are used and it is safe to do so, it is a great luxury to take off your oots at night; if you cannot do this, loosen the lacing as much as possible.

Arms.—The sword should be light but sharp. Offrs. of all ranks and of l branches of the service should have a central-fire revolver carrying the gulation pistol ammunition. I strongly recommend offrs. to have their

revolver or other pistol, sword, scabbard, stirrup-irons, bits, chains, an everything iron or steel well nickled. It keeps them from rust, and save much trouble in cleaning.

S.Os. should have, in addition to the above, a 50-ft. measuring tape, prismatic compass, a little tin colour-box containing Indian ink, burnt siena Prussian blue, green, and a brush. A couple of pencils, some good stee pens, a block of sketching-paper, a pair of compasses, and pocket range finder (a pedometer is useful). An almanack to be specially prepared by th Intelligence Department in England for the use of offrs. and N. C. Offrs., th calculations being made for the latitude and longitude of some central tow in the intended theatre of operations. These almanacks should be printe on slips of a size to fit the pocket-book, into which they should be paste The following useful form is that in which they were supplied for th Ashantee war.

OCTOBER, 1873.

Lat. 7° 0′ *N.* *Lon.* 2° 0′ *W.*

BEARINGS, MAGNETIC; VARIATION, 18° 23′ W.

MOON'S PHASES.

			H. M.	
October	6th	○ Full Moon	5 31	A.M.
,,	13th	☾ Last Quarter	6 25	,,
,,	21st	● New Moon	10 55	,,
,,	29th	☽ First Quarter	0 10	,,

Date.		Sun.		Sun's bearing at		Moon.		Moon's bearing at	
		Rises.	Sets.	Rising.	Setting.	Rises.	Sets.	Rising.	Setting
	*	H. M.	H. M.	°	°	H. M.	H. M.	°	°
1	T	6 2	5 58	E. 21 S.	W. 15 N.	2 14 P.M.	—	E. .	—

Every mounted offr. should carry, strapped to his saddle, a waterpro coat rolled up with his great-coat, and a leather case containing pencil pens, and paper. The S.O. should carry all the most indispensable articl of kit in saddle-bags on one of his spare horses. If the campaign is to l in a very rainy region it is a good plan to have 1 of the 2 pairs of boo made to come well up the thigh, being so finished inside that the tops ca be turned down below the knee in fine weather. A pair of good shootin boots, or a pair of very loose Wellington boots, are very convenient to slee in, or to wear after a march, when walking about in camp. For cavly. an all mounted offrs. good brown leather butcher boots are indispensable ; th

* *Initial letter of the week.*

les should be thick with a broad, low heel, and made to fit easily ; they ould be slit up over the instep, with a soft tongue sewn all round to ake them waterproof, and the opening fastened by lacing ; the spur-strap cover the opening and the lacing. I strongly recommend silk drawers, ey add greatly to comfort. Messing is always a difficult matter, as the nglish offr. will carry his preconceived notions of comfort into the field ith him. He must learn to live as much like the private soldier as possible, nd Os.C. battns. should positively forbid the conveyance of private stores ith the regtl. baggage. As has been said before, all future campaigns ust be of short duration, and any offr. who cannot make up his mind to ve upon the same fare as his men, had better remain at home with his other. S.Os. should mess in threes or fours, having provided themselves ith a canteen for each mess similar to that recommended for other offrs. he attempt to carry about a table or chair during the active work of a ampaign is ridiculous ; offrs., like their men, must eat their dinners sitting n their beds, or on any large stone that may be at hand.

WHAT ALL OFFICERS SHOULD CARRY IN THEIR HEADS.—Taking it for ranted that all offrs. are well acquainted with the Queen's regulations and ne customs of the army, they should endeavour to carry in their heads ertain easy mathematical formulæ regarding the measurement of distances, c. A great deal of course depends on their disposition and their power of erception. Make it a practice to note carefully, even as you whiz along in railway carriage, the peculiar features of the country, the nature of its ences, &c. This is commonly done by hunting-men from habit, so much so nat with them it is a mental operation gone through almost mechanically. ccustom yourself to time the pace at which you travel, to count the number f telegraph poles there are to a mile, and so ascertain how many yds. they re apart, &c. As time and distance are the two elements upon which all nilitary movements hinge, offrs. cannot accustom themselves too much to very-day calculations regarding them, as they bear upon their amusements, r their ordinary routine of duty. I think men accustomed to keep horses re more in the habit of doing so than men who don't ride much. To keep journal is very good practice ; in it should be noted one's daily habits, the vents of the day, and general opinions upon them, together with remarks pon the books one reads, the politics of the time, foreign affairs, &c. All uch practices tend to impress useful facts on the memory. It is taken for ranted that every offr. has a fair knowledge of arithmetic, of at least the first wo books of Euclid, of plane trigonometry, of algebra as far as quadratic quations, and of permanent fortification. They should be able at a glance o distinguish the common vegetable productions, including the various pecies of timber. For facilitating the measurement of distances, &c., every ne should know the exact length of his ordinary pace, and be able to pace ards accurately ; he should know the exact length of his foot, hand, cubit, nd sword, and arms from tips of fingers of left hand to right ear ; he should

know the height of his knee, waist, and eye, and also the exact proportio that his drinking-cup bears to a pint. The more information regarding th strength, composition, and distribution of the contending armies that an offi can carry in his head the better.

THE ORGANISATION OF OUR ARMY.

Cavalry.—The organisation of the English cavalry is as follows :—

1. The Household Cavalry ; 2. Heavy Cavalry ; 3. Medium Cavalry ; 4. Hussars. There are only 3 regts. of Household cavly. ; they are armed with cuirass, and steel helmet, heavy sword, revolver, and B.L.R. carbine. The N.C.Os. and men must be 6′ in height. There are 4 regts. of heavy and 11 regts. of medium cavly., 5 regts. of the latter are lancers armed with lance B.L. carbine and sword (26 N.C.Os. and trumpeters have re volvers instead of lances), and, with the exception of the Scots Greys, wea brass helmets. There are 13 regts. of hussars armed as the heavies, the wear busbies instead of helmets. The sword used by the 4 regts. of heavy cavalry is $35\frac{1}{2}$″ in the blade ; wt. 2 lbs. 8 oz., or, with scabbard, 4 lbs. 9 oz. That used by all other regts. is the same in length, but is 6 oz. lighter, th sword and scabbard together only weighing 4 lbs. $1\frac{3}{4}$ oz., or $7\frac{1}{4}$ oz. lighte than the old pattern which is still used by the heavy regts. In future manu facture the universal pattern for all mounted services, except the household and the 4 regts. of heavy cavly., will be a sword weighing 31 oz., or together with scabbard, 3 lbs. 9 oz., the length of blade being 33″. The lance is 9′ long, weight 3 lbs. $13\frac{3}{4}$ oz. ; the staves are bamboo.

The M.H. carbine weighs $7\frac{1}{2}$ lbs., is 3′ 2″ long, and can fire the ammuni tion of the Infantry rifle, although it has an ammunition of its own (see articl on Ammunition) ; it is sighted up to 1000 yds. Arm-chests holding 2 carbines weigh when empty 70 lbs., and measure 3′ 7″ — 1′ $7\frac{1}{2}$″ — 1′ 2″ (out side). The service revolver weighs $2\frac{1}{4}$ lbs.

The offrs'. chargers are their private property. The average ht. of cavly. horses is $15\frac{1}{2}$ hands. The average net wt. of a dragoon is about 11 stone 6 lbs. ; of a lancer 10 stone 12 lbs., and of a hussar 10 st. 1 lb. The wt. of their dress, arms, accoutrements, ammtn., saddlery, and equipment is in round numbers about 103 lbs. for all. Adding the wt. of water in water-bottle (2 lbs. $4\frac{1}{2}$ oz.) and of 2 days' rations for the man (4 lbs.), the total wt. carried by our cavly. horses is about 19 stone 10 lbs. in the heavies ; 19 st. 5 lbs. in the Lancers, and about 18 st. 5 lbs. in the Hussars. To these wts. must be added at least 1 day's corn for the horse.

Our cavly. equipment is still much too heavy, and the men are dressed too much for appearance and too little for the work they have to do on service. It is to be hoped that the helmet now given to the infy. may be also issued to our hussars and lancers. The tunics are still far too tight, preventing the full and free play of the muscles about the throat, arms, and

est. The sling sword-belt is an abomination, and with the steel scabbard, sword can ever be kept in serviceable order. The sword is only for use horseback, it should therefore be fastened to the saddle, and the dragoon ereby relieved of its wt. The pistol should be carried on the man's person, h a lanyard passing round the neck, so that when separated from his rse by any accident he may be effectively armed. The regulation bridle d bit are heavy and cumbrous, and the present headstall might easily be pensed with by making the bits removable so that the head portion of e bridle should serve as a headstall. All brass bosses should be removed m our saddlery ; they are useless, and entail trouble upon the soldier in eping them clean. It is to be hoped that all bits, chains, stirrups, and ner iron work over which hours are now uselessly spent in burnishing, may future be either nickelled or lacquered : the dragoon has now too much to rn to afford the time required to produce this theatrical effect. The time uandered daily in this folly would suffice to teach him much that he is norant of, but which is essential to his efficiency. Although the time may t yet have arrived for arming infy. with a repeating rifle, I am sure the vly. should have a magazine rifle of some sort. In the sudden dashes ade by cavalry to seize points of importance, it is most essential they ould have such a weapon ; and as only a proportion of the men are dis-ounted at a time, there can be no great practical difficulty in controlling eir fire. Machine guns should invariably accompany cavly. in their raids, d distant operations.

Cavly. Pioneer, tools, &c.—The pioneers consists of 1 serjt. per Regt. d 4 men per Sqdn. who carry the following per squadron: 1 hand-axe oz.) ; 1 saw file (2 oz.) ; 1 pick (3 lbs. 11 oz.) ; 1 pincers ($5\frac{3}{4}$ oz.) ; ding rules (2′—2 oz.) ; 1 hand-saw (14 oz.) ; 1 hand-saw sets (3 oz.) ; 1 ovel (3 lbs. 4 oz.) ; 2 spanners (9″—21 oz.) ; 8 gun-spikes (1 oz.) ; 2 de-nators, each with 2′ of fuze (8 oz.) ; 8 discs of dry guncotton (2 oz.) : 15′ pe lashing (1″—$6\frac{1}{2}$ oz.) ; 18, 4″ iron nails ($11\frac{3}{4}$ oz.). Besides this there is rried by the serjt. 1, 2″ auger (2 lbs. $12\frac{1}{2}$ oz.) ; 2 gun-spikes ; 1 box of tches ; 1 cylinder to hold 8 detonators, and 1 to hold 12 discs ; also 20 s. of soft iron wire (2 oz.). Each squadron is now to be made complete thout calling on the things carried by the serjt., and will have 1 pack horse carry its tools, guncotton, &c.

To clean Brown Belts, &c.—When wet they should be dried in the sun or a warm room, but they will crack if placed close to a fire. Dirt should removed by a damp (not wet) piece of sponge or rag. Soft soap should applied to polish when the belts, &c., are clean and dry by dipping a rner of a sponge or rag in water and then rubbing it on the soap until lathers, then apply to the leather, and when dry polish with a dry rag : is softens as well as polishes the leather.

Soft Soap is made with 8 oz. common yellow soap and 4 oz. of beeswax ; e former should be cut in small pieces and boiled with the beeswax.

WAR ESTABLISHMENT OF A REGIMENT OF CAVALRY. (4 squadrons.

Offrs. N. C. Os. & Men.	Numbers.	Horses. Chargers.	Troops.	Draught.
Lieutenant-Colonels	2	6		
Majors	3	9		
Captains	5	15		
Subalterns	16	48		
Adjutant	1	3		
Paymaster°	1	1		
Quartermaster	1	1		
Medical Officer	1	1		
Veterinary Surgeons	2	4		
Total	32	88		
Serjeant-Major	1			
Q.M. Serjeant	1			
Band Serjeant	1			
Paymaster Serjeant°	1			
°Armourer Serjeant	1			
Saddler Serjeant	1			
Farrier Q. M. Serjeant	1			
Serjeant Cook	1			
Trumpet Major	1			
Orderly Room Serjt.	1			
Transport Serjeant	1			
Troop Serjeant-Majors	8	..	480	
Serjeants	24			
Serjt. Farriers	8			
Saddlers	4			
Shoeing Smiths	8			
Wheelers and Saddletree makers	2			
Trumpeters	8			
Corporals	32			
Bandsmen	15			
Privates	480			§
Drivers‡	30	..	..	57
Total N.C.Os. Rk. & Fl.	630	..	480	57
Total of all ranks	662	88	481	57
Details with regtl. Hd.Qrs.—				
Officers	7	15		
Serjts. of all grades	11	..	8	
Bâtmen	14			
Wagonmen	12			
Cooks	10			
Drivers	20	..	..	40
Mules for Medcl. Panniers	2	..	..	1†
Dismounted Men	8			
Total	84	15	8	41

The No. of the carriage.	Wagons & Carts.	Carriages.	Drivers.
1	Hd.-Qr. Wagon	1	2
2 to 5	Squadron Wagons	4	8
6	Forge Wagon	1	2
7 to 10	Supply Wagons	4	8
11 to 12	Tent	2	4
13 to 14	S. A. A. Carts, with a few tools	2	4
		14	28

Ammunition.	R p a
Carbine, on the soldier	
Regtl. Reserve	
Pistol, on the soldier	
Regtl. Reserve	

Estabmt. of a Squadn.	Nos.	C.	T.
Officers	6	18	
Trp. Serjt.-Majors	2		
Serjeants	6		
Corporals	8		
Artificers	4	..	118
Trumpeters	2		
Privates	96		
Drivers	2	..	..
Bâtmen	12		
Wagonmen	1		
Total all Rks	139	18	118

The Regt. will be distributed thus:

§ Includes 1 mule.	Nos.	C.	T.
Left at Base	22	1	
Hd. Qrs. in the field	84	15	8
4 Squads. all men carried	556	72	472
Total	662	88	480

C. T. and D. in the above table stand Chargers, Troops and Draught horses.
° To be left at B. of O. † This is a mu
‡ 2 of these are allotted, together with 1 m for Medl. purposes.

Articles worn or carried by the soldier of Cavly. and other Mounted Corps in marching order.

	lbs.	oz.
ll head-dress {Lancers	1	13½
ll head-dress {Hussars	1	12½
nic.	3	0
annel shirt	1	1½
,, belt	0	7
awers	0	12½
ntaloons	2	6
aces	0	4
cks	0	4½
ots	4	11
urs	0	13½
oves	0	3½
untlets (Lancers and heavy Cavly.)	0	12

	lbs.	oz.
Girdle (Lancers')	0	2½
Field Dressing	0	2

(*Arms, Accoutrements, &c.*)

	lbs.	oz.
Sword and belt, &c.	5	12
Haversack	0	4
Water bottle, full, and strap	2	9
Pocket-knife and lanyard	0	6
Pouch belt	0	9
Pouch and 30 rds. of ammtn.*	3	13½
Carbine	7	8
Lance	4	0
Revolver	2	4

Articles carried on the horse, and horse equipment.

(*Saddlery.*)

ddle complete †	22	0
idle complete	4	0
east plate	1	3
upper	0	12
allets, pair of	2	12½
ead rope	0	15
oe cases and 2 shoes	2	14½
mnah	2	12
ead rope		

(*Equipment on saddle.*)

all blanket under saddle	2	0
oof picker	0	2
sebag	1	1
eel rope and shackle	1	2
cketing peg	0	12½
sso equipment, with long trace ‡	10	0
allet §	3	0
rbine bucket	2	0

(*Articles in wallets.*)

lannel shirt	1	1½
pair drawers	0	12½
1 holdall (containing spoon, comb, and housewife)	1	0
1 pair socks	0	4½
1 towel and piece of soap	0	8
1 polishing brush	0	4
1 tin of grease	0	10
1 horse brush	0	9
1 curry-comb	0	12
1 horse rubber	0	9
1 stable sponge	0	1
1 oil bottle	0	4
1 pocket ledger	0	4
1 day's reserve ration		

(*Articles in front of the saddle.*)

1 cloak rolled 40" long	7	1
1 forage cap under centre cloak straps	0	5

(*Articles behind the saddle.*)

1 waterproof sheet	0	6
1 hay net	0	15
1 corn sack	1	13
1 mess tin with current day's meat	2	0

All other articles belonging to the soldier to be put in kit bag and left in regtl. depôt at B. of O.

* An expense pouch will be issued for an additional 10 rounds of ammunition.
† The new pattern saddle will be nearly 4 lbs. lighter.
‡ In regulated proportions.
§ When sabretache is worn, add 1 lb. 7 oz.

The following approximate wts. for Lt. Cavly. indicate what horse carries on active service :--

	st.	lb.	oz.
The rider (say)	10	4	0
Clothes on rider—viz., flannel shirt, drawers, socks, braces, head-dress, tunic, pantaloons, boots, spurs, gloves, and flannel belt	1	1	11
Arms, &c.—viz., belts, sword	0	7	0
Carbine	0	7	7
Ammunition : 30 rounds	0	4	8
Saddlery—viz., saddle and bridle complete, breastplate, wallets, shoe cases, numnah, head rope, and carbine bucket	2	9	11
Small blanket under saddle	0	2	0
Kit of rider—viz., clothes brush, stable sponge, oil bottle, pot of grease, horse rubber, pocket ledger, field dressing, horse brush, curry-comb, flannel shirt, drawers, socks, towel and piece of soap, holdall with needles and thread, kit, scissors, fork, spoon, comb, and forage cap	0	7	[illegible]
One day's reserve ration (sausage), say	0	0	12
Cloak and waterproof sheet	0	9	[illegible]
Mess-tin and strap	0	1	[illegible]
Haversack, water bottle, and pocket knife	0	1	12
Hoof picker, nose-bag, picket peg, heel rope, and shackle	0	4	[illegible]
Hay net, corn sack	0	3	12
A fore and a hind shoe with nails	0	1	12
Balance of man's rations, &c. (say)	0	1	0
Balance of horse's forage, &c. (say)	0	6	0
Mallet (when carried)	0	2	0
Total	18	5	[illegible]

REGIMENTAL TRANSPORT.

The next pages give the details of the regtl. Transport which is a integral portion of the Cavly. Regt. when placed on a war footing. Th drivers and Transport Serjts. belong to the Regt., and the O. C. the Regt. at all times responsible for its complete efficiency. All wagons and carts use for Regtl. and for all other transport purposes are equipped as shown belo

WAGON AND CART STORES.—The stores, detailed below, being speci to wheel transport, are omitted when pack transport is employed. Th wt. of a G.S. wagon, Mark IV., and of the men with their kits, arms, an rations, who will be carried on the wagons, are added together in th Table to avoid the necessity of repeating them in subsequent tables. Whe Mark III. G.S. wagons are used, as in the case of cavly. forges, the wt. to b drawn will be 1 cwt. lighter. As the rule, the wheel-driver and the wage man will be on the box seat of the wagon, but no other man is to ride the unless specially authorised to do so. No man must, on any pretence, b allowed to ride inside the wagons when they are loaded with stores. Th wagonman must walk up and down hill, and whenever the draught is heav He works the break, and is responsible for the care of the stores in th wagon. Every wagon and cart will carry 1 day's rations and forage f its drivers and horses. Every wagon and cart will have an inventory boar

aining a list of its contents with their authorised or approximate wts. eighing machine forms part of the equipment of each wagon, to enable C. O. to make sure that the authorised load is not exceeded.

G.S. WAGON, MARK IV., WITH ITS COMPLETE EQUIPMENT.

Article.	No. carrd.	Wt. of 1 article.	Total Weight.	Remarks.
		lb. oz.	lb. oz.	
e, felling, 4½ lb. . . .	1	5 12	5 12	Strapped to tailboard.
e, pick, helved . . .	1	8 9	8 9	Do. under body nr. front.
ard, inventory . . .	1	1 0	1 0	Carried in front box.
xes, tin, 6 lb. of grease .	2	7 8	9 0	Strapped on fore-carriage.
ish, carriage	1	0 10	0 10	In small locker.
ckets, canvas	2	0 11	1 6	In front box.
ckets, leather	2	4 12	9 8	Slung under fore-carriage.
l hooks	1	2 0	2 0	Strapped on tailboard.
oks, reaping	2	1 0	2 0	,, ,,
ul, handled	1	14 0	14 0	Strapped under body.
, linch	1	0 5	0 5	In small locker.
sts, picket, field . . .	4	6 0	24 0	2 on each side, under raves at rear.
pes, drag, light . prs.	1	7 0	7 0	Strapped to raves off-side.
pe, lashing	1	2 11	2 11	In front box.
pe, picket, 16 yds. . .	1	14 0	14 0	Strapped to axletree fore-carriage.
ovel, universal . . .	1	5 0	5 0	Strapped on off-side.
ade, universal. . . .	1	5 10	5 10	Strapped on near-tide.
n yarn . . . skein	1	5 0	5 0	In front box.
asher, iron	1	0 11	0 11	In small locker.
eighing machine . . .	1	1 0	1 0	In front box.
tal wt. wagon equipment	..	..	119 2	
n on box seat. . say	2	160 0	320 0	Wheel-driver & wagon-man.
ms and kits of 2 men* .	2	40 0	80 0	In front box.
nkets, G.S., for 2 men .	2	4 12	9 8	,, (the drivers').
day's rations and forage for drivers and horses, say	..	..	84 6	,,
tal wt. of personnel . .	..	..	493 14	
S. wagon, Mark IV., with pole, drag-shoe and chain, floating-raves, bale hoops, canvas cover, &c., complete. . . . say	..	..	2131 0	Wagons vary slightly in wt.
tal wt. of wagon equipped, but not loaded. . . .	..	..	2744 0	Or 24½ cwt.

* The kit of the lead driver is carried on the off-horse.

EQUIPMENT OF CART.

Articles.	No.	Wt. of 1 article.	Total Wt.	How carried on S.A.A. carts.
		lb. oz.	lb. oz.	
Board, inventory . . .	1	1 0	1 0	In locker.
Brush, carriage	1	0 10	0 10	,,
Buckets, canvas	2	0 11	1 6	,,
,, leather. . . .	2	4 12	9 8	Slung on near shaft.
Grease for wheels . . .	..	3 0	3 0	
,, tin box, for . . .	1	1 8	1 8	Strapped near side.
Hooks, reaping	2	1 0	2 0	In locker, or on tailboard
Pin, linch	1	0 5	0 5	In locker.
Ropes, lashing	1	2 12	2 12	,,
Ropes, drag, light . . pr.	1	7 0	7 0	Strapped on footboard.
Spun yarn. . . . skein	1	5 0	5 0	In locker.
Washers, drag	1	2 13	2 13	,,
Cart equipment, total wt..	..	..	36 14	In other carts, strapped on, or placed inside.

Books and Stationery sufficient for 3 months will be taken into the field for a Regt. of Cavly. or a Battn. of Infy. or Batty. R. A., they will be packed in 2 boxes, each when full weighing about 70 lbs. for the cavly. and inf and 65 lbs. for the R. A.

The wagons are drawn by 4 horses, the lead pr. driven postilion fashio and the wheelers with long reins from the box. They march with t baggage columns and seldom leave the roads. Their draught is calculate at a rate of 10 to 11 cwt. per horse. The infy. S.A.A. and Tool cart drawn by 2 horses, driven postilion fashion, and accompany the fightin line. Their draught is calculated at 8 to 9 cwt. per horse. The cavl S.A.A. cart has 4 horses, and accompanies the fighting line, generally movi

h the H.A. ammtn. wagons; both prs. of horses are driven postilion
nion; their draught is about 5 cwt. per horse, so that, when not in contact
h the enemy, their lead prs. may be considered as spare horses.
Officer's bâtmen ride their master's spare horses in compact order behind
column of wagons. They wear their swords, but strap their carbines on
he wagons.
The blankets of the men in each tent should be rolled together in one roll,
width of the blanket.

TAIL SHOWING HOW EQUIPMENT, STORES, &C., OF CAVALRY REGTS. ARE CARRIED IN REGTL. TRANSPORT WAGONS.

Articles in No. 1 or Hd.-Qr. Wagon.	No.	Average wt. of 1 article.	Total approxt. wt.
		lb. oz.	lbs.
Baggage, Offrs.' .	1	80 0	80
,, ,, . .	6	50 0	300
Blankets, grey, G.S.	39	4 12	185
Books, &c., in boxes	2	78 0	156
Buckets, canvas .	6	0 10	4
Biscuit, reserve . .	240	1 0	300
Meat, preserved .	240	1 0	336
Groceries, in box .	1	35 0	35
Implmts., butchery	1	49 0	49
Kits, bâtmen's . .	18	12 0	216
,, dismtd. men's	5	12 0	60
,, S. Serjts. . .	1	12 0	12
Lanterns, brass . .	2	..	33
Mauls, wood . .	2	7 12	15
Posts, wood, picket	8	6 0	48
Ropes, picket, 25 yds.	2	26 0	52
Oats, sack, 5-bushel	4	5 0	20
Soap	..	..	14
Medical panniers .	1	..	..
Tents, circular . .	1	69 8	80
Load in body of wagon, in cwts.	..	..	Cwts. 17¾

Articles in No. 1 or Hd.-Qr. Wagon.	No.	Average wt. of 1 article.	Total approxt. wt.
		lb. oz.	lbs.
Fastened on and under Wagon			
Canteens, Offrs.' .	3	20 0	60
Flanders Kettles .	4	8 8	34
Arms, dismtd. men.	25	7 0	175
Field companion .	1	4 0	4
Haversack, surgical	1	0 8	2
Water-bottle. . .	1	1 0	
Dubbing	..	..	10
Grease, 12 lb. . . Oil, 2 quarts. . .	..	..	23
Tools, Opening . .	1	3 12	4
Remainder of load .	..	..	2¾ cwt.
G.S. wagon, fully equipped, &c. .	..	..	24½ cwt.
Total wt. of wagon loaded, about. .	..	..	45 cwt.

* The medical panniers have to be carried in this wagon if the mule becomes ineffective. The weight of the pair packed is 160 lbs.

Cavalry Regimental Transport.

Articles in Nos. 2, 3, 4, & 5 Sqdn. Wagons.	No.	Average wt. of 1 Article.	Total approx. wt.
		lb. oz.	lbs.
Baggage, Offrs.'	6	50 0	300
Blankets, G.S.	133	4 12	632
Biscuit, Reserve	100	1 0	125
Meat, preserved	100	1 0	140
Books, &c.	2	20 0	40
Buckets, canvas	12	0 10	7
Canteens, Offrs.'	2	20 0	40
Groceries, 4 oz. ration	..	..	75
Groceries, cases for	2	25 0	50
Hooks, reaping	4	1 0	4
Kits, dismtd. men's	14	12 0	168
Tools, set of saddlers'	1	64 0	64
Material for repair of pants	..	..	20
Oats, sacks (5 bushl.)	4	5 0	20
Maul, wood	1	7 12	8
Posts, picket	40	6 0	240

Articles in Nos. 2, 3, 4 and 5 Sqdn. Wagons.	No.	Average wt. of 1 Article.	Total approx. wt.
		lb. oz.	lbs.
Ropes, picket, 25 yds.	10	26 0	260
Lanterns, brass	2	..	
Load in waggon body . . say			19¾ cwt.
Kettles, Flanders	10	8 8	
Bearers, hospital	1	18 0	
Arms, dismtd. men.	15	7 0	112
Handcuffs, pairs	1	1 6	
Remainder of load on and under waggon			1¾ cwt.
G.S. wagon, fully equipped, &c.			24½ cwt.
Total wt. of wagon loaded, about			46 cwt.

Articles in No. 6 or Forge Wagon.			
Blankets, grey, G.S.	4	4 12	19
Kits, dismtd. men's	2	12 0	24
Kits, staff-serjeants'	1	12 0	12
Oats, sacks, 5-bushl.	4	5 0	20
Chests, veterinary	4	77 0	308
Coal . . . cwt.	2	112 0	224
Forge, complete	1	621 0	621
Signalling things	..	..	116
Shoes, horse, fore and hind pairs	92	..	300
Tools—			
Carpenters' sets	1	..	78
Collarmakers' ,,	1	..	62
Farriers' ,,	2	126 0	252
*Wood, for cooking	..	..	320
Total load			16 cwt.
Wagon equipment and personnel			5½ cwt.
G.S. wagon. Mark III.			18 cwt.
Total weight, about			45 cwt.

Nos. 7, 8, 8 & 10 or Supply Wagons			
Biscuits, bags, 1 lb. ration	160	..	1
Meat, presd. 1lb. rat.	160	..	2
Groceries, in cases (4 oz. per ration)	160	..	
Sugar (¼ oz. ration). Lime juice (ratn. $\frac{1}{320}$ gallon)	160	..	
Vegetables, preserved (1 oz. ration)	160	..	
Total gross wt. 160 men's ratns., 1 day			4 cwt.
Forage.			
Oats (12 lb. ratn.)	157	17 cwt.	18
Blanket, G.S. Grey	1		
G.S. wagon fully equipped, &c..	1		24½ cwt.
Total wt., wagon loaded, about			45½ cwt.

* ½ lb. per man ; another ½ lb. is carr in the 2-tent wagon.

CAVALRY REGIMENTAL TRANSPORT.

Articles in Nos. 11 & 12 Wagons for Tents.	No.	Average wt. of 1 Article.	Total approxt. wt. in lbs.	How packed.
		lb. oz.		
Tents, circular	27	80 0	2,160	In body of wagon.
Wood for cooking	..	..	160	In body of wagon.
Blanket, G.S. grey (for wagonman)	1	4 12	5	In front box.
Total in cwt... ..	..	..	20¾	
G.S. wagon (cwt.)	..	..	24½	
Total wt. in cwt. of wagon loaded, about ..	..	..	45¼	
Nos. 13 & 14, or S.A.A. carts for Cavly. Regt.				
AMMUNITION.				
S.M.H. carbine, boxes ..	12	75 0	900	Body (7560 rds.).
Pistol, boxes	5	16 0	80	Locker (1200 rds.).
Wt. of ammtn. ..	..	..	980	
TOOLS.				
Axes, felling, 4½-lb.	4	5 12	23	In the 2 centre partitions of top row, partition board being removed.
Bar, crow, 4 ft. 6 in... ..	1	26 0	26	
Hooks, bill	10	2 0	20	
,, reaping	10	1 0	10	
Picks, light	10	3 12	37	
Shovels, light	10	3 0	30	
Wt. of tools	..	..	146	
Bags, canvas, ammtn. ..	4	0 15	4	In locker.
Bags, sand (to pack the tools with)	6	0 10	4	In body.
Blankets, G.S. (drivers) ..	2	4 12	9	In locker.
Total	..	..	17	
Total load	..	..	1,143 about 10 cwt.	
Cart equipment	..	..	37	
1 day's rations and forage for drivers and horses	..	..	100	In locker.
Tools, artificers', for cart ..	1	4 7	4	In leather case on near side.
G.S.A.A. cart	..	..	952	
Wt. of cart equipped..	..	..	1,093 about 10 cwt.	
Total wt. cart loaded, about	..	..	20 cwt.	

Detail of Tents.	
Appropriation.	No.
Lt.-Col. Commg. ..	1
2nd Lt.-Col. & Adjt.	1
Q.M. & Pay Mtr. ..	1
M. O. & 2 V. Ss. ..	1
Staff-serjeants. ..	1
Regtl. Staff. ..	1
Troop Officers. ..	8
1 per 15 Serjts. & men. ..	40
Total ..	54
No. in each wagon.	27

RECAPITULATION OF REGTL. TRANSPORT FOR A CAVALRY REGT.

	Purpose.	Drivers.	Horses.
No. I. Wagon	Hd.-Qrs. Equipment, &c. .	2	4
,, II., III., IV., & V. Wagons .	Squadron do.	8	16
,, VI., Wagon	Forge	2	4
,, VII., VIII., IX., & X. Wagons	Supply	8	16
,, XI. & XII. Wagons . . .	Tent	4	8
,, XIII. & XIV. S.A.A. carts .	S.A.A. & a few tools . .	4	8
Mule for Hospital Panniers . .	Medical	2	1
Total 12 wagons & 2 carts.	Total . .	30	57

There is no fixed war establishment for Cavly. Regts. in India; the ordinary establishments are as follows:—*British Cavly. Regt. consists of* 6 *Troops*, 2 Lt. Colonels, 3 Majors, 3 Captains, 11 Lieutenants, 1 Pay Master, 1 Adjt., 1 Riding Master, 1 Q. M., 1 Vet. Surgeon, 1 Regtl. Serjt. Major, 1 Q. M. Serjt., 1 Band Master Serjt., 1 Pay Master Serjt., 1 Serjt. Instructor in Fencing, 1 Armourer Serjt. 1 Farrier Q. M. Serjt., 1 Saddler Serjt,, 1 Serjt. Trumpeter, 1 Serjt. Rough Rider 1 Orderly Room Serjt., 6 Troop Serjt. Majors, 17 Serjts., 6 Serjt. Farriers 6 Trumpeters, 24 Corporals, 384 Privates, being a total of 24 Offrs. and 454 of all other ranks, and 436 troop Horses. *In Bengal its native establishment of followers* &c., is:—6 Farriers, 2 Jemadars of Syces, 2 Hospital Syces, 209 Troop Syces 396 Grass Cutters; for Q. M. estabt. 1 Tiudal, 6 Lascars, 12 Puckallies, 12 Sweepers 1 Chowdry, 1 Mutsuddy, and 2 Weighmen. And for conservancy, 5 Bheesties 7 Sweepers, and 3 Bildars. *In Madras* Jemadars of Syces 6: Syces 152: Grass Cutters, 396, 1 Tiudal, 6 Tent Lascars, 6 Native Shoeing Smiths; and Q. M. estabt. 1 Chowdry, 12 Puckallies, and 2 Weighmen. *In Bombay*, 2 Jemadars of Syces, 2 Hospital Syces, 6 Muccadums of Syces, and 6 of Grass Cutters, 179 Syces, 13 Grass Cutters, 1 Tiudal, 6 Lascars, and 6 Native Shoeing Smiths; for Q.M. establishmt 12 Puckallies, 5 Hand Bheesties, 12 Sweepers, 1 Chowdry, and 2 Weighmen, and for Conservancy Establishment 7 Bhisties, 7 Sweepers, and 2 Bildars. *In Bengal there are* 21 *Regts. of Native Cavalry*, besides the Governor-General's Body Guard (122 of all ranks), the Guide Corps (4 Troops, 340 of all ranks), the Central India Horse (2 Regts. of 6 Troops and 500 of all ranks each), and lastly the Doelee and Erinpoora Cavalry (4 Troops, 332 of all ranks). Each of the 21 Regts. of Bengal Cavalry consists of 6 Troops with 1 Commandant, 1 Second in Command, 3 Squadron Commanders, 4 Squadron Offrs. and 1 Medl. Offr., 3 Russuldars, 3 Ressaidars 1 Woordie Major, 6 Jemadars, 52 Duffadars, 1 Farrier Major, 1 Salootrie, 6 Trumpeters, 1 Assist. Salootrie, 6 Farriers, and 464 Sowars, 6 Camel Sowars, being a total of 8 Combatant and 1 M. O. (European), and of 550 of all native ranks. Its Native followers, &c., are 2 Schoolmasters, 12 Lascars, &c. &c., and 9 for Subt. Medl

l Hospl. Estabt. *In Madras there are* 4 *Regts. of Native Cavly.*, in which the tish offrs. are the same as in Bengal. The Regt. consists of 6 Troops. It has 6 adars, 6 Jemadars, 31 Havildars, 24 Naicks, 7 Trumpeters, 1 Farrier Majr., 6 rier Havildars, 3 Shoeing Smiths, 300 Privates, and 40 Recruit and Pension ys, or 424 Natives of all ranks. ‖ Its native Estabts. are, 2 Schoolmasters, 6 for Subt. dl. and Hospl. Estabt., 16 for Qr. M.'s Estabt., 9 Artificers of sorts, 6 Jemadars Syces, 150 Syces, and 330 Grass Cutters. *In Bombay there are* 6 *Regts. of Native valry*, each consisting of 6 Troops, in which the English Officers are the same as Bengal: 1 Ressaldar Major, 2 Ressaldars, 3 Resseidars, 1 Wordee Major, 6 nadars, 1 Kote Duffadar Major, 1 Farrier Major, 36 Duffadars, 6 Trumpeters, 30 iks, and 457 Sowars, and 6 Camel Sowars. Total, 9 English Officers and 550 tive soldiers of all ranks. Its followers are, 5 for Subt. Medl. and Hospl. Estabts., r Q. M.'s Estabt., and 9 others. Besides the above, which may be termed the gts. of Regular Native Cavalry, there are some other cavalry corps with various ablishments. *The native cavalry regiments sent to Cyprus* in 1878 (those sent to yssinia were of similar strength) consisted of (each) 10 British Offrs. (2 being Os.), 14 Native Offrs., 462 R. & F., 504 horses (including offrs. chargers), native followers (including offrs. servants), 249 ponies and 13 bullocks. The spl. estabt. consisted of 3 Hospl. Assists., 8 other native servants, and 74 Dooly-arers (these 85 natives included in the 414 native followers), with 5 Doolies, 9 ndies, and 2 stretchers. Each British offr. was allowed to embark 1 personal vant, and 1 for each of his chargers. The English were allowed to take 1 istee to every 6, and 1 Dhobee and 1 sweeper to every 10 offrs.; F. Os. to take lbs. of baggage, other ranks 240 lbs. (including wt. of tent), 1 personal servant s allowed to embark for every 2 native offrs., each native offr. was allowed 40 lbs. baggage. For the offrs'. mess, 3 native servants and 1280 lbs. of baggage were rmitted; 80 lbs. was allowed to the Adjt. and to the Q. M. for their offices. For M.'s stores for 3 months' supply, 320 lbs. was allowed to each regt. The tools quired were packed in 2 prs. of camel Khajawahs for each regt. Each native offr. s allowed to take a second charger, but whether he did or not was obliged to keep at his own cost, 1 pony and 1 servant as syce and grass cutter; the N. C. Os. d privates were obliged to keep the same between every two.

Infantry in our army is really only of two sorts, the Guards and the Line; although the latter are divided nominally into Fusileers, Light Infantry, fles, and heavy regts., there is no difference in their arms or practical uipment. The standard of height in the guards is always some or 4″ higher than for other regts. At present the height for the foot ards is 5′ 8″, and for the line 5′ 4″, the chest measurement of 34″ being e same for both. There are 3 regts. of Guards (7 battns. in all); they not serve abroad, except in important wars. The line consists of 69 gts., all of 2 line batts. and from 1 to 5 batts. of Militia each, except e Cameron Highlanders, which has but one line batt., and the King's oyal Rifles and the Rifle Brigade, which have 4 line batts. each. There

are thus 141 battns. of the Line and 138 battns. of Militia. Each of these regts. has a depôt permanently located in the county or town to which it belongs. In a normal condition of peace ½ of the Line battns. will be abroad, the other ½ at home. All are armed with the *M. H. rifle*, which is issued of 2 sizes, "Long butts" and "Short butts," 49½" and 49" in length respectively without bayonet; when bayonets or sword bayonets are fixed those lengths are 71½" and 71". The wts. without bayonet are 8 lbs. 12 oz., 8 lbs. 10½ oz., and 8 lbs. 8 oz.: with bayonet or sword bayonet those wts. are 9 lbs. 11½ oz., 9 lbs. 10 oz., and 9 lbs. 7½ oz. Wt. of *bayonet* or sword bayonet 15½ oz. and the scabbard 7½ oz. The Henry barrel is 33" in length, the diameter of bore is 0·45"; it has 7 grooves. The powder charge is 85 grs. R. F. G², powder; wt. of bullet 480 grs., and it is 1·27" long. *The cartridge* is 3·15" long; wt. of bundle of 10, 17 oz.; 12 aimed or 25 unaimed rds. can be fired from it per minute, and it may be assumed, taking our men all round, 8 rounds per minute is a fair average at fixed targets. The rifle is sighted up to 1450 yards, but it shoots well up to over 3000 yds. Its *muzzle velocity* is about ·1353'. The *bullet* has a penetration 12" or 13" into loose soil. Wt. of *sword bayonet*, saw-backed, 25½ oz., or with scabbard 33 oz.; its extreme length is 24". Of all the new arms now in use by the great military nations, the M. H. has the largest calibre, the heavest bullet, heaviest charge, and the lowest muzzle velocity. The M. H. bullet goes 500 yds. in 1·46". *The new pattern rifle* with which the army is now being armed, is superior to that in all other nations, at all ranges. The *calibre* is 0·4": L. of rifle and of bayonet, same as M. H.: bullet weighs 384 grs.: charge 85 grs.: muzzle velocity 1570 feet-secs. Wt. of rifle 9 lbs. 4 oz.: wt. of bayonet 1 lb. 1 oz. without scabbard: it is sighted to 2000 yds. Wt. of 10 rds. of ammn. 1 lb. 1 oz.

Foreign Rifles.—The names of the rifles in use by foreign armies are, the Werndl in Austria, the Gras in France, the Mauser in Germany, the Vetterli in Italy, and the Berdan in Russia.

Snider rifle is of two sizes, the "Long butt" and the "Short butt"; wt. of former 9 lbs. 0¾ oz., of latter 8 lbs. 14¾ oz. Wt. of bayonet 13½ oz., and when fixed extends 17½" beyond the muzzle. The "Long butt" rifle is 55" and the "Short butt" 54" long. There is also the "Short" Snider with which our Rifle Regts. were formerly armed; it weighs from 8 lbs. 4 oz. to 8 lb. 11 oz., and is from 48¾" to 49" long, according to the pattern. The calibre of all patterns is 0·577". It is only sighted up to 950 yds. Wt. of bullet 480 grs.; the powder charge is 70 grs.; a packet of 10 cartridges weighs 16 oz.

The Regimental Intrenching Tools to accompany a battn. of infy. are carried in 1 cart. and Os. C. battns. will be held responsible for their safety. When not in use they should always be kept packed in the cart: they are to be used for all regtl. purposes, such as making trenches round

nts, digging latrines, &c. &c., as well as for intrenchments, so as to render unnecessary the issue of a 2nd set of tools for such work. They should be under the immediate charge of the regtl. Q. M., who will issue them as required to captains of companies, receiving them back again as soon as they are done with.

The Wallace Spade.—Its wt. is 2 lbs. 5·5 oz.: extreme length 23″: length of blade of spade 7·25″, and its width 5·75″. Its handle forms a pick with which loopholes can be quickly made in walls. It is not intended for ordinary camp work, but for hasty entrenchments. About 50 p. c. of the R. & F. should have them. They are carried in a frog that fastens on the waist belt, the handle secured to the bayonet by a loop passing over it.

Infy. Pioneer Tools.—They are carried by the pioneers (1 serjt. and 13 men), who do not carry either rifles or ammunition. 7 hand axes (31 oz.), 6 felling axes (5 lbs. 13 oz.), 1 pinching bar (7 lb.), 6 bill hooks (2 lb. 2 oz.), 6 picks (8 lb. 11 oz.), 2 handsaws (20″—24 oz.), 11 shovels (3 lbs. 4 oz.), 22 gunspikes (1 oz.), set of shoeing tools (5 lbs. 3 oz.), set of small tools carried by serjt. (5 lbs. 1½ oz.): the average wt. of these tools and their leather equipment carried by each man is about 12 lbs.

Regimental Reserve Ammunition consists of 30 rds. per man; as each soldier carries 70 rds. (40 in pouch, 10 in expense bag, and 20 in valise), there will be with the battn. 100 rds. for every man in it. 4 ammunition carts (new pattern) will carry 28,800 rds. of M. H. (each cart carries 7,200 rds. and a few tools), or 26,880 rds. of Snider (each cart carries 6,720 rds. and a few tools). See page 105.

Infantry Regtl. Transport.—This will be supplied to each battn. immediately it is ordered to take the field; the O. C. the battn. to be responsible for its efficiency; the drivers are selected by him from the ranks of the battn. To look after the offirs'. chargers and other horses belonging to each infy. brigd., 1 V. S. is attached to its staff; the repairs to harness and shoeing of regtl. transport will be done by the regtl. artificers; the repair of all regtl. transport carriages, and shoeing of S. Os. horses will be done by the artificers of the transport section attached to the brigd., who will also execute any repairs, &c., which the regtl. artificers are unequal to perform. Two men of the battn., a corporal and a private, trained for the duties, will be placed under the orders of the M. O. One of these, in addition to any other duties, will have charge of the mule with the medical panniers. The M. O. will also be provided with a bâtman from the battalion.

INFANTRY SOLDIER'S EQUIPMENT.

Field kit of infantry and other dismounted corps.—The articles carried when the valise is worn are enumerated below; those not in this list are packed in the waterproof bag or kit bag, and are left at the B. of O. in

War Establishment of a Battalion (8 comps.).

• For Regtl. Transport Officer.
† To remain at Base of operations, together with one man from each company.

Ranks.	Nos.	Nos.	Horses. Riding. C.	Riding. P.	D.
Lieut.-Colonels	2	..	3	..	
Majors	4	..	4	..	
Captains	4				
Subalterns . ..	16	..	..	1•	
Adjutant	1	30	1	..	
Paymaster†	1	..	1	..	
Quartermaster	1	..	1	..	
Medical Officer .. .	1	..	1	..	
Serjeant-Major	1				
Q. M. Serjeant	1				
Band Serjeant .. .	1				
Drum or Bugle-Major..	1				
Orderly-room Clerk ..	1	10			
Armourer Serjt.† ..	1				
Paymaster Serjt.† .	1				
Regtl. Transpt. Serjt.	1	..	..	1	
Serjeant Cook . ..	1				
Pioneer Serjeant ..	1				
Colour Serjeants ..	8	40			
Serjeants	32				
Drumms. or Bugls. .	16	16			
Corpls. (1 Band Corpl.)	41				
Pioneers & Artificers ..	13				
Band	20	1000			
Privates	895				
Drivers	28				54
(Pack mules) ..	3	..	..	..	3
Totals	1096	1096	11	2	57

Establmt. of a Comp.	
Officers	3
Serjeants	5
Drumms. or Bugls. ..	2
Corporals	5
Privates	113
Drivers	1
Total . ..	129

In this table, C. stands for chargers, P. for riding horses that are public property, and D. for draught horses.

‡ These Bâtmen, although attached to the Battn. Hd. Qrs., are included in the establishment of the companies.

Ranks.	Nos.
Detail attached to the Battn. Hd. Qrs.	
Officers, including Transpt. Officer	8
S. Ss. including Transpt. Serjt. and Serjt. Cook	8
Pioneers	14
Band	22
Rk. & Fl. as Bâtmen	16‡
Drivers	14
Total	82

Regimental Transport.	Nos.	Drivers.	D. Horses & Mules.
Carts { intrench. tools ..	1	1	2
Carts { S. A. A.	4	4	8
Wagons, G. S.	10	20	40
Mules { for ammtn.	..	2	2
Mules { for Medl. pannrs. ..	..	2	1
Spare	..	2	4
Total	15	31	57

Ammunition.	In Pouch per arm.	Regl. Reserve per arm.
Rifle	70	30
Pistol .. .	24	36

* The patterns for these have not yet been decided.	When valise is worn.	When valise is not worn.
	lb. oz.	
Clothes in wear	12 4	12 4
Accoutrements (1882) without valise	4 0	4 0
Arms	10 9	10 9
Ammunition (70 rds.)	8 0	8 0
Mess-tin, complete	1 9	1 9
Haversack	0 4	0 4
Water-bottle	1 1	1 1
Balance of day's rations, including tea, in wtr. bott.	2 0	2 0
Knife and lanyard	0 6	0 6
Field dressing	0 2	0 2
Total	40 3	40 3
Valise (1882 pattern)	3 0	
In the Valise.		
Reserve ration (sausage) say	0 12	0 12
Oil bottle and grease-pot (full)	0 6½	0 4
Towel and soap	0 8½	0 8½
Brush, clothes	0 5	
Holdall, fitted (housewife, comb, fork and spoon)	0 6½	
Pocket ledger	0 2	0 2
Belt, flannel	0 7	
Nightcap, woollen	0 3	0 3
Flannel shirt	1 1	
Socks (1 pair)	0 5	0 5
Shoes, canvas*	1 4	
Cape	1 5	
Great-coat	4 12	4 12
Small waterproof sheet*	,, ,,	0 6
	11 13	
Total wt. carried by the soldier	55 0	47 7

No oil-bottle carried: the grease-pot is carried in one of the pouches. All these other articles are carried in great-coat pockets. Gt.-coat is rolled about 15" long, and strapped to back of waistbelt, with waterproof sheet rolled round it.

DETAIL, SHOWING HOW EQUIPMENT, STORES, &c., OF INFANTRY BATTNS. ARE CARRIED IN REGTL. TRANSPORT WAGONS.

No.		No.	
I.	Hd.-Qr. wagon ..	1	The wagons and carts with an Infy. Battn. in the field which constitute its Regtl. Transport, are calculated for a marching strength of 1,000 men of all ranks.
II. to V.	Company wagons ..	4	
VI. VII.	Supply wagons ..	2	
VIII. to X.	Tent wagons ..	3	
XI. to XIV.	S. A. A. carts ..	4	
XV.	Intrenching tool cart. .	1	
	Total ..	15	

NO. 1, OR HD.-QR. WAGON FOR AN INFY. BATTN. (2 DRIVERS & 4 HORSES).

Articles.	No.	Average wt. of 1 article.	Total approxt. wt. in lbs.	Remarks.
		lb. oz.	lbs.	
Offrs'. Baggage	1	80 0	80	In addition to what they can carry on their chargers.
,, ,,	5	50 0	250	
Blankets, G.S.	62	4 12	295	Two also in front box.
Biscuit, reserve	280	..	350	25 p.c. for cases.
Meat, preserved	280	..	392	40 p.c. for cases.
Books & stationery in boxes	2	78 0	156	
Groceries. . . . in box	1	25 0	25	
Tools, butchery	..	..	49	In leather case.
,, signalling	..	..	113	In chest.
Kits, S. Serjts.	7	20 0	140	
Lanterns, brass	2	..	33	In a box.
Soap	..	..	28	In a box.
Tools, carpenters' . in box	1	78 0	78	
,, shoemakers' ,,	1	80 0	80	
Medical panniers, pair of	..	..	..	
Tents, circular	1	80 0	80	For medical use.
Load in body. . . say	19¼ cwt.			
Jacks, lifting, G.S.	1	31 0	31	Strapped on.
Offrs'. Canteen	3	20 0	60	
,, ,, straps for	3	1 0	3	
Flanders Kettles	4	8 8	34	
,, ,, straps for	4	0 4	1	
Fd. companion	1	4 0	4	Strapped on: for medical purposes.
Haversacks	1	0 8	2	
Water-bottles	1	1 0	4	
Handcuffs	8	1 6	9	
Grease, 12 lbs.; Oil, 2 qts.	..	..	23	In 2 Torrens' kettles.
Dubbing	..	..	10	In a Torrens' kettle.
Tools, Opening	1	4 0	4	
Remainder of load	1¾ cwt.			
G S. wagon, completely equipped	24¼ cwt.			
Total wt. wagon loaded about	45¼ cwt.			

e regtl. depôt there. When the valise is not worn, as many of the re-aining articles as may be ordered are packed in the valise, and the emainder in the waterproof bag or kit bag. The clothes and boots taken to use for a campaign should be as good as new in the matter of wear. The men must be taught to mend their own clothes; they should grease heir feet, when on the march, to prevent chafing. The balance of the day's ation is carried in the haversack and mess-tin. The *reserve* ration (sausage) hould be inspected daily, in the same manner as ammunition, to prevent s being made away with. *Extra rations*, *i.e.* in addition to the ordinary ay's ration and *reserve* ration, will only be carried when specially ordered. They will usually consist of biscuit and cheese, and will be carried in the aversack and mess-tin.

Nos. II., III., IV., & V., or Company Store Wagons of Infy. Battn. (2 Drivers & 4 Horses each).

Articles.	No.	Average wt. of 1 article.	Total approxt. wt. in lbs.	* Blankets of each tent to be in one roll width of blanket. They pack best when folded in four and laid flat. Great care is required in loading them, or they will not go into the space under the bole hoops.
		lb. oz.	lbs.	
Offrs'. Baggage	6	..	250	
Blankets, G.S.*	220	4 12	1,045	2 also in front box.
Biscuit, reserve	180	..	225	25 p. c. for cases.
Preserved Meat	180	..	252	40 p. c. added for cases.
Books and Stationery	2	20 0	40	Small cases.
Boots, pairs	25	3 4	81	
Boots, case for	1	15 0	15	
Groceries	..	..	120	2 days' ration for 240 men, at 4 oz. per ration.
Groceries, boxes for	2	25 0	50	
Load in body, say	18½ cwt.			
Offrs'. Canteens	2	20 0	40	
,, ,, straps for	2	1 0	2	
Flanders, Kettles	16	8 8	136	
,, ,, straps for	16	0 4	4	
Hospl. Bearers	2	18 0	36	Strapped to stays of floating raves.
Remainder of load	2 cwt.			
G.S. wagon equipped	24½ cwt.			
Total wt. of wagon loaded about	45 cwt.			

NOS. VI., & VII., OR SUPPLY WAGONS FOR AN INFY. BATTN. (2 DRIVER & 4 HORSES EACH).

Articles. Wt. of 1 Ration.	No.*	Average of 1 Article.	Total approx. wt. in lbs.
RATIONS.		lb. oz.	lbs.
Biscuits, in bags (1 lb.)	500	..	515
Meat, preserved (1 lb.)	500	..	700
Groceries, in cases (4 oz.)	500	..	155
Sugar ($\frac{1}{4}$ oz.)	500	..	36
Limejuice ($\frac{1}{320}$ gal.)			
Vegetables, compressed (1 oz.)	500	..	44
Total wt. of 500 rations, say	13 cwt.		
FORAGE.			
Patent rations (20 lbs.)	35	20 0	700
Total wt. of 35 horses' forage for one day	$6\frac{1}{4}$ cwt.		
Wood	$1\frac{1}{4}$ cwt.		
G.S. wagon, fully equipped, &c.	$24\frac{1}{4}$ cwt.		
Total wt. of wagon loaded about	45 cwt.		

Detail of tents.	
Appropriation.	No
2 Lt. Cols.	1
Other Offrs. of battn. Staff.	1
Staff-serjeants.	1
Bâtmen Regtl. Staff	1
Orderly room	1
Guard	1
Company Offrs.	8
1 for every 15 N. C. Os. and men.	64
Total tents for a battn.	78
Number in each wagon	26

NOS. VIII., IX. & X., OR TENT WAGONS FOR AN INFY. BATTN. (2 DRIVERS & 4 HORSES EACH.)

†Tents, circular	26	80 0	2028
Wood, for cooking	..	..	250
Total load, say	..	21 cwt.	
G.S. wagon, fully equipped, &c.	..	$24\frac{1}{4}$ cwt.	
Total wt. of wagon loaded, about	..	$45\frac{1}{4}$ cwt.	

† An additional tent t carried in No. 1, or th Hd. Qr. wagon, fo medical purposes. Th tent is carried even whe the tent wagons a ordered to be left b hind. 80 lbs. is give as an average: whe quite dry this tent weigh 74 lbs.

* The numbers in this column are half of those for a battn., and should be as nea as possible the load of each wagon. There must, however, be a certain amount give and take in the loading of the two wagons, in order to avoid the breaking of packages, which, in the case of some articles, a perfectly equal division wou necessitate.

NOS. XI., XII., XIII., & XIV., OR S.A.A CARTS FOR AN INFY. BATTN. (1 DRIVER, 2 HORSES EACH).

Articles in each cart.	No.	Average wt. of 1 Article.	Total approxt. wt. in lbs.	How packed.
AMMUNITION.		lb. oz.	lbs.	
Cartridges, M. A., in boxes .	12	79 8	954	In body (7,200 rds.).
Cartridges, pistol, in boxes .	1	13 0	13	In locker.
Wt. of ammunition	..	..	967	
TOOLS.				
Axes, felling, 4½-lb.	4	5 12	23	In the two centre partitions of the top row, the partition board being removed.
Axes, hand, 2-lb.	4	2 0	8	
Hooks, bill	4	2 0	8	
Picks, light	2	3 12	7	
Shovels, light.	2	2 14	6	
Tools, S. A. A. sets	1	4 7	4	In case on near side.
Wt. of tools	..	..	56	
Bags, ammunition	4	0 15	4	In locker.
Bags, sand	40	0 10	25	In body.
Blankets, G.S.	2	4 12	9	In locker.
Remainder of load . . .	..	..	38	
Cart equipment	..	..	37	
1 day's rations and forage for driver and horses	..	..	50	In ocker
S. A. A. cart	..	..	952	
Wt. of cart equipped . . .	..	..	1,039	
Total wt. of cart loaded about.	..	..	19 cwt.	

No. XV., or Intrenching Tool Cart of Infy. Battn. (1 Driver, 2 Horses).

Articles in each cart.	No.	Average wt. of 1 Article.	Total approxt. wt. in lbs.	How packed.
Tools.		lb. oz.	lbs.	
Axes, felling, 4½-lb.	4	5 12	23	In body.
Axes, hand, 2-lb.	4	2 0	8	,,
Hooks, bill	21	2 0	42	On sides.
Hooks, reaping	10	1 0	10	In body.
Picks, light	92	3 12	345	,,
Shovels, light	92	2 14	264	,,
Crow-bars, 4′ 6″	4	24 0	96	Strapped on side.
Stones, sharpening	2	1 8	3	In box under cart.
Sandbags	6	0 10	4	In body.
Wt. of load	..	..	795	
Blankets, G.S.	2	4 12	9	In body.
Cart equipment	..	..	37	
Tip-cart, Mark II.	..	..	1,173	
1 day's rations for driver and horses	..	..	50	In body.
Wt. of cart equipped	..	..	1,269	
Total wt. of cart loaded, about	..	..	18½ cwt.	

Indian Establishments.—There is no war establishment for troops in India but the normal establishment of a British Infy. Battn. of 8 companies is as follows :—2 Lt.-Cols.; 4 Majors ; 4 Capts.; 16 Lieuts.; 1 Paymaster ; 1 Adjutant ; & 1 Qr. M.; 29 Commissioned Officers in all. 1 Serjt-Majr.; 1 Band Mastr. Serjt. ; 1 Qr. M. Serjt. ; 1 Paymastr. Serjt. ; 1 Armourer Serjt. ; 1 Serjt. Pioneer ; 8 Clr. Serjts. ; 32 Serjts. ; 1 Orderly-room Serjt. ; 1 Serjt. Drummer; 16 Drummers (or buglers); 40 Corporals and 780 privates, being a total of 29 officers and 884 of all other ranks. It is now intended to add about 100 more men to each Battn. *Its Native establishments in Bengal are,* a Moonshee for Schoolmaster ; for Q. Ms'. establishment, 1 Tindal, 8 Lascars, 16 Puckallies, 16 Sweepers, 1 Chowdry, 1 Mutsuddy, and 2 Weighmen ; for Conservancy, 5 Bheesties, 15 Sweepers, and 4 Bildars. *In Madras,* it has 29 native followers of all sorts ; *in Bombay,* it has 66 followers of all sorts.

THE NATIVE INFY. ESTABLISHMENTS IN INDIA ARE AS FOLLOWS:—

Bengal.—There are 54 Regts. of 1 Battn. (8 Companies) each, including Ghoorkha, Punjaub, and Sikh Regts. Each Battn. consists of 1 Commandant, 2 Wing Commdts., 5 Wing Offrs. and 1 M. O., 8 Subadars, 8 Jemadars, 40 Havildars, 40 Naicks, 16 Drummers, 720 Sepoys. Total, 8 Combatant and 1 Medl. Offr. (British), and 832 native soldiers of all ranks. The subordinate medical establishment consists of 2 Hospl. Assists., 1 Ward servant, 2 Bheesties, 1 Goorgah, 2 Cooks, 2 Sweepers, 1 Mate-bearer, and 3 Bearers. There are 2 Schoolmasters and 31 other native followers. Besides these Regts. there are also the Corps of Guides, of 8 companies, of the same strength and organization, its followers being somewhat more numerous: the Deolee and Erinpoora Irregular Forces, each of 8 companies, but having only 2 combatant offrs., the total native soldiers of all ranks in each being 612. Also the Meywar Bheel Corps (8 companies), the Nepaul Escort (one company), and the Bhopaul Battalion, which all vary somewhat in numbers.

In Madras there are 32 Native Infy. Regts., of 1 Battn. (8 Comps. each). The detail is the same as in Bengal, except they have 1 extra Havildar, and 56 Pension and recruit boys, making the total strength in Natives of all ranks 889 for each Regt., together with 2 Schoolmasters, 4 for Subt. Medl. and Hospl. Estabt., and 20 other Native followers.

In Bombay there are 26 Native Infy. Regts. Each Regt. consists of 1 Battn. (of 8 comps. each), the detail being the same as in the Bengal N. I. except that it has 24 boys extra, giving a total strength of 856 Natives of all ranks. The Hospl. establishment is 9, the number of Native followers is 20.

The N. I. Regts. sent to Cyprus in 1878 (those employed in Abyssinia were of about similar strength) consisted of 8 combatant and 2 Medl. Os. (10 British Offrs.), 14 Native Offrs., 701 Rk. and F. With each of the Bengal Regts. there were 141 public and 38 private followers, and with each from Bombay the numbers were 138 and 132 respectively; 10 Offrs. chargers, and 4 bullocks. The Hospl. Estabt. sent with each Regt. (their numbers are included in the public followers) consisted of 3 Hospl. Assists., 7 Native servants, and 86 Dooly-bearers, 7 Doolies, 9 dandies and 2 stretchers. The British Offrs. were allowed to embark 1 personal servant, and 1 servant for each charger; F. Os. 320 lbs. of baggage, all other ranks 240 lbs. (wt. of ten included). Each Regtl. mess allowed to embark 3 servants and 1280 lbs. of stores, &c. 80 lbs. for the Adjt.'s, and 80 lbs. for the Q. M.'s offices. The British Offrs. were allowed to have 1 Bhistee to every 6, and 1 Dhobee and 1 sweeper to every 10 offrs. Every 2 N. Offrs. were allowed to take 1 servant.

The equipment and public carriage provided in the Bengal Presidency for Regts. on Fd. Service is as follows :—

Establishments.				Troops.	Tents.		
Native O ffrs.	Medical Subordts.	S. Serjts.	Rk. and F.		S. Serjts.	English Privates.	Pâls.
..	1	4	154	Battery R. H. A. Field Artillery	5	14	5
..	1	2	88	,, ,, Heavy ,, .	4	8	14
..	1	1	86	,, ,, Garrison ,, .	3	8	2
..	2	3	91	,, Mountain { in Hills .	..	..	24
				,, Plains .	5	8	11
..	4	11	444	Regt. English Cavalry . . .	14	36	2
..	4	10	876	,, ,, Infantry	13	67	2
13	2	..	444	,, ,, Native Cavalry. .	..	..	2‡
16	2	..	696	,, , ,, Infantry .	..	..	40◊
..	3	..	4*	Head Quarters Sappers . . .	9	2	..
2	..	..	120†	Company of ,, . . .	1	1	10

* These 4 are British N.-C. Os. † Of these 6 are British N.-C. Os.
‡ For Hospitals.
◊ 32 of these are for 8 companies (4 per com.), 2 for Qr. Guard, 2 for Rr. Guard and 4 for Hospital. 1 Lascar is provided for each tent with British troops.

2 Copper water vessels (5 gals. each) are allowed for each E.P. tent, & 1 for each S. Ss. tent ; 1 lantern for each tent with British troops. For the carriage of tents, 1 camel for 1 S. Ss. tent, or 2 elephants for 5 S. Ss tents ; 2 camels for a E. P. tent (new pattern), or 1 camel & 1 elephant or 1⅓ elephant for 2 E. Ps. tents (new pattern). If of old pattern 3 camels or 1 elephant to 2 tents : 1 camel for 2 pâls, or 1 elephant for 6 pâls. *For carriage of baggage :* S. Serjts. class A (Serjt.-Majr. ; Q.-Mr.-Serjt. Band Serjt. ; Serjt. Instructors of Musketry & Fencing) ½ camel each ; other British N.-C.Os. and men of all arms, 8 to a camel : Nat. offrs. and Hospl. Assistants have conveyance provided for 30 seers of baggage each ; Nat. N.-C.Os. for 15 seers, and Native Rk. and File for 7½ seers. Brit. N.-C.Os belonging to Sappers and Miners are allowed ½ camel each for the conveyance of baggage ; for carriage of cooking pots, 2 camels to each Battery of H.A. or Fd. Artilly., and 1 camel for those of other Batteries and for each troop or company of British troops. For arms of sick, 9 camels for Regt

of Brit. Cavalry, and 12 per Infy. Battn. ; 4 camels for Nat. Infy. Battn. and ½ camel per compy. of Nat. Sappers and Miners. For Paulins or Troop stores, 4 camels for Batty. R.H.A. ; 3 for Fd. Artilly. ; 2 for Heavy Batty. ; 4 for Regt. of Brit. Cavy. For Vety. stores 1 for R.H.A. and Fd. Batty. ; 1 per Regt. of Brit. Cavy. For scales and weights 1 per H.A. ; Fd. ; and Heavy Batty., and 2 per Regt. of Brit. Cavy. For Bullock gear, 1 camel for gear of every 20 bullocks. For Hospl. and Medical equipment, according to nature of service. For S.A.A. according to nature of service (each camel to carry 6 boxes). For carriage of grain for horses and mules, 15 camels for Batty. R.H.A., 10 Fd. Artilly., and 33 per Regt. of Cavy. For grain for bullocks, 1 camel per Batty. R.H.A. and Fd. Batty., and 13 per Heavy Batty.

Grain for horses, 5 seers a day for 3 days	H.A.	200	horses.
	Fd. Batty.	130	,,
	Brit. Cavy. Regt.	436	,,
do. mules 3 do.	Batty. Mountn. Artilly.	178	mules.
do. bullocks 3 do.	H.A.	59	bullocks.
	Fd. Batty.	73	,,
	Heavy Batty.	290	,,

Carriage of sick.—Dooly bearers are supplied in following proportions : 1 dooly for every 10 British soldiers, & 1 per Troop or Compy. of Native troops ; 6 bearers to each dooly, for every 4 doolies 1 mate extra, and for every 16 doolies 1 sirdar extra. Bangy Burdars, 1 per Batty., 2 per Brit. Regt. Cavy. & Infy. ; 1 per Nat. Regt. or detachment of Sappers and Miners to carry Medicine Petarrahs. For troops North of Jhelum, Kandies are provided at the following rates :—

Batty. R.A.	2	common,	1 Bareilly.
Regt. Brit. Cavy.	4	,,	2 ,,
,, Infy.	6	,,	3 ,,

This is exclusive of service establishment of doolies, and will be taken with troops on hill service with as many doolies in addition as the estab. of Kahars. can carry.

British Offrs. Tents & Baggage.—All Brit. Offrs. provide their own tents, and the camels for their conveyance, also for the conveyance of their baggage. The wt. of the tent being restricted to 80 lb.

Mounted Infantry.—The Dragoon of 150 years ago has now reappeared in active service in our army under the title of mounted infy. This revived arm is invaluable for Outpost, Advd., and Rr. Gd. duties, and, in conjunction with really good cavly., for patrol and reconnaissance work. Galloways, or even mules or donkeys, if horses are not to be had, will do, as the formation of Mtd. Infy. at the beginning of a war should not interfere with the supply of horses for the cavy. and R.A. When possible, no entire horses should be used : geldings are best. In level countries, a

small proportion might be carried on light carts. This force can be raised at any moment by calling for volunteers from the infy. The proportion between Mtd. infy. and cavly. might be, I think, three or even four to one. Whenever we take the field, it is to be hoped that our cavly., the finest in the world, may be supplemented largely by Mtd. infy. In our recent wars the hardest work and hardest fighting has devolved on the Mtd. infy. and Camel Corps, and they have rendered the most invaluable service. As yet we are the only European nation that has officially recognised the enormous advantages to be obtained from the intelligent use of this arm. Our cavy. is most properly taught to fight dismounted; but we have too little of it, and it is too valuable to be expended on purely infy. duties. The Mtd. infy. should be selected from volunteers, so many men from each Infy. Battn. for their intelligence and good shooting. Even the soldier who has never been on horseback, can easily be taught in a week or two to keep his seat over rough ground, and to sit so as to avoid giving his horse a sore back. The danger in the instruction of Mtd. infy. is, lest offrs. and men should think it is intended to convert them into cavy. With the exception of the most elementary instruction in riding and in stable duties, all they have to learn that is not in every way essentially the infy. soldier's work, are those outpost, and scouting, and reconnoitring duties that can only be efficiently carried out by mounted men. For wars in wild countries, and with semi-civilized races, in which we are so often engaged, Mtd. infy. are invaluable; and I believe that if properly handled in conjunction with cavy., with H. A., and machine guns, they will play a most important part in all European wars of the future. The companies should be commanded by carefully selected captains, and all the offrs. be dashing, daring young men, eager for distinction. It should be the crack corps with every army in the field, always in the front, and in constant touch with the enemy. I think there should be at least 3 battns. of Mtd. infy. with each Army Corps, each battn. to be about 500 or 600 strong: no company to be less than 100 men. Acting in concert with the cavy. of the Army Corps, with a Batty. R. H. A. and, say, 4 good machine guns, under a leader who knew his work, in whom the men had complete confidence and would follow anywhere, this Mtd. infy. could render the most invaluable services: important positions in advance could be seized and held until the arrival of the Divnl. infy., and the Army Corps would not only be protected from all possible surprise, but the C. in C. would be kept constantly informed of the enemy's doings. Its horse equipment should be of the simplest nature; all those useless brass ornaments and ginglin iron chains, which with our cavy. and R.A. delight the eyes of the barrack-yard soldier, should be got rid of: stirrups and all iron that cannot be dispensed with, should be nickeled or lacquered. The rifles to be carried in the Namaqua bucket, the ammtn. distributed round the body in

andolier, and in a similar arrangement adapted to the waist-belt. The men's kit to be that of the infy. soldier, except that they should have cord antaloons and gaiters instead of the ordinary trousers, and that each man hould have 2 pairs of drawers.

Camel Corps.—Those we raised for the Nile Column recently were ormed on exactly the same principles as our Mtd. Infy.—namely, so many nen were selected from the volunteers from several Regts. and Battns. The Camel Corps organized at Suakim had Indian equipment, 2 men being n each camel. The Indian camels used were much stronger than those e purchased in the Soudan and Upper Egypt ; but still I do not believe in ny camel being able to do hard work over a desert country, where he will ave very little water and food, with 2 men on his back. They could not nost certainly when so loaded have made the marches done by Sir Herbert Stewart's column in the Bayuda Desert. To reduce the weight on the amel carrying 2 men, all the water and corn and cooking pots and spare mmtn. are carried on spare camels. But no man should be allowed to go nto a great desert without a good supply of water on his own camel. Experience is our best guide and master, and it tells me with certainty that t is most difficult to keep camels alive, and in working condition, in the lesert, with only one soldier on each camel. To have attempted to do the work done by our Camel Corps up the Nile, with each camel carrying two nen, would have ended disastrously. In India, where plenty of water and ood are to be had, the two-men system answers well, but it is not suited to he Soudan deserts. The double saddle, supplied by the Indian Govt., complete, weighed 73½ lbs. This Corps at Suakim was never put to any severe test, either in marching or fighting ; but it did all it had to do there ery well, and it would have enabled a certain number of Infantry soldiers o have got over long distances wherever food and water for the camels were obtainable. The Camel Corps' equipment for the Nile Column, one soldier to each camel, was in lbs. as follows : Saddle of Egyptian pattern, complete, 53·5 ; leather water-bottle (zemzemiyeh) (empty), 2 ; leather water-skin (holds from 5 to 6 galls.), 1·25 ; stirrup-leathers and irons, pair of, 2·75 ; sulleetah, 3 ; headstall, 2 ; shelter tent with poles and iron pins, 18 ; Namaqua bucket, 2·625 ; whip, 0·5 ; corn-sack, 2 ; pr. of forage nets, 2 ; feeding bag, 0·5 ; and tripod, 1·75, making a total wt. of 92·125 lbs. If the tent and the tripod be left behind the wt. would be lbs. 72·375. To this must be added the wt. of arms, accoutrements, clothing in use and kit carried in sulleetah, say about lbs. 37 ; for 100 rds. of ammutn., lbs. 10·625 ; 3 days' rations, lbs. 8 ; 3 days' corn for camel, lbs. 30 ; 6 galls. of water, lbs. 60 ; blanket, lbs. 4 ; and allowing lbs. 145 for wt. of naked man, the total wt. to be carried by the camel would be in round figures—say, lbs. 370.

The soldier carried haversack, regulation water-bottle full, waist-belt,

sword-bayonet, rifle and sling and bandolier holding 50 rds. of ammtn., haversack and rifle complete. (When not likely to be engaged the rifle was carried in the Namaqua bucket.) He wore helmet and large puggeree, frock, shirt, cord pantaloons, braces, socks, ankle boots, drawers and puttees. *The Sulleetah* was placed like ordinary saddle-bags over the saddle-tree: the man's blanket over that, and over it a leather saddle cover. In the sulleetah were 1 shirt, 1 pr. of drawers, 1 pr. of pantaloons, glengarry cap, 1 towel, soap, holdall with knife, fork and spoon, polishing brush, tin of grease, cavalry canteen, at least 50 rds. of ammtn., and 3 days' rations, viz., 3 tins Kopf soup, 3 lbs. tinned meat, 3 lbs. biscuit, and 3 days' groceries and salt. *On or attached to the saddle* were skin, holding about 6 galls. of water, which was fastened on camel's back behind the saddle; leather water-bottle holding about 2 quarts; 3 days' grain for camel; picketing gear consisting of iron picketing-peg—the head-rope was always attached to the headstall; a knee-lashing for the camel; a leather whip; a wooden tripod to keep water-skin from the ground when bi vouacking; 1 Torrens' kettle was carried by every 8th man. No great-coats were carried.

Artillery is divided in our army into horse, field, and garrison batteries. The tactical unit is the battery, but for purposes of administration, the corps is divided into brigades, having generally 8 batteries in each. The men of the R. A. and Fd. batts. are divided into gunners, drivers, and artificers. There is a battery of H. A. to each cavy. brigd.; the R. A. with each army Divn. consists of 3 fd. batts., and the army corps artillery of 3 batts. of H. A. and 2 batts. of fd. artilly. The batty. consists of 6 pieces told off into 3 divisions of 2 guns each, and into 6 sub-divisions of 1 gun each. In Austria and Russia the batty. consists of 8 pieces. Our artillery is now being slowly re-armed, the very inferior R. M. L. 9-pr. being replaced by the B. L. 12-pr. At present we have for the H. A. the old R. M. L. 9-pr., the R. M. L. 13-pr., and the R. B. L. 12-pr. For the mountain artillery we have the R. M. L. 7-pr. of 3 patterns, weighing 150, 200, and 400 lbs. respectively; the last pattern is in 2 pieces, which, when required for action, are screwed together.

DETAIL OF BATTERY ESTABLISHMENTS.

Officers and Men.	R.H.A. 12 or 13 prs.	Field. Light Batty. 9, 12 or 13 prs.	Field. Heavy Batty. 16 prs.	Garrison.
Major	1	1	1	1
Captain	1	1	1	1
Lieutenants	3	3	3	2
Surgeon, Attached	1	1	1	..
Vet.-do., Attached	1	1	1	..
Battery Serjt.-Majr.	1	1	1	1
Do. Qr.-Mr. Serjt.	1	1	1	..
Farrier Serjt.	1	1	1	..
Serjeants	6	6	6	5
Trumpeters	2	2	2	2
Shoeing-smiths	5	4	4	..
Collar-makers	2	2	2	..
Wheelers	2	2	2	..
Corporals	6	6	6	5
Bombardiers	6	6	6	5
Gunners*	74	76	91	120
Drivers	77	69	80	..
Totals	190	183	209	142

* 2 Gunners trained specially will be attached to M.O.

Horses.		R.H.A. 12 or 13 prs.	Field. Llght Batty. 9, 10 12 3prs.r	Field. Heavy Batty. 16 prs.
Officers	Public	..	5	5
Officers	Private	14	4	4
Sf.-Serjts. & Serjts	Riding.	9	9	9
Trumpeters	Riding.	2	2	2
Artificers	Riding.	3	1	1
Corporals	Riding.	6	6	6
Gunners	Riding.	36	..	..
Spare	Riding.	6	5	5
6 Gun Carriages with limbers	Wagons.	36	36	48
6 Ammunition with limbers	Wagons.	36	36	48
1 Store with limber	Wagons.	4	4	4
1 Forage with limber	Wagons.	6	6	6
3 Ammtn. & Store, for baggage	Wagons.	12	12	12
3 do. do. for supply	Wagons.			
1 General service for tents	Wagons.	4	4	4
Spare	Wagons.	12	8	10
18 Wagons Total		186	138	164
		12 & 13 pr.	9 pr.	16 pr.
No. of rounds per Gun with Battery		142	148	100

9-pr. batteries carry 135 time fuzes, 50 percussion fuzes and 200 friction tubes per gun.
12 & 13 " " 140 " 72 " " 175 " " "
16 " " 90 " 64 " " 150 " " "

Mountain Batteries.—The gun now adopted is the 2·5″ R.M.L. steel screw gun of 400 lbs. The establishment of Warrant-Officers, Staff-Sergts., Sergts., Corpls., Bombadiers, and Trumpeters for mountain batteries is the same as for Field Batteries.

For a Mountain Battery with mule equipment.—The artificers are one Farrier, and of collar-makers, wheelers, and shoeing smiths, 3 of each; 90 gunners, 57 drivers on permanent establishment, and 94 hired drivers; 18 horses for officers and non-com. officers, &c.; 112 ordnance mules and 81 baggage mules; 72 ammunition boxes containing 360 shrapnel, and 144 common shell; 100 rounds of case; 360 rounds M.H. carbine, and 120 rounds for revolvers; 216 percussion fuzes; 108 medium and 324 small time and concussion fuzes. No transport for tents is provided.

For a Battery with camel equipment, the difference in establishment is 2 shoeing smiths instead of 3; 100 gunners and 45 camel drivers instead of mule drivers, 22 horses and 90 camels; 72 ammunition boxes, containing 144 common, and 432 shrapnel shells, and 144 rounds of case; 4 boxes of M.H. carbine, and 1 box of revolver ammunition. The heaviest load on any camel is 381 lbs., saddle and gear included: the lightest is 273 lbs. No transport for tents is included in this establishment.

The war establishment of batteries in India as regards Europeans is the same in all three Presidencies, and is as follows.

* Mountn. Batty. of 6·400 lb. Screw Guns. Ranks.	R.H.A.	Fd. Batty.	*Mountn. Batty.	Heavy Fd. Batty.	Garrison Batty.
Major	1	1	1	1	1
Captain	1	1	1	1	1
Lieutenants	3	3	3	3	3
Staff.-Serjts.	2	2	2	2	1
Serjeants	6	6	6	7	5
Trumpeters	2	2	2	2	2
Farrier Serjt. & Carriage-smith	1	1	1	..	..
Corporals	6	6	6	6	5
Bombardiers	6	6	6	6	5
Shoeing & Carriage-smiths	2	2	..	1	..
Bombdr. Collar-maker	1	1	1	..	..
Bombdr. Wheeler	1	1	..	1	..
Gunners	76	76	82	70	97
Drivers	54	54	..	..	..
Totals	162	162	111	100	120

The Native establishment varies in each Presidency, and is as follows.

Native Establishments.	R.H.A.			Fd. Batty.			Mountn. Batty.			Heavy Fd. Batty.			Garrison Batty.		
	Bengal.	Madras.	Bombay.	Bengal.	Madras.	Bombay.	Bengal.	Madras.	Bombay.	Bengal.	Madras.	Bombay.	Bengal.	Madras.	Bombay.
Havildar Majr. of Drivers	..	..	..	..	..	..	1	1	1	..	..	..	..	..	..
Havildar Drivers	..	..	..	..	..	..	3	3	3	1	1	1	..	..	..
Naicks ,,	..	..	..	..	..	..	6	6	6	6	6	6	..	..	..
Drivers	..	..	..	..	..	..	138	138	138	150	150	150	..	..	..
Tindal	1	1	1	1	1	1	..	1	..	1	1	1	1	1	1
Store Lascars	12	12	12	12	12	12	..	6	..	12	12	12	6	6	6
Tent ,,	2	2	2	2	2	2	..	2	..	2	2	2	2	2	2
Puckallies	3	5	..	3	3	3	3	3	3	2	..	2	3	2	2
Bheesties	1	1	1	1	1	1	1	1	1	8	8	8	..	..	..
Sweepers	3	..	..	3	..	..	3	3	3	3	1	1	3	..	2
Jemadar Syces	3	3	3	3	3	3	..	..	..	..	..	..	..	..	..
Syces	118	118	118	71	71	71	..	6	..	5	5	5	..	4	..
Grass Cutters	178	178	60	110	110	37	..	..	..	5	5	3	..	4	..
Bullock Drivers	3	3	3	3	3	3	..	.	..	..	..	..	..	..	..
Mistri Smith	1	1	1	1	1	1	1	1	1	1	1	1	..	1	..
Firemen	1	1	1	1	1	1	..	..	..	1	1	1	..	1	..
Filemen	2	2	2	2	2	2	..	..	..	2	2	2	..	[illegible]	..
Hammermen	2	2	2	2	2	2	..	..	..	2	2	2	..	1	..
Mistri Carpenter	1	1	1	1	1	1	1	1	1	..	..	..	..	1	..
Carpenters	1	1	2	1	1	2	2	2	2	2	2	2	..	1	..
Moochies	2	2	1	2	2	1	..	..	..	2	2	2	..	2	..
Mutsuddy	1	..	..	1	..	..	..	..	..	1	..	..	..	..	..
Cooks	..	..	..	..	..	..	2	2	2	..	..	..	..	..	..
Munshie	..	..	..	..	..	..	1	1	1	..	..	..	..	..	..
Smiths	..	..	..	..	..	..	3	3	3	..	..	1	..	..	..
Shoeing-smith	..	..	..	..	..	..	1	1	1	2	2	2	..	..	..
Saddlers	..	..	..	..	..	..	3	3	3	..	..	..	..	..	..
Salootrie	..	..	..	..	..	..	1	1	1	..	..	..	..	..	..
Jemadar Mahout	..	..	..	..	..	..	..	..	..	1	1	1	..	1	..
Mahouts	..	..	..	..	..	..	..	..	..	12	12	12	..	11	..
Coolies	..	..	..	..	..	..	..	..	..	12	12	12	..	11	..
Conservancy Establishmt. Bheesties.	1	..	2	1	..	2	1	..	1	1	..	1	1	..	1
Conservancy Establishmt. Sweepers.	3	..	5	3	..	5	3	..	2	3	..	3	3	..	3
Conservancy Establishmt. Bildars	2	..	1	2	..	1	2	..	1	2	..	1	2	..	..
Totals	341	333	218	226	216	151	176	185	174	239	228	234	21	50	17

FIELD GUNS.—*The* 18*lb. B. L. Armstrong* gun on steel Fd. carriage charge 8lb. P. ; shrapnel shell 290 balls (35 per lb.) : B.C. 1 oz. *The R. M. L.* 16-*pr.* of 12 cwt. wrought iron and steel tube. Total L. 78″ : L. of bor 68·4″ : cal. 3·6″ ; grooves, 3 ; twist of rifling 1 in 30 (uniform). H. to centr of gun 43¼.″ Wheels 5′ diam. : track 62″4½cwt. *Common shell* filled with 1 oz. B. C., wt. 16 lbs. 11½ oz. ; *shrapnel* filled with 128 bullets (72 at 18 per lb and 56 at 84) and 1½ oz. B. C., 17 lbs. 14¾ oz. ; *case*, holding 176 balls a 16½ per lb. 15 lbs. 3 oz. *Charge*, 3 lbs. R. L. G². powder. M. V. 1355 *Ammunition* 100 rds. per gun : gun limber (24 rds.) ammunition wago (48 rds.) and limber (24 rds.) with 4 rds. of case on the gun axletree : eac box on limber and wagon contains 9 shrapnel and 3 common shells. Gun carriage and limber packed for service, without tents, weigh about 42 cwt 24 lbs. Ammunition wagon, limber and body similarly packed weighs abou 42 cwt. 13 lbs. without tents. *Range*, at an elevation of 3° 40′, 1800 yds. of 4° 15′, 2000 yds, of 7° 33′, and of 11° 22′ 4000 yds. Wheels 5′ diam. track 62″.

The R. M. L. 13-*pr.* of 8 cwt. wrought iron with steel tube. Total L. 92″ L. of bore 84″ ; cal. 3″ ; grooves 10 ; rifling increasing from 1 in 100 at breac to 1 in 30 at muzzle : rotation obtained by copper gas check without pro jections. H. to centre of gun 43″. Wt. of wheels 4½ cwt. : diam. and trac same as 16-pr. ; *common shell* filled with 10 oz. B. C. = 13 lbs. with percus sion fuze fixed 13 lb. 6¼ oz. : shell empty 12 lb. gas check 6¼ oz : *shrapne* filled with 116 balls (34 per lb.) and ¾ oz. B. C. = 13 lbs. : *case* holding 34 balls (34 per lb.) 13 lbs. 7½ oz. *Charge*, 3 lb. 2 oz. R. L. G²; M. V 1595′. *Range*, at an elevation of 3° 6′ is 2000 yds. ; of 5 47′ 3000 yds. : c 9° 4000 yds. : and of 19° 6′ 6000 yds. *Ammunition*, 142 rds. per gun (3 common shell, 108 shrapnel, and 4 case) the gun-limber carries 34, and th wagon 104 shells : 2 rds. of case are carried in gun-limber and 2 in wagon limber.

The R. M. L. 9-*pr.* of 6 cwt. wrought iron with steel tube. Total L 74·2″ : of bore 66″ : cal. 3″ : grooves 3 : rifling 1 in 30 (uniform) H. of gu 42″ : *common shell* filled with 7·5 oz. B. C. Wt. 9 lbs. 1 oz. : *shrapnel* fille with 63 balls and 12 drams B. C. 9 lbs. 12¾ oz. : *case* 110 balls, 16½ per lb 9 lbs. 12 oz. *Charge*, 1¾ lbs. of R. L. G.² M. V. 1398′. *Ammunition* 148 rds. per gun (36 rds. in 2 boxes, each holding 14 shrapnel and 4 commo shells on limbers, and 72 rds. on wagon body in 4 boxes, each box sam as those on limbers), and 4 rds. of case carried on axletree arm of gun Carriage, gun and limber, packed for service without tents weigh about 3 cwt. *Range*, with shrapnel at an elevation of 4° 40′, 2000 yds. : of 10° 21 3300 yds. W. of wheels 4½ cwt. diam. and track same as 16 pr.

The R. B. L. 7 cwt. 12-*pr.* of tough steel. Total L. 92·35″: L. o bore, 84″ : (28 calbrs.) : cal. 3″ : 12 grooves : rifling increasing twist fo half the bore, from 1 n 120 cals. to 1 in 28, then 1 in 28 for outer half o

re: breech action, interrupted screw with De Bange obturator: *charge* o. S. P. powder: M. V. about 1700 to 1730′: all projectiles weigh 12½ lb: al weight behind teams will be 34½ cwt. for gun and limber, and 36 cwt. ammunition and all other wagons, exclusive of men and personal uipment. This is undoubtedly the best field-gun in existence, and it is ped that no false economy may prevent us from at once arming our eld Artillery with it. The shrapnel is 8·5″, long, and carries 216 balls, 35 the lb.) B.C. 12 drs.: the case has a length of 8·5″, and contains 314 xed balls, 34 to the lb. The gun-carriage weighs about 18 cwt., and the nber about 15·5 cwt. Each ammunition box holds 18 rds. Ranges are yds., and elevation 1500, 1° 53′: 2000, 2° 52′: 3000, 4° 15′: 4000, 26′; and 5000 yds. at 13° of elevation. This is to be our gun for H. A. d for field batteries.

The R. M. L. 7-pr. (steel) (150 lbs.). Total L. 28·5″: nominal L. ·125″: of bore 2′: cal. 3″: grooves 3: twist of rifling 1 in 20 (uniform) *mmon shell* filled with 7 oz. B. C. 7 lbs. 5 oz.: *double* with 1 lb. B. C. lbs.: *shrapnel* filled with 42 balls and 8 drams B. C. 7 lbs. 5½ oz.: *case* led with 70 balls 6 lbs. 4 oz. *Charge* 6 oz. F. G. powder for common and rapnel, and 4 oz. for double shell. M. V. 673′. *Range*, case effective to o yds.: shrapnel should not be fired beyond 650 yds.: double shell in- nded as a substitute for vertical fire from the old 4·4″ mortars: at an eleva- on of 10° 14′ with common shell, 1500 yds. The wt. of gun-carriage with heels 306 lbs. H. of axis of trunnions 22″: diameter of wheels, 30.″

The R. M. L. 7-pr. (steel) (200 *lbs. pattern*). Total L. 41″: of bore ″: cal. 3″: grooves 3: twist of rifling 1 in 20 (uniform) projectiles as for ghter guns. *Range* with double shell 12 lbs. and charge 4 oz. F. G. at ° 48′ elevation 800 yds.: at 18° 38′ 1300 yds.: at 28° 50′ 1700 yds.: with mmon and shrapnel shell charge 12 oz. F. G. at 2° 36′ 840 yds.: at 5° 21′. 30 yds. M. V. 968′. The wt. of gun-carriage with wheels 350 lbs. or hen packed 550 lbs.: of limber with wheels 382 lbs., or packed with com- on shell 512 lbs., or with double shell 526 lbs. Each Mountain Batty. rries per gun, 48 common, 10 double, 32 shrapnel and 4 star shells, and 12 ls. of case. Wheels 36″ diam., they weigh 144 lbs. Height of centre of un 25·75″.

The R. M. L. 2·5″ (steel) (400 *lbs. pattern*) is in two pieces, the breech nd the muzzle portion, weighing 201 and 199 lbs. respectively. When put gether, total L. of gun is 70 45″, of bore 66·5″: cal. 2·5″: grooves 8: fling spiral increasing from 1 in 80 at breach to 1 in 30 calibres at 3·53″ om muzzle, the remainder uniform 1 turn in 30 calibres: *common shell* ith gas check, and filled with 4 oz. B. C., weighs 7 lbs.; *shrapnel* contain- g 100 balls (35 per lb.), 70 buck-shot and 10 cast iron segments with ½ oz. . C., and gas check, weighs 7 lbs.: *case* containing 159 balls (34 per lb.) eighs under 7 lbs.; wheels 36″ diam., and 193 lb. *Charge* 24 oz. R. L. G²:

W. of *Shrapnel* loaded with 88 balls and ½ oz. B. C., and fuze, 7 lb. 6 oz. *Ranges* with common and shrapnel shell, 1° elevation, 800 yds. : 2° 6′, 130 yds. : 3° 52′, 2000 yds. : 7° 19′, 3000 yds. : and 11° 7′, 4000 yds.

Fuzes are of 3 sorts, the Time Fuze, the Percussion, and the Doubl Action or Time and Concussion Fuzes. They are packed by fives in ti cylinders. The 15 secs. wood time fuzes and the percussion R. L. fuzes ar those now commonly used in our fd. artilly.

The draught per horse in all batts. armed with 9-pr. is about 657 lbs and in those armed with 16 pr. about 789 lbs. (the gunners being dismounte in both instances).

All gunners and drivers in H. A. and Fd. Batts. should be armed wit the regulation revolver (to be carried on the person) and with an Elch sword-bayonet: the cavly. sword is a useless encumbrance to the arti leryman.

The greatest number of rds. fired by a German batty. in 1870 was 230 rd per gun fired at Mars le Tour, but the average per gun fired in that batt by all the artillery engaged was only 94, which was greatly in excess of th amount fired at any other of the great battles.

The ordinary charge for S. B. guns is ¼ to ⅓ the wt. of the shot; for l guns about ⅛ of shot. Battering charges about 1½ service charge. F Batty. shells penetrate earth from 6′ to 12′; guns of position from 12′ 16′. Fd. batts. can fire 2 rds. a minute, the pieces being laid each rd.; b as a rule the rate of firing is much slower and more deliberate.

Measurement of Gun Material.—From tip to tip of axle, the gun-carriag and wagons measure 6′ 5″; gates and passages should therefore have minm. width of 7′ 6″ to allow artillery to pass. The diameter of fie carriage-wheels is 5′. The track of all fd. artilly. and of all W. D. carriag is 5′ 2″ outside measurement, except that of the pontoon and wire wagon which is 5′ 10″.

Proportion of men to Guns.—The proper establishment of men a horses for field artillery is to be estimated thus:—Having provided t exact number of gunners required to work the guns, and of drivers a horses required for the guns and wagons, add one-tenth as "spare." you are told that with any enemy's column there are so many field guns, th number multiplied by 25 will give you roughly the number of artillerym with the column.

War Rockets.—They are named according to their total wt. T Hale's rocket, which are those in use in our army, have no sticks, and are two kinds; the 9-pr. and the 24-pr. The former is for field service, the lat is chiefly used in fortresses. Their length is 16¾″ and 23″, and their d meter 2½″ and 3¾″ respectively. The troughs used in firing them are 27 l and 64¾ lbs. respectively. The range of the 9-pr. rocket at an elevation 5° 25′ is 1000 yds.; at 8° 40′ is 1500: at 12° 20′ is 2000; and at 16°

2500 yds. Its effective range is not more than about 1200 yds. War kets are painted red. Their use in the army is to be discontinued in ure.

Signal Rockets may be very useful in communicating between columns night which are separated by practically impassable objects. They are of sizes, viz. 1 lb. and ½ lb., with sticks 8′ 2″, and 6′ 6″ long; the former ntains 28, the latter 20 stars. All signal rockets are painted stone-colour; y deteriorate rapidly in damp tropical climates, and should therefore be cked in tin-lined cases. The 1-lb. rocket ascends about 1800′, and it is d they may be seen in clear weather to a distance of from 30 to 40 les.

Siege Trains will consist of any number of units of Heavy, Medium or ght ordnance, according to the requirements of the service, each unit nsisting of 16 pieces and of 8 Garrison Batts., with 500 rds. per gun, and ores in proportion.

Description of Gun, &c., in each unit of seige train.	One Heavy Siege Train Unit.	One Medium Siege Train Unit.	One Light Siege Train Unit.
6·6″ 70-cwt. gun	2	..	..
40-pr. 35-cwt. gun, Mark II	4	6	..
25 ,, 18 ,,	..	..	8
5-in. howzr. 70 cwt.	10	..	..
6·6″ ,, 36 ,,	..	10	..
6·3″ ,, 18 ,,	..	..	8
Steel, siege Moncrieff hydro-pneumatic carriage for 70 cwt. 6·6″	2	..	..
Fd. wt.-iron gun-carriage for 25-pr. R.M.L. gun with tops	..	..	9
Siege R. M. L. 40-pr. gun-carriage with tops	5	7	..
,, ,, howzr. carriage, with hydraulic buffer	11	..	..
,, howzr. 6·6″ ,, ,, ,, ,,	..	11	..
,, ,, 6·3″ ,, ,, ,, ,,	..	..	9
Trench carts	8	8	8
Gyns, 18′ light, Mark II	2	2	2
Ammunition and Store Wagons.	35	35	35
Forge with limber	2	2	2
Platform carriage, siege gun	3	..	..
Gyn and store carriage	2	2	2
Sling wagon, wood, with limber, to 6 tons	1	..	..
Double-decked ground platforms	10	10	..
Clarke's strengthened platforms.	4	6	16

Number of Guns, Carriages, and Bullocks in each Class of Siege Train used in India.		1st Class Siege Train.		2nd Class Siege Train.		3rd Class Siege Train.		4th Class Siege Train.	
		Guns or Carriages.	Bullocks.	Guns or Carriages.	Bullocks.	Guns or Carriages.	Bullocks.	Guns or Carriages.	Bullocks.
24-pr. . . at 26 bullocks each		12	312	6	156	4	104	2	5
Spare carriages, 22	,,	4	44	1	22	0	0	0	
18-pr. . . 22	,,	12	264	6	132	4	88	2	4
Spare carriages, 18	,,	2	36	1	18	0	0	0	
10"-Howzr. . 26	,,	4	104	2	52	1	26	2	5
Spare carriages, 22	,,	1	22	0	0	0	0	0	
8"-Howzr. . . 22	,,	6	132	4	88	2	44	2	4
Spare carriages, 18	,,	1	18	1	18	0	0	0	
Carts, Store, or Artificers . . 6	,,	30	180	16	96	8	48	6	3
Carts, platform . 6	,,	27	162	15	90	9	54	6	3
Carriages, Transport, medium . 12	,,	3	36	2	24	1	12	1	1
Total Bullocks . . .			1310		696		376		27
Add Spare			218		116		62		
Grand Total of Bullocks. .			1528		812		438		33
Total number of pieces of ordnance		34		18		11		8	

Siege guns and guns of position. 64-*pr. R. M. L. gun*, total L. 118 L. of bore 97·5" : cal. 6·3" : nominal wt. 64 cwt. : grooves, 3 : twist rifling 1 in 40 (uniform). Ammunition, battering shells filled with 33 oz. B. including gas-check, 90 lbs. ; common, filled with B. C. of 7 lb. 2 oz., 64 lbs shrapnel filled with 234 balls (14 per. lb.) and B. C. of 9 oz., 64 lbs. : case sh filled with 50 8 oz. balls, 49 lb. 14½ oz. : charge 12 lb. R. L. G. : M.V. 128 with 10 lb. charge and 65 or 66 lbs. shell, 1383′ ; with the 12 lbs. charge a 90 lbs. shell its range is 4000 yds. at an elevation of 10° ; with the 10 l charge and the lighter projectile its range is the same with an elevation 9° 35′, and is 5400 yds. at 14° 57′. Wt. of carriage empty, with whee drag-chain, &c., about 33 cwt.

40-*pr. R. M. L. gun* (Mark II.), total L. 120" : L. of bore 104·5" : c 4·75 : average wt. 34·5 cwt. : grooves 3, rifling 1 in 35 uniform. Ammu tion; charge 7 lbs. R. L. G², common shell filled with 2·5 oz. B. C., 38

oz. : shrapnel filled with 180 balls (18 per lb.) and 4·5 oz. B. C., 41 lbs. oz. : case shot filled with 405 balls at 16½ per lb., 38 lbs. 6 oz. : Range 00 yds. at 3° 22′ : 3000 yds. at 5° 52′ : and 4500 yds. at 10° 46′. The me gun of Mark I. total L. 100·5″ : L. of bore 85·5″ : average wt. 34 cwt. : rriage the same for both guns : H. of centre of gun 53″ : wheels 60″ diam. ″ track. Wt. of carriage, empty, with wheels, drag-shoe and elevating c, nearly 33 cwt. : Wt. of limber, empty, with boxes, shafts and wheels, cwt. 1 qr. : wt. of wheels, 10½ cwt. Gun-limber carries 4 common and shrapnel shells, and 2 rds. of case : wagon-limber and body carries 18 mmon, and 18 shrapnel shells.

25-*pr. R. M. L. gun*, total L. 98″ : L. of bore 88″ : cal. 4″ : grooves 3 : ling, twist 1 in 35 (uniform) : average wt. 18 cwt. : H. centre of gun 46″ : heels 60″. Ammunition, common shell (filled with 1·75 lbs. B. C.) lbs. : shrapnel (filled with 158 balls and 3 oz. B. C.) 25 lbs. 3 oz. : case ot filled with 245 balls (16½ per lb.) 24·25 lbs. : charge 4 lbs. R. L. G² wder. M. V. 1320′. Range at 4° 20′, 2000 yds. : at 10° 9′, 3600 yds. : and 00 yds. at 14° 40′. Wt. of carriage, empty, with wheels, drag shoe, &c., cwt. : of limber, empty, with boxes, shafts, and wheels, 11 cwt. 1 qr. un-limber carries 12 shrapnel shells, and 6 common shells, and there are rds. of case on gun-axle : Ammunition wagon (body and limber) carries shrapnel, and 18 common shells.

8-*in. R. M. L. Howitzer* of wrought iron with steel tube ; total L. 64″ : of bore 48″ : cal. 8″ : mean wt. 45 cwt. 3 qrs. : grooves 4, twist of ling, 1 in 16 (uniform). Ammunition, common shell filled with 14·5 lbs. C. 185 lbs. 13·75 oz. : case shot filled with 75 8-oz. balls, 74 lbs. Charges m 10 to 25 lbs. : with a 10-lb. charge the range is 1600 yds. at 10° 5′, d 3800 yds. at 38° 15′. The carriage is similar to that of the 40-pr., and e limber is the same as the 64-pr. limber with a store box.

6·3-*in. R. M. L. Howitzer* of wrought iron with steel tube ; total L. ″ : L. of bore 45″ : mean wt. 17 cwt. 77 lbs. ; cal. 6·3″ : grooves 20 : ling increasing twist from 1 in 100 at breech to 1 in 35 at muzzle ; mmunition, common shell filled with 7 lb. B. C., gas check included, 70 lb. ; se shot filled with 50 8-oz. balls, 49 lbs. 14·75 oz. Charges from 4 to lb. : with a 4-lb. charge the range is 1800 yds. at 10° 5′ ; 3000 yds. at 20° ; 00 yds. at 29° 45′ ; and 4000 yds. at 35° elevation. Carriage is that for e 40-pr. ; the limber that for the 64-pr.

The guns used in the field are as follows :—

Nature of Gun.	Weight of Gun.	Calibre.	Weight of Gun and Carriage (packed).	Number of Rounds in Limber and on Gun.	Weight of Limber Loaded.	Total Weight behind Team (Gunners Dismounted).	Number of Rounds in Wagon (body and limber).	Weight of Wagon Loaded.	Range at Elevation of 9°.
	lbs.	in.	lbs.		lbs.	lbs.		lbs.	yd
B.L.R. 20 p^{dr} Armstrong . .	1792	3·75	3581	18	..	5425	48	4256	35
Do. 12 do.	896	3·00	2240	34	1904	4144	90	4844	34
Do. 9 do.	672	3·00	2128	34	1600	3750	90	4540	30
M.L.R. 16 p^{dr} (wrought iron) .	1355	3·60	2700	28	1916	1916	72	4732	34
Do. 13 do. do. .	896	3·00	2240	36	1888	4228	106	5032	40
B.L.R. 12 do. do. .	784	3·00	..	..		3724	..	4032	.
M.L.R. 9 do. do. .	896	3·00	2240	40	1701	3941	108	4506	30
Do. 7 p^{dr} (steel) for mountain service .	150	3·00	345	..	..	..	..	..	13
Do. do. do. .	200	3·00	417	..	..	..	..	..	22
Do. 2·5 in. do. screw	400	2·5							35

6·6-*in. R. M. L. converted gun of 70 cwt.* of wrought iron with toug steel tube : total L. 9′ 10″ : cal. 6·6″ : twist of rifling increasing fro 1 turn in 100 cals. at breech to 1 in 35 cals. at 13·2″ (2 cals.) from muzz remainder uniform at 1 in 35 cals. Ammtn. common shell empty 91 lb 6 oz.; gas check 3 lbs. 1 oz.; B. C. 5 lbs. 9 oz. : total wt. filled 100 l The battering shell is 3½ lbs. heavier, the B. C. being that quantity less, the total wt. when filled is still 100 lbs. The charge is 25 lbs. P. powd M. V. 1416 ft. secs. Range 2000 yds. at 3° 8′ : 3000 yds. at 5° 30′ ; 4000 y at 9° 35′ and 5000 yds. at 13° 32′. The carriage is the siege H. P. (hyd pneumatic) on the Moncrieff system, the gun recoiling below the parapet to loaded, and, in doing so, storing up in compressed air sufficient force to r it again to the firing position. When in firing position H. to centre of 8·55″, to loading position 5′ 2″, and when travelling 4′ 4″: track of wheels 5

6·6-in. R. M. L. Howitzer of 36 cwt. of wrought iron with tough s tube : total L. 90·7″ : cal. 6·6″ : twist of rifling from 1 in 94 cals. at bre to 1 in 35 at muzzle. Ammtn. common shell empty 91 lbs. 6 oz. ; check 3 lbs. 1 oz.; B. C. of P. and R. F. G. 7 lbs. 9¾ oz.: total wt. of s

ed 100 lbs. : shrapnel filled with 318 balls, 14 per lb., 96 lbs. $3\frac{1}{2}$ oz. : gas eck 3 lbs. 1 oz.; B. C. $11\frac{1}{2}$ oz. : total wt. 100 lbs. : case filled with 4 balls (4 oz.) 100 lbs.; charges, 5, 3, and 2 lbs. R. L. G^2. Range with lbs. charge, 1000 yds. at 3° 46′ : 2000 yds. at 8° 26′ : 3000 yds. at 13° 24′ : 00 yds. at 19° 40′, and 5000 yds. at 28° 54′ : M. V. 839 ft. secs. It is fixed m a platform with a siege carriage provided with compressors.

Siege Gun Carriages.—We still adhere very much to the antiquated stem of firing our siege guns through embrasures, because no Govern-ent will give us the money required to make overbank carriages. If we ve ever to contend against any nation provided, as the German heavy ns are with their superior overbank carriage, we shall suffer horribly. I wish ose who are responsible for not giving us the best gun carriages could en have to stand for some time in our old-fashioned embrasures ! But I ppose no one cares, because it will be only soldiers who will have to suffer !

Batteries of position.—The establishments vary little from those of Fd. tteries already given. The guns used are the 40-pr. and 25-pr. R. M. L., d the 40-pr. and 20-pr. B. L. Armstrong. Four guns constitute a Battery, cept with the 25-pr., of which there are 6. With the Armstrong gun tts. there are 30 riding horses and 112 draught horses for the 40-pr., and for the 20-pr. Batts. : 4 ammn. : 3 ammn. and store, and 1 platform agons with 40-pr., and the same, with the exception of the platform wagon, th the 20-pr. : the number of rds. carried is 38 per 40-pr. and 66 per 20-pr. With the R. M. L. 40-pr. and 25-pr. the same number of riding horses, d 134 and 124 draught horses per Batty. respectively. Both carry 1 spare n carriage, 1 forge, 1 store, and 1 ammunition and store wagon, and the rmer 8, the latter 6 gun-ammunition wagons.

Machine Guns.—After lengthened and powerful opposition from the pre-diced and the interested, we are now at last about to have some machine ns handed over to our Infy. for use in the field. If made use of intelli-ently on active service, the machine gun of the Infy.-rifle calibre that will re with smokeless powder and be sighted up to 3000 yds. will mark a new a, as pronounced as that when rifled or when breech-loading small arms ere first adopted. No gun with less than 2 barrels should be used.

The Nordenfelt.—Unlike most other machine guns, its firing action is ith a lever moved horizontally by the hand of the man who lays and fires e gun at the same time. Most of the other guns require one man to lay nd another to fire them by turning a vertical crank. The 3-barrelled Infy.-fle calibre weighs 56 lbs. ; the tripod on which it is mounted weighs 20 lbs. ; the 5-barrelled gun of same calibre weighs 120 lbs. ; its tripod 32 lbs. Both fire either volleys or single shots at will of the firer. The ew pattern now being made (0·45″) has 5 barrels : wt. complete with feeder ut without mounting or shield, 143 lbs. : of cone mounting, 160 lbs. ; of hield, 69 lbs. It is only sighted up to 2000 yds., which is not sufficient.

The Gardner.—The 5-barrelled Infy.-rifle calibre weighs, with feeder an traversing gear, 327 lbs.; its tripod, 59 lbs. It is sighted to 1600 yd There is also a 2-barrelled gun. The 1-barrelled gun now being mad weighs 59 lbs. with feeder but without mounting or shield; the tripo mounting weighs 80 lbs. and it is only sighted up to 2000 yds.

The Gatling.—The new guns have 6, 8, and 10 barrels, and weigh fro 100 to 237 lbs., according to number and length of barrel; the 6-barr camel gun and carriage weigh 240 lbs., which it is proposed to carry one mule: it is proposed to carry on 5 mules the feed magazines requir for firing together with 8000 rds.

THE FIELD GUNS USED BY CONTINENTAL ARMIES ARE ALL BREECHLOADERS, AND ARE AS FOLLOWS:

Description.	Wt. of Gun.	Total Length.	Calibre.	Effective range with Common Shell.		Material
				Range.	Elevatn.	
AUSTRIA.	Cwts.	Ft.	Ins.	Yds.	° ′	
7 c. m. Mountain gun	1·76	3·28	2·6	3333	16 56	Steel
8 c. m. H. A. gun	5·87	6·39	2·95	5000	17 10	Steel
9 c. m. gun (Fd. Batts.)	9·56	6·76	3·42	5000	15 12	
FRANCE.						
80 mil. Mountain gun	2·06	3·94	3·15	3035	15 0	Steel.
80 mil. Field gun	8·45	7·48	3·15	7655	25 0	Steel.
90 mil. do.	10·41	7·48	3·54	7535	25 0	
GERMANY.						
H.A. gun.	7·66	6·89	3·09	6196	25 0	Steel.
Fd. Batty. gun	8·84	6·89	3·47	6551	25 0	Steel.
ITALY.						
7 c. m. Mountain gun	1·91	3·28	2·95	3089	15 0	Bronze.
7 c. m. Light gun	5·85	5·42	2·95	3543	10 0	Bronze.
9 c m. Heavy gun	9·66	6·89	3·42	3500	10 0	
RUSSIA.						
Mountain gun	1·93	3·96	2·5	..	..	Steel.
H. A. gun	7·09	5·58	3·425	7000	25 16	Steel.
Light Field gun	9·03	6·9	3·425	7000	22 5	Steel.
Heavy do.	12·25	6·9	4·2	..	..	
SPAIN.						
Mountain gun	2·0	3·32	3·09	3280	20 35	Steel.
Long 8 c. m. gun	6·58	6·35	3·09	5468	22 29	Steel.
9 c. m. Krupp	9·56	6·89	3·42	5905	22 55	Steel.

A Divisional Reserve Ammuntn. Column, & Reserve Ammuntn. Column for Army-Corps Details.

Officers and Men.	Divisional.	*Army-Corps Details.
Major	1	1
Lieutenants	2	2
Quarter-Master ..	1	1
Surgeon	1	1
Vety. Surgeon ..	1	1
Battery Serjt.-Major	1	1
Battery Qr.-M. Serjt.	1	1
Farrier Serjt.	1	1
Serjeants	5	5
Trumpeters	2	2
Shoeing-smiths ..	5	6
Collar-makers ..	3	3
Wheelers	3	3
Corporals	5	5
Bombardiers	5	5
Gunners	48	43
Drivers	104	117
Totals	189	198

Horses.	Divisional.	Army-Corps Details.
Officers (Riding.) Private	4	4
Officers (Riding.) Public	4	4
Staff Serjts. & Serjts. .. (Riding.) ..	8	8
Trumpeters .. .. (Riding.) ..	2	2
Artificers .. . (Riding.) ..	1	1
Rank and File .. .. (Riding.) ..	3	3
Spare, Riding	3	3
Totals	25	25
S. A. A. Carts	44	8
Gun carriages (spare) with limber .. 16-pr.	4	4
Gun carriages (spare) with limber .. 13-pr.	4	8
Wagons. Ammuntn. with limber .. 16-pr. ..	36	36
Wagons. Ammuntn. with limber .. 13-pr. ..	18	48
Wagons. Ammuntn. & store R.A. for ammuntn.	36	72
Wagons. Ammuntn. & store R.A. for stores & baggage	12	12
Wagons. Ammuntn. & store R.A. spare ..	6	4
Wagons. Forge & limber	6	6
Spare	16	16
Totals	207	239

Equipment.	Divisional.	*Army-Corps Details.
Carriages, gun, spare 16-pr. ..	1	1
Carriages, gun, spare with limber .. 13-pr. ..	1	2
Carts, small-arm	22	4
Wagons. For Ammunition. Ammuntn. with limber 16-pr.	6	6
Wagons. For Ammunition. Ammuntn. with limber 13-pr.	3	8
Wagons. For Ammunition. A. & S. for ammtn.	6	12
Wagons. A. & S. for stores, &c ..	3	3
Wagons. Ditto, spare	1	1
Wagons. Forge with limber	1	1
Total carriages†	44	38
Number of rds. carried‡ per gun 16-pr. ..	1,090	1,090
Number of rds. carried‡ per gun 13-pr. ..	480	1,802
Number of rds. carried‡ per rifle	201,600	9,600
Cavalry carbine	10,080	22,960
Revolver	5,280	17,088

* This is a 1st reserve for the Corps Artily., Cavly. Brigd., &c. A 2nd reserve for the whole Corps is carried in the Army Corps Reserve Ammtn. Colmn.

† One day's rations and forage to be carried distributed in the wagons.

‡ Each A. & S. wagon carries 126 rds. for 16-pr. in 21 boxes of 6 projectiles each, and the cartridges in 4 metal-lined cases or 208 rds. for 9-pr. in 26 boxes of 8 projectiles each, and cartridges as for 16-pr.; or 25,200 rds. M. H. in 42 boxes.

N.B.—When tents and horse blankets are carried, no extra carriage is required, as they can be placed on the wagons.

Artillery Regimental Staff for 1 Army Corps.	Officers.	3rd Class Clerks.	Bâtmen.	Riding Horses Private
Colonel Commanding Corps Artillery	1	1	2	3
Adjutant	1	..	2	2
Lieut.-Col. Commanding Corps Horse Artillery ..	1	1	2	3
Adjutant, R.H.A.	1	..	2	3
Lieut.-Col. Commanding Corps Field Batteries, and Corps Reserves	1	1	2	3
Adjutant, R.A.	1	..	2	2
	6	3	12	16

N.B.—In my humble opinion this is an inordinately large staff for 3 H. A. Batts. and 2 Batts. 16-p

Rl. Engineers.—The Corps at present consists of 1 Field Park, Pontoon Troop, 1 Telegraph Battn. (in 2 Divisions): 4 Field Companie 7 Depôt Companies: 5 Submarine Mining Comps.: 4 Survey Comps.: a 20 Garrison Companies. The men are equipped like infantry. Ur lately they were armed with a breech-loading Lancaster carbine (8 lb 3½ oz.) and sword bayonet (1 lb. 8¼ oz.).

The personal equipment of the R. E. is similar to that laid down cavly. and infy., according as the men are mounted or not.

Detail of a Garrison Company.*

Officers and Men.	No.
Major	1
Captain	1
Lieutenants..	2
Total Officers	4
N.-C. Officers and Men.	
Serjeants	6
Corporals	6
2nd Corporals	6
Sappers	100
Buglers	2
Bâtmen†	8
Total	132

Conveyance for the Baggage, Camp Equipag and Stores of these Garrison Companies will provided, according to circumstances, by t Director of Transport.

The R. E. are now armed with the same rifle the Infantry, and every man has in possessi 50 rds. of ammunition, which is maintained drawing on the Infantry Divisional reserve In the Telegraph and Pontoon troops a co siderable proportion of the men are arm with cavalry swords, which is an absurd arrang ment; those not armed with a rifle should ha a revolver and an Elcho sword-bayonet.

* This includes Siege, Telegh., and Torpedo Companies.

† Each Offr. is allowed 2 Bâtmen. They will be provided from the Reserves, and wil unarmed.

DETAIL OF ONE FIELD COMPANY AND FIELD PARK, R.E.

Officers, N.-C. Officers, and Men.	Each of Four Field Companies.		Field Park.		Four Field Cos., and Field Park.		Total.
	Mounted Men.	Dismounted Men.	Mounted Men.	Dismounted Men.	Mounted Men.	Dismounted Men.	
Officers.							
Majors	1	..	..	..	4	..	4
Captains	1	..	..	..	4	..	4
Lieutenants	3	..	1	..	13	..	13
Surgeons	1	..	..	..	4	..	4
Total Officers ..	6	..	1	..	25	..	25
N.-C. Offrs. and Men.							
Serjeants	2	6*	1	..	9	24	33
Corporals	1	6	1	..	5	24	29
2nd Corporals	1	6	1	..	5	24	29
Farrier Serjeant ..	..	..	1	..	1	..	1
Shoeing-smiths	1	..	1	..	5	..	5
Corpl. Collar-makers ..	..	..	..	1	..	1	1
Corpl. Wheelers ..	..	..	..	1	..	1	1
Sappers, various trades	..	134	..	..	..	536	536
Drivers	26	..	24	..	128	..	128
Trumpeters	1	..	..	..	4	..	4
Buglers	..	1	..	..	..	4	4
Bâtmen†	..	12	..	2	..	50	50
Total Offrs., N.-C. Offrs. and Men	38	165	30	4	182	664	846
	203		34		846		

Horses, Saddlery, Harness, and Carriages.		Each of Four Field Co.s.	Field Park.	Four Field Co.s, and Field Park.
	Horses.			
Riding	Officers	11	2	46‡
	N.-C. Officers	3	3	15
	Trumpeters	1	..	4
	Spare	..	2	2
	Total	15	7	67
Draught for	Store Wagons ..	24	28	124
	Printing	..	4	4
	Lithographic or Photographic ..	..	4	4
Pack Equipment		3	..	12
Spare		4	6	22
	Total Horses	46	49	233
	Carriages.			
Wagons	Store	6	7	31
	Printing	..	1	1
	Lithographic or Photographic ..	..	1	1
	Total	6	9	33

* 1 Serjt. in each Comp. is a Comp. Serjt.-Major.
† Each Offr. is allowed 2 Bâtmen. They will be provided from the Reserves, and will be unarmed.
‡ Each R.E. Offr. below the rank of major attached to Fd. Comps., is allowed 2 public horses; the Surgeon has 1 troop horse.

DETAIL OF ONE PONTOON TROOP.

Officers.	No.
Major	1
Captain	1
Lieutenant	4
Quarter-Master	1
Surgeon	1
*Vety. Surgeon	1
Total	9
N.-C. O.s & Men.	
Troop Serjt.-Major	1
Troop Q.-M. Serjeant	1
Serjeants	10
Corporals	12
2nd Corporals	12
Pontooniers	100
Drivers	148
Trumpeters	3
†Bâtmen	18
Artificers.	
Farrier and Carriage-smith	1
Serjeant Artificer	1
Corporal Artificers	3
Shoeing and Carriage-smiths	8
Collar-makers	4
Wheelers	4
Carpenters	4
Total	339

*Horses.**	No.
(Riding.)	
Officers	17
Staff Serjeants	2
N.-C. Officers	13
Farrier	1
Shoeing-smiths	2
Trumpeters	2
Total	37
(Draught.)	
For wagons: Pontoon	120
For wagons: Trestle	24
For wagons: Store	34
For wagons: Forge	6
Spare	22
Total Horses	243

Carriages.	No.
Wagons: Forge	1
Wagons: Pontoon, for	20
Wagons: Trestle, for	4
Wagons: Store	6
Total ‡.	31
Artificers' Tools.	
Carpenters' sets	2
Collar-makers' ,,	4
Painters' ,,	3
Smiths' G. A. S., with 36-lbs. vice ,,	1
Tinmans' ,,	1
Tools, shoeing, in leather case ,,	4
Wheelers' and Saddletree makers ,,	1
Whitworth's Stocks and Dies 1¼-in. to ¼-in., with Tray ,,	1

* Each Officer of R.E. below the rank of Major, attached to the Pontoon Troop, is allowed 2 public horses; the Surgeon has 1 public horse; the Veterinary Surgeon provides his own horses and saddlery.

† Each Officer is allowed two Bâtmen, to be provided from the Reserve; they will be unarmed.

‡ One of these, a four-horsed wagon, carries one day's supply of rations and forage.

Each pontoon and trestle wagon carries 5 yds. of bridge complete, so the troops can lay 120 yds. of bridge in all.

DETAIL OF ONE TELEGRAPH TROOP, R.E.

Officers and Men.	Right Half Troop.	Left Half Troop.	Total for One Troop.
Officers.			
Major	1	..	1
Captain	..	1	1
Lieutenants	3	3	6
Quarter-Master	1	..	1
Surgeon	1	..	1
Veterinary Surgeon ..	1	..	1
Total	7	4	11
N.-C. Officers and Men.			
Troop Serjeant-Major	1	..	1
Troop Q.-M. Serjeant	1	..	1
Serjeants..	5	5	10
Corporals..	5	4	9
2nd Corporals	5	4	9
Sappers	50	40	90
Drivers	66	56	122
Trumpeters	2	2	4
†Bâtmen	14	8	22
Artificers.			
Farrier and Carriage-smith	1	..	1
Serjeant Artificer ..	..	1	1
Serjeant Telegrapher ..	1	..	1
Corporal Artificer ..	2	..	2
Corporal Telegrapher..	2	2	4
Shoeing and Carriage-smiths	3	3	6
Collar-makers	1	2	3
Wheelers	2	1	3
Carpenters	1	2	3
Telegraphers	10	2	12
Total	179	136	315

Horses, Saddlery, and Harness.	Right Half Troop.	Left Half Troop.	Total for One Troop.
Horses.			
Riding.			
Officers	•13	•8	•21
Staff Serjeants	2	..	2
Non-Commissioned Officers	7	9	16
Signallers ..	11	11	22
Farrier	1	..	1
Shoeing-smiths	..	1	1
Trumpeters ..	1	1	2
Total ..	35	30	65
Draught.			
For wagons—			
Wire	36	24	60
Office	8	8	16
Store	8	8	16
Air Line ..	12	12	24
Forge ..	4	4	8
Spare.. ..	6	6	12
Total horses	109	92	201

Equipment.	Right Half Troop.	Left Half Troop.	Total for One Troop.
Carriages.			
Wagons—			
Wire	6	4	10
Office	2	2	4
re	2	2	4
Air Line	2	2	4
Forge	1	1	2
Total	13	11	24
Artificers' Tools.			
Carpenters .. sets	1	1	2
Collar-makers .. ,,	2	2	4
Farriers .. .. ,,	1	1	2
Painters .. .. ,,	1	1	2
Smiths' G.A.S., with 36-lb. vice .. .. sets	1	1	2
Telegraphers .. ,,	9	8	17
Wheelers and Saddle-tree-makers .. sets	1	1	2
Whitworth's stocks and dies .. . sets	1	1	2
Tools, shoeing, in leather case .. ,,	2	2	4

• Each Officer is allowed one troop horse, and forage for one private horse.

† Each Officer is allowed two Bâtmen, to be provided from the Reserve; they will be unarmed. One day's supply of rations and forage is carried distributed among the wagons.

A Half Troop is attached to an Army Corps: the establishment shown on p. 57 for Right Half Troops is that which is considered requisite in the event of only ½ Troop forming part of an expeditionary force. The 10 wire wagons carry 30 miles of cable (3 miles each wagon). The 4 office wagons carry instruments, &c., for 16 stations. The 4 air-line wagons carry 30 miles of overhead wire with necessary number of poles, &c.; 60 miles of telgh. can thus be constructed and worked by the Telgh. Troop. It is proposed to reorganize this Telgh. Troop and the 2 Telgh. Companies into a "Field Telgh. Corps," divided into 8 sections, each section carrying 20 miles either of cable or overhead telgh. material, or 160 miles in all. Each section at war strength will consist of 1 subtn. offr. and 50 N.-C. Os. and men. See Article on "Electric Telgh."

The establishment of the Corps of Native Sappers and Miners in Bengal consists of 10 Comps., 9 combatant and 1 M. Os., 63 British N.-C. Os., 10 Subadars, 10 Jemadars, 40 Havildars, 80 Naicks, 20 Buglers, 1000 Privates. The Educational Estabt. 5; Hospl. Estabt. 14; Native Artificers and followers 111; and a Conservancy Estabt. of 6. For pontoon companies there are 28 native artificers in addition.

The number of companies in the Madras Regt. of Sappers and Miners is the same (10). There is one M. O. and 13 combatant offrs., 32 British Warrant and N.-C. Os., 10 Subadars, 10 Jemadars, 41 Havildars, 80 Naicks, 20 Buglers, 1050 Privates, and 56 Recruits and Pension boys. The Educational Estabt. is 6; 1 Apothecary, 1 European Artificer; and 72 Native Artificers and followers. *In Bombay* the Corps of Sappers and Miners consists of 5 Companies with 1 Commandant, 5 Compy. C. Os., 1 Adjt., 1 Q. M., 2 Doing Duty Officers, 1 Surgeon, 1 Assist. Commissary, 1 Serjt. Major, 1 Q.-M. Serjt., 1 Signalling Serjt., 4 Serjts., 4 First Corporals, 4 Second Corporals, 5 Subadars, 5 Jemadars, 20 Havildars, 10 Buglers, 40 Naiques, 400 Privates and 12 boys. The Subt. Medl. Estabt. consists of 8, Conservancy Estabt. 6, and there are besides 50 Native Artificers and followers.

COMMISSARIAT AND TRANSPORT CORPS.—WAR ESTABLISHMENT.

THE TRANSPORT AND SUPPLY COLUMN FOR AN INFY. BRIGD. is formed from 1 company of the Commissariat and Transport Corps. The Company provides:—

1st. The whole of the organization for collecting and issuing rations and forage to the brigd.

2nd. The arrangements for shoeing, and the vety. supervision of the brigd.

3rd. The transport for the baggage, &c., of the Brigd. Staff, and of its own men, on the same scale as is carried with the battns.

4th. The transport, &c., for the Brigd. Supply Column, which carries 1 day's complete rations and forage for every man and horse in the brigd.

One Offr. (D.A.C.G.) acts as Senior Commisst. Offr., and is directly responsible to the G. O. C. the Brigd. for all the commisst. and transport arrangements. One Off. (D.A.C.G.) supervises the transport of the brigd. and also acts as C. O. of the men of the company. The details of the company are as follows:—

Establishment of One Company, Commisst. and Transport.	Officers.		Warrant Offrs.		S. Serjts. & Serjts.		Buglers.	Rk. & File.		Totals.		Grand Total.	Horses.		
													Riding.		
	Commisst.	Transport.	Commisst.	Transport.	Commisst.	Transport.		Commisst.	Transport.	Commisst.	Transport.		Private.	Public.	D. horses or mules.
HD.-QR. SECTION.															
D.-A.C.-G.	1	1	..	..	..	..	..	..	..	1	2	3	1	1	..
Qr.-Mr.	..	1	..	..	..	..	..	..	..	..	1	..	2	..	..
Vety. Surgeon	..	1	..	..	..	..	..	..	..	..	1	..	..	2	..
Warrant Offrs.	..	..	1	1	..	..	..	..	..	1	1	2	..	1	..
Compy. Serjt.-Mjr. ..	..	..	..	..	..	1	..	..	..				..	1	..
,, Q.-M. Serjt. ..	..	..	..	..	..	1	..	..	..				..	1	..
,, Farrier	..	..	..	..	..	1	..	..	..	1	6	7	..	1	..
,, Wheeler ..	..	..	..	..	..	1	..	..	..				..	..	..
,, Collar-maker ..	..	..	..	..	..	1	..	..	..				..	..	..
Serjeants	..	..	..	..	1	1	..	..	..				..	1	..
Buglers	..	..	..	..	..	..	1	..	..	..	1	1	..	1	..
Farrier Corps.	..	..	..	..	..	.	..	..	2				..	1	..
Collar-maker Corps. ..	..	..	..	..	..	..	..	..	1	..	7	7	..	..	..
Wheeler Corps.	..	.	..	..	..	..	..	..	1				..	..	..
Shoeing-smith	..	..	..	..	..	..	..	..	3				..	..	..
Corps.	..	..	..	..	..	.	..	..	2				..	..	..
,, as Issuers	..	..	..	..	..	..	..	2	..				..	..	..
,, as Butcher.. ..	..	..	..	..	..	..	..	1	..				..	..	..
Privts. as Butchers ..	..	..	..	..	..	..	..	2	..	10	37	47	..	..	..
,, as Drivers .	..	..	..	..	..	..	..	..	20				..	..	34
,, as Labourers ..	..	..	..	..	..	..	..	2	..				..	..	..
,, as Bâtmen ..	..	..	..	..	..	..	..	3	11				..	..	..
,, ,, ..	..	..	..	..	..	..	..	..	4				..	..	..
Total Hd.-Qr. Section	1	3	1	1	1	6	1	10	44	13	55	67	3	10	34
SUPPLY COLUMN.															
Quarter-Master	..	1	..	..	..	..	..	..	..	..	1	1	..	1	..
Warrant Officer.															
Conductor..	..	..	1	..	..	..	..	..	..	1	..	1	..	1	..
Serjeant	..	..	..	..	..	1	..	..	..	..	1	1	..	1	..
Artificer.															
Shoeing-smith	..	..	..	..	..	..	..	..	1	..	1	1	..	1	..
Rank and File.															
Corporals	..	..	..	..	..	..	..	..	1				..	..	..
Privts. as Issuers ..	.	..	..	..	..	..	..	1	..				..	.	..
,, as Butchers and Drovers..	..	..	..	..	..	..	..	3	..	5	31	36	..	..	..
,, as Drivers ..	..	..	..	..	..	..	..	..	24				..	..	44
,, as Bâtmen ..	..	..	..	..	..	..	..	1	2				..	..	..
,, ,, ..	..	..	..	..	..	..	..		4				..	..	..
Total Supply Column	..	1	1	..	..	1	..	5	42	6	34	40	..	4	44
Grand Total of one Com.	1	4	2	1	1	7	1	15	78	19	89	107	3	14	78

SUMMARY OF TRANSPORT FOR COMPANY.

Transport.	Carts or Wagons.	Drivers.	Draught horses and mules.
Head-Quarter Section.			
Carts { Butchery.	1	1	2
Carts { Water.	1	1	2
Forge wagon	1	2	4
G.S. Wagon { Brigd. Hd.-Qr. Staff.	1	2	4
G.S. Wagon { Senior Commisst. Offr.	1	2	4
G.S. Wagon { Company	2	4	8
G.S. Wagon { Supply	1	2	4
Spare	..	6	6
Total Hd.-Qr. Section	8	20	34
Supply Column.			
G.S. Wagons { For rations and forage	7	14	28
G.S. Wagons { For wood	3	10	16
Total Supply Column	10	24	44
Grand Total	18	44	78

No. I., or Wagon for the Staff of an Infy. Brigd., and No. II., or Wagon for Senior Commissr. Offr. with Infy. Brigd. (each has 2 Drivers, 4 Horses).

Articles in each wagon.	No. I. Wagon.			No. II. Wagon.	
	No.	Average wt. of 1 article.	Total approxt. wt. in lbs.	No.	Total approxt. wt. in lbs.
		lb. oz.	lbs.		lbs.
Offrs.' Baggage	1	100 0	100	1	80
,, ,,	2	50 0	100	..	..
Blankets, G.S.	8	4 12	38	8	38
Books and Stationery	2	78 0	160	..	100
Camp equipmt.	..	..	..	..	150
Kits, staff clerks'	1	20 0	20	8	160
,, bâtmen's.	7	12 0	84		
Artificers' tools	..	..	..	..	10
Implements, butchery . . . sets	1	49 0	49	..	..
Miscellaneous stores	..	..	..	..	607
Lanterns, in cases	2	33 0	33	..	..
Biscuits	20	1 0	22	..	..
,, reserve	11	0 8	6	20	22
Preserved meat	20	1 0	28	20	28
Groceries, in box	1	..	54	1	25
Corn rations	20	12 0	240	20	240
Tents, circular.	6	80 0	480	4	320
Wood for cooking	..	..	11	..	10
In wagon body.	..	12¾ cwt.		16 cwt.	
Offrs.' canteen	1	20 0	20	1	20
Flanders Kettles	2	8 8	17	2	17
Opening tools	1	4 0	4	1	4
		¼ cwt.		¼ cwt.	
G.S. wagon equipped.	..	24¼ cwt.		24¼ cwt.	
Total wt. wagon loaded . . about	..	38 cwt.		41 cwt.	

COMMISSARIAT AND TRANSPORT ESTABLISHMENT OF AN ARMY-CORPS.

Details.	Commissary-General.	Dep.-Commissary-General.	Asst.-Commissary-General.	Dep.-Asst. Commissary-General.	Subalterns or Qr.-Masters.	Total Officers.	Total Warrant Officers.	N.-C. Offrs. & Men.					Horses.			Civilian Labourers.
								Mounted.	Dismounted.	Servants.	Bâtmen.	Total.	Riding. Private.	Riding. Public.	Draught.	
Head-Quarters	1	..	2	1	..	4	..	..	2	4	4	10	9	..	..	..
Army-Corps Details	..	..	..	1	1	2	..	..	11	2	2	15	2	..	..	..
1 Co. Commisst. & Transpt. Corps	..	..	..	1	2	3	3	143	..	3	6	152	..	15	200	..
Cavly. Brigd. Hd.-Qrs.	..	..	1	..	..	1	..	..	..	1	1	2	2	..	..	..
Staff and Divnl. Details	..	..	..	1	..	1	1	..	15	1	2	18	1	1	..	..
1 Co. Commisst. & Transpt. Corps	..	..	..	1	2	3	3	108	..	3	6	117	..	19	200	..
Hd.-Qrs. 1st Divn.	..	..	2	..	..	2	1	..	3	2	3	8	4	1	..	..
Staff and Divnl. Details	..	..	..	1	..	1	..	..	8	1	1	10	1	..	..	..
1st Brigade	..	..	..	1	..	1	1	..	8	1	2	11	1	1	..	..
2nd Brigade	..	..	..	1	..	1	1	..	8	1	2	11	1	1	..	..
2 Cos. Commisst. & Transpt. Corps	..	..	..	2	4	6	6	204	..	6	12	222	..	38	400	..
2nd Division (2 Cos.)	..	..	2	5	4	11	9	204	27	11	20	262	7	41	400	..
3rd Division (2 Cos.)	..	..	2	5	4	11	9	204	27	11	20	262	7	41	400	..
Medical Services, 4 Cos. Commisst. & Transpt. Corps	..	..	..	4	8	12	12	572	..	12	24	608	..	60	800	..
L. of C. (Office)	..	1	..	1	..	2	1	..	4	2	3	9	4	1	..	..
Advanced Depots	..	..	1	..	2	3	2	..	21	3	5	29	4	2	..	100
1 Co. Commisst. & Transpt. Corps	..	..	..	1	2	3	3	143	..	3	6	152	..	15	200	..
2 Bakery Columns, 2 Cos. Commisst. & Transpt. Corps — 1st Col.	..	..	..	1	2	3	4	132	91	3	7	233	..	22	154	..
2 Bakery Columns, 2 Cos. Commisst. & Transpt. Corps — 2nd Col.	..	..	..	1	3	4	4	156	109	4	8	277	..	26	184	..
Total for 1 Army-Corps	1	1	10	28	34	74	60	1866	334	74	134	2408	43	284	2938	100

When the army consists of about only one Army-Corps the Commissariat and Transport establishments at Base and on the L. of C. may be estimated at 5 companies, distributed somewhat as follows :—

Details.	Commissary-General.	Dep. Commissary-General.	Asst. Commissary-General.	Dep.-Asst. Commissary-General.	Subalterns or Qr.-Masters.	Total Officers.	Total Warrant Officers.	N.-C. Offrs. & Men.					Horses.			Civilian Labourers.
								Mounted.	Dismounted.	Servants.	Bâtmen.	Total.	Riding.		Draught.	
													Private.	Public.		
Lines of Communication	..	..	4	6	6	16	11	..	110	16	27	153	20	11	..	100
2 Cos. Commisst. & Transpt. Corps ..	..	..	..	2	4	6	6	286	..	6	12	304	..	30	400	..
Base	..	1	..	..	..	1	1	..	4	1	2	7	3	1	..	..
3 Cos. Commisst. & Transport Corps (1 dismounted)	..	..	..	3	6	9	9	306	..	9	18	333	3	33	400	..
Transport Direction	..	1	..	1	2	4	..	6	..	4	4	14	6	2	..	..
Local supply—base	..	..	1	..	1	2	1	..	7	2	3	12	3	1	..	..
Reserve Depot	..	..	1	1	2	4	2	..	22	4	6	32	5	1	..	100
Bakery, Cattle, and Fuel	..	..	1	..	4	5	3	..	56	5	8	69	6	3	..	..
Base, HP.	..	..	..	1	1	2	1	..	2	2	3	7	2	1	..	..
Landing	..	..	1	1	..	2	6	..	2	2	8	12	3	2	..	200
Accounts	..	..	1	..	..	1	2	..	5	1	3	9	2	..	..	..
Total Army-Corps	1	3	19	43	60	126	102	2464	542	126	228	3360	96	369	3738	500
4 Hospitals outside zone of active operations	..	..	4	..	8	12	8	..	..	12	..	12	..	..	..	..
As Agents, ditto	..	1	5	..	..	6	..	..	..	6	..	6	..	..	..	..
	1	4	28	43	68	144	110	2464	542	144	228	3378	96	369	3738	..
														4107		

Land Transport.—A most difficult question for all generals. Happ is he who can reduce the amount of impedimenta to be carried. In our nex war it is hoped that the men of the Transport Companies will be dresse and equipped roughly, but in a workmanlike manner, for the hard wor they have to do. In my opinion the result of all our war experience for th last 30 years goes to prove, that it is a fatal mistake to place the transpor of an army under the Commissariat Dept. Transport to be efficient mus have a perfect military organization, and that it cannot receive when unde the charge and command of a Civil Dept. of the army. At the same tim it is essential that whilst organized upon Military principles, the offrs. an men employed should remember they are employed upon noncombatan duties. Our old Military Train was a failure because it was armed, equippe and dressed in Dragoon fashion; the offrs. were "above their work," an all ranks seemed to be too "fine gentlemen" to condescend to the arduou duties connected with the business for which they were invented. Ou present Transport Companies are well organized, but in the field they shoul be worked under a Director of Transport, who should be an officer holdin combatant rank in the army, and not under the C. G., who is himself th largest employer of transport during war. The transport should o organized as a separate dept. under the direct orders of the G. of C. Cal upon the Line for whole battalions of soldiers to do the transport wor should not be permitted. Before undertaking any military operation, n matter what may be its probable or possible magnitude, I would impre upon the commander to provide beforehand for the conveyance of his store baggage, &c., by a well-organized transport service under military offrs every small detail being well thought out and provided for. On the manne in which this is done will depend in the largest measure the success of th undertaking.

In the British army there is a prejudice in favour of pack animals, whic has come down to us from the Peninsular war. Nearly all our regulation regarding baggage to be carried in the field used to be based upon th calculation of what bat animals can carry. The worst transport, and th most difficult to manage, is that by pack animals. As a rule, there will alwa be guns with an army, and wherever it can go wheeled transport can follo Pack animals are continually being laid up with sore backs. A train baggage is on the road, say 10 hours; during that time the pack anima have no rest, as they cannot be unloaded during temporary halts. It difficult and tedious to load them well, and loads frequently fall o occasioning delay and confusion. Two pack mules will carry a loa exclusive of pack-saddle, of about 300 or 350 lbs. The same 2 animals w draw a load of about 800 or 1000 lbs. (in a light cart), according to th nature of the roads. The question of driving *versus* riding is now bei considered upon its true merits, and it is to be hoped that a large proporti

our conveyances will be driven in future. A horse loses his power of stained draught by having a driver on his back. During the late war in merica every species of transport was tried; animals, whether mules or orses, carrying loads on their backs, were given up at an early period of e war, and latterly the whole transport of both armies, except the nveyance of the sick, was performed by long wagons drawn by 6 mules or orses, and driven by the man who rode the near-wheeler. Animals of the ansport service require but little grooming during war, so that 1 man is nple for the care of 4. The men should be armed solely with a good ntral fire revolver, and be clothed in easily-fitting blouses made like orfolk jackets. All ironwork about the carts and harness should be cquered. The men should be better paid than the other branches of the rvice, and only steady men allowed to enter it.

The Director of Transport should have entire direction of all the transport the army that is not specially allotted—like for example Regtl. Transport Corps; but even this reserved Transport will be, when the army halts, ade over to him, while the troops remain stationary, by the G. Os. C. ivns. &c. for general use. All remount depôts must be directly under him, d under the orders of the G. O. C. in the field, he should have sole anagement of everything connected with the transport duties of the army, e raising, organization, maintenance and working of all the auxiliary and her transport. He must work directly under the orders of the G. of C. e should be a military officer of rank selected for his powers of organization d his special knowledge of the subject.

Military Transport divides itself naturally into two classes: 1st. that nich moves with the troops, and which has a complete military organization th trained officers and soldiers: the 2nd. is the great general or auxiliary ansport which works in rear of the advanced depôt, and is generally locally otained; it may be by canal or river in boats, and it will then require special organization. The more it is directly under military officers, and orked by disciplined soldiers, the more effective it will be.

The 1st class with us is divided into,

(a) Regimental Transport,

(b) The Commissariat Transport Companies attached to Divns., Brigds., d Departments.

On the march all our transport moving with the army is divided into 1st d 2nd Lines; with the former is all that is daily required by the troops, d which keeps as near them as possible on the march; with the latter are e tents, when they are to accompany the army, the Fd. Hospls., Bakery ain, Ordnance Reserve stores, &c.

Regimental Transport.—At present all nations recognize the importance a well organized regtl. transport: but, with us, it is more important than ith foreign armies, because our Commissariat transport establishment is so

Military conveyances. The wagons and carts, &c., for military transpo should be light but strong, which ends can only be secured when they a made of sound well-seasoned wood. Our wagons, &c., planned and made

DESCRIPTION OF WAGONS AND CARTS NOW IN USE.

	NAMES OF WAGONS, CARTS, ETC. * To hold 8 wounded men=about 14 cwt.	Number of Horses.	Wt. complete with Pole or Shafts, Drag-chain, &c. &c.	Weight of load.	Internal dimensions of Body (partitions removed). L.		W.		D.		Track (outside measurement) in ft. and Inches.		Tonnage for Shipment.	
			cwt.	cwt.	ft.	in	ft.	in.	ft.	in.	ft.	in.	tns.	
1	Flanders wagon, R.A.	4	17¼	30	10	1½	3	6¼	1	7	5	2	5·80	No. 3 is the only wagon with equirotal wheels: No. 6 has wheels of 2′ 4″ and 4′ 8″ in diameter; 121 and 162 lbs. weight respectively.
2	Canadian do. . .	2	13	20	9	8½	3	2	1	3	4	8	5·49	
3	G. S. do. (mark I.)	4	17¼	30	8	9	4	0	2	0	5	10	3·5	
4	Do. (do. II.)	4	17⅝	30	9	7	4	1½	2	0	5	8	4·36	
5	Do. (do. III.)	4	18	30	9	8	4	1½	1	6	5	8	4·304	
6	Do. (do. IV.)	4	19	30	9	8	3	8	1	8	5	2	4·041	
7	Spring do.	4	23¾	40	10	1	4	3	2	0	5	2	4·177	
8	Bread and meat do.	4	29¾	40	10	4	3	11	2	9½	5	2	8·604	
9	Bakery do.	4	27	40	10	4	3	11	2	9½	5	2	8·604	
10	Steam oven . . .	4	42¾	..	..		..		..		5	9	10·71	
11	Pontoon (mark III.)		16¼	..	..		..		..		5	10	7·502	
12	Trestle (mark III.)		16¼	..	..		..		..		5	2	7·502	
13	Cart, spring . . .	2	12	20	5	5½	4	1	1	11	5	2	2·443	
14	Cart, tip (mark I.) .	2	11½	20	6		4	1	1	11	5	2	2·112	
15	Do. (mark II.) .	2	8¾	15	5	6	3	4½	1	9	5	2	2·979	
16	Cart, G. S. . . .	2	6⅝	15	6		4	1	1	8	5	2	2·079	
17	Do. Maltese. . .	1	5½	6	..		..		..		5	2	1·75	
18	Cart, S. A. A. . .	2	8½	12	..		..		..		5	2	2·468	
19	Wagon, Ambulance	2	17¾	..	..		..		..		5	2	3·625	
20	Wagon, Medical .	2	17⅝	..	..		..		..		5	2	8·292	

N.B.—In this table, L. stands for length; W. for width; and D. for depth.

No. 6 is now the transport wagon for the army; no more of other patterns will structed. Except when the roads are very good and level, and the horses large, and in very good condition, all our transport wagons are so heavy, that when fully they will requre 6 horses each; the ambulance wagon, when loaded with 8 men, would weigh over 32 cwt: with 2 horses it would be immovable, except on the and most level roads.

oolwich, are about the heaviest used in any army ; they are apparently nstructed not only to support the ordinary strains of a campaign, but to also proof against all possible accidents or contingency that could befall em in any and every part of the globe. This is, in my opinion, an absurd ecaution ; it would be amply sufficient if they were made proof against the dinary and probable accidents that may be expected in an ordinary mpaign. The result of our present system is, that the number of horses otted to some of the most cumbersome conveyances, can, in some instances, arcely draw them when loaded according to regulations. It is better to ve light carts and wagons, and undergo the inconvenience of an occa-nal break-down and loss of a wagon, than that every cart and wagon ould be so heavy that no break-down is ever possible. The loss of a agon now and then is nothing, but the waste of strength in draught casioned by heavy material is a serious matter.

The wagons in use in South Africa were—

Cart or Wagon.	No. of bullocks.	No. of mules.	Weight complete.	Weight of load.	Height of draught.	Track.	Wheels.				
							Weight lbs.		Dish inches.		Width of tire.
							Fore.	Hind.	Fore.	Hind.	
			cwt.	lbs.							in.
Colonial ox wagon with tent	16 to 20	..	29	4000	2′ 3″	5′ 3″	140	168	2	3½	3
Do. with half tent. .	Do.	..	24 to 28	Do.	Do.	5′ 2″	196	244	1½	2⅜	Do.
Colonial mule wagon	..	8 to 10	16	2000	2′ 6″	Do.	203	272	½	½	2½
merican buck wagon	14 to 18	10 to 12	22	2000 to 3000	Do.	Do.	192	224	¾	1	2¾
Do. Do.	..	10	20	2000	Do.	Do.	98	164	Do.	¾	2½
American box wagon	..	8 to 12	13	2000	2′ 8″	Do.	136	168	⅞	1¼	2¼
Scotch cart	..	6	6	1000	2′ 9″	5′	144	..	2½	..	2½
		4	5	800	2′ 6″	5′ 4″	148				3
Colonial 'bus. . . .	..	6	14½	..	2′	5′ 2″	90	112	⅝	2	2

The wagons used during the Red River expedition weighed, complete with t and drag-chain, 11 cwt. 1 qr.: they were drawn by 2 horses each; their ordi load over the very bad road used was from 1600 to 1900 lbs. The road was rough, and they stood the work well. Similar wagons are commonly used all Western Canada. A number of 2-wheeled carts were tried over the same roa first starting, but after a couple of days' trial they were given up, the road being hilly for them. The 2-wheeled carts used by the Russians in 1877 in Armenia b down also from the same causes. The Maltese cart was used to great advantag the Crimea; with one mule, on a good road its load should be about 650 lbs. cart weighs from about 5½ cwt. to 6 cwt. All wagons and carts should be fitted breaks; the break used in South Africa is very good and is very simple in cons tion. They should also be supplied with a tarpaulin to keep their loads dry in weather. The 18′ buck wagon when fitted as an ambulance tohold 3 men lying 6 men sitting, weighed 42 cwt.

Traction engines have never yet been effectively tried for trans purposes during war. Although they are useless except on fairly roads, they could, it is thought, be used to advantage in some count Their use was attempted during the Ashanti campaign, but the steepne the inclines on the road forced us to abandon their use. The trac engine most suited for military purposes is the "Steam Sapper;" when empty 102 cwt. 1 qr.; add for coals 3 cwt., water 10 cwt., and d 168 lbs., and the total weight when running will be 5 tons 16 cwt. 3 The wt. on driving wheels 85 cwt. 3 qrs., on leading wheels 31 cwt total greatest width 6′ 1″ Its consumption of coal is 50 lbs. an hour used as a stationary engine, on a road 49 lbs., and as a locomotiv rails 37 lbs. per hour. Under those 3 conditions, its consumption of per hour is from 30 to 40 galls., from 35 to 48, and from 30 to 40 The tank of engine contains 70 galls., that of tender, 50. Water is req every 6th mile. In a day of 10 hours' work as a stationary engine it rec 1½ lb. of tallow and 1½ lb. of lard oil; if used on road or rails it rec ¼ lb. more of lard oil, and under all circumstances ½ lb. of cotton wast diem. The "Steam Sapper" on a good road will draw a load equal own wt. up an incline of $\frac{1}{10}$, and twice its wt. up to $\frac{1}{20}$, and 3 times its wt. over the level or up slopes not exceeding $\frac{1}{30}$. Its maximum eff load is 10 tons on roads with slopes not exceeding 1 in 11, with pre not above 75 lbs. per sq. in. Its average speed on fair roads 2½ to 3 per hour; weight of truck 2 tons; the net load therefore with 1 ca would be 8 tons, with two, 6, and with three, 4 tons. These traction en are worked to the best advantage in pairs, each drawing 2 or 3 carri they can then help one another when in difficulties.

Transport Coolies.—In many of our small wars transport coolies played an important part, notably in the Ashanti campaign, for animals could live on the Gold Coast, the whole transport consis

coolies, men, women, and even children being employed. They carried the loads on their heads, the common load being 50 lbs. for a man, but many carried 60 lbs. and some even 70 lbs., and the women about 40 lbs. each. Similar weights were carried in China by the Coolie Corps, the load being either carried in 2 equal portions, 1 at each end of a split bamboo, or 2 loads were carried between 2 men, in 1 parcel slung to the centre of a pole. In the Loochai and Duffla expeditions, the wt. of the load was only 40 lbs., as each carrier had to carry his own kit besides, which weighed over 21 lbs. In China the Coolie Corps was organised in comps. of about 300 coolies each (it was intended they should have been 400 men each), under the command of an English offr. To each comp., in addition to the English offr., there was 1 company serjt., 4 other serjts., 28 British soldiers, 4 Chinese headmen, and 4 Chinese assistants. The staff of the corps consisted of 1 commandt., 1 2nd in command, 2 subalterns, and 1 sergt. In the Duffla expedition the Coolie Corps consisted of 4 Divns., under 1 commandt. Each Divn. consisted of 1 British offr., 3 British N.-C. offrs., 12 sirdars or mates, and 300 carriers ; each Divn. was divided into 3 comps. of 100 carriers each, under a N.-C. O. with a sirdar or mate for each of its 4 sections. In the organization of a carrier corps, the customs, habits, and prejudices of the natives to be employed must be studied, for upon them the details of the organization must very much depend. In most cases savages work best under their own chiefs or headmen ; the element of white men is required to ensure punctuality, possibly honesty and obedience to orders ; in many cases it is only possible to ensure to the indivdual carrier the payment of his just wages by having the payments made direct to the carrier by an English offr. The native carrier transport in Ashantee was thus allotted per battn. of English troops. For 650 soldiers at 1 carrier for every 3 soldiers, 217 carriers ; 30 offrs.' baggage, at 1 carrier per offr., 30 ; cooking pots for 30 offrs., at 1 to every 3 offrs., 10 ; regtl. reserve of S. A. A. (Snider), 50 rounds for 580 men (70 boxes), 70 carriers ; 82 camp kettles (Flander's pattern), 10 by 1 carrier, 9 carriers ; regtl. orderly room and Q. M.'s office, 2 ; for 40 cots (for sick carriage), at 6 carriers each, 240 ; native orderlies for 2 M.Os., 6 ; headmen, 1 per 25 carriers and 3 spare, 28 ; making a total of 616 natives, and adding 38 (6 per cent.) as spare, the total number of natives for each battn. was 654.

Ox transport can be used in the rear of an army along its lines of communication with very great advantage in a country like South Africa, that abounds with grass ; there the ox will not work or even live many months upon any other food. In India, Turkey, and throughout the East, the ox, however, thrives well on chopped straw. The great advantage of ox transport in South Africa is that the oxen require to have no forage carried for them, the country supplying all they require. During the summer months of July, August and September, when the old grass has been burnt, and the young

grass has not yet come up, to move with only ox transport is difficult. Ox transport in South Africa can travel from 12 to 14 miles a day, but no more than about 60 miles a week can be expected from it. The average rate of march for a single wagon is $2\frac{1}{2}$ miles an hour, which comes down to 2 miles an hour for a large convoy. Ox transport should be divided in South Africa into sections of 10 wagons each, with a white man as conductor for each section, there being an officer to about every 50 wagons. The best and surest work is obtained from ox transport when its movements do not in any way depend upon the movement of troops or of convoys drawn by mules or horses. Oxen should be worked by night as much as possible, and never during the greatest heat of the day, nor in wet weather nor in larger numbers than 50 wagons together; if that number be exceeded, there will be delays and difficulties about grazing. The ox takes several hours to feed; they should be well guarded by mounted escorts in an enemy's country. It is very necessary they should be accustomed to the language or tone of voice of those who drive them. The following spare gear was issued in South Africa with every section of 10 wagon: 1 jack-lifter, 1 trek touw, 10 yokes, 40 riems, and 20 yokes-stays.

Animals used for Transport Purposes.

The Horse may be said to be in the prime of life from 5 to 10 years old; he weighs from 1000 to 1200 lbs., according to his height; the former is for the saddle, the latter for the draught horse. For Cavly. and R.A. purposes his minimum height should be 15 hand 2". The average walk of a horse is a mile in 16 minutes, 3·75 miles an hour, making 120 strides (110 yds.) each minute, the stride being 0·916 yd.; the regulation rate of walk for our Cavly. is "not to exceed 4 miles an hour." The average trot is a mile in 8 minutes (7·5 miles an hour), making 180 steps (220 yds.) each minute, the stride being 1·22 yd. A good trotter will do from 7 to 8′ at a stride. This is a slow trot; when going at a good pace, a horse trots easily $8\frac{1}{2}$ miles an hour. Our regulation trot of manœuvre is 8 miles an hour, at which pace 235 yds. are passed over in one minute. The gallop is about 100 strides (352 yds.) each minute, that is, at the rate of 12 miles an hour, the stride being about 10′. The gallop of manœuvre in our Cavly. is at the rate of 12 miles an hour. A "horse's length" (a measure of distance) is 8′. A horse occupies in ranks 3′ × 10′, and when picketed, from 3 to 6′ × 9′; he should have in stables not less than 1200 cub. ft.; stalls should be not less than 4′ 5″ × 9′. When horses are used as pack-animals, their load should be 200 lbs., including pack-saddle. It has now been settled that all horses are to be picketed to ropes stretched between picket posts or waggons. *In riding long distances* on one horse, the long halts for rest and feeding should not, if possible, be less than 3 hours.

Stable management.—The efficiency of horses, ponies, and mules depend

much upon the care taken of them after the march, or when stationary at any time during the war; their diet should be carefully attended to, and occasional change is most beneficial; when the climate and circumstances admit, there should be *stables* of 1 hour duration 3 times a day; the routine to be somewhat as follows:

Morning stables to be early, ½ past 5 or 6 A.M.: stables or horse lines to be cleaned out, animals watered, feed with about ⅓th of hay ration; pick and wash feet, and groom; sponge or wipe with wet cloth, docks, eyes and nostrils, give 1 or 2 lbs. of corn: clean up again: clean saddlery and harness.

Midday stables.—Water: if horse is wet or muddy, rub well down: feed with half the corn still left and ⅓th of hay ration: clean up stables or horse lines.

Evening stables, about 5 or 5.30 P.M. Water: clean and dry feet: groom: feed with remainder of corn and ⅓th of hay ration: bed down, and clean up stables or horse lines: give remaining ⅔th of hay the last thing at night.

Watering.—As a general rule, all animals should be allowed to drink as much as they like: a few horses will drink inordinately and they must be checked. Horses, mules, and ponies should be watered at least three times a day: the cavalry horses in the march across the Bayuda desert were over 70 hours without water: they were mostly Syrian horses. Give only a little water before marching in the very early morning, but during the march, let them have short drinks whenever possible: avoid giving water for at least 1, if possible 2 hours, after a full feed. When very warm from work give no water, until cool: a long drink is dangerous when hot from work: it is a good plan to water when about 1 or 2 miles from camp, and then to walk the horses slowly to their lines for the night: always give lake or river water in preference to that from springs or wells. A horse ordinarily drinks about 1½ galls. at a time, and takes about 3 minutes to do so: he requires from 6 to 8 galls. per diem.

Feeding.—Horses must not be cleaned or disturbed when eating their corn. In the field, horses and mules must be fed as occasion offers: it is better to feed them often with small quantities at a time, as their stomachs are very small; work on an empty or very full stomach is bad for them. Bran is excellent as a change, and when possible a mash may advantageously be given twice a week, instead of the corn at the evening stables. Green food, especially in summer and for young animals, is very good when they are not working hard: carrots, ½ bushel a day, also good: sick animals will often eat green food or carrots when they will touch nothing else. On the march, and in the field generally, let them pick up what they can during short halts and when they can. When absent at feeding hour, they should not be given two feeds at next feeding time, if

there be time to give them separately with an interval between each, before bedding-down for the night. At the opening of a campaign, teach young animals to eat the grain of the country. Horses will eat leaves when grass is not to be had; those of the elm are the best. Horses and ponies, and especially mules thrive well and can do hard work on bamboo leaves. Chopped straw is a good substitute for hay; horses have done work for some considerable time on the thatch taken off houses. In rainy weather grass should be piled in heaps, and the driest parts given first. Give sparingly all food that the horse is not accustomed to.

Upon the quantity and quality of the previous year's harvest depends very much the extent to which you can draw supplies of food for man and beast from the theatre of war. The daily ration for all horses in the field is 12 lbs. of oats and 12 lbs. of hay. (See articles on *Hay* and Oats.) Horses employed on heavy draught work are allowed 2 lbs. of oats and 2 lbs. of hay extra. The ration in the Crimea for the former was 12 lbs. of oats or barley, and 16 lbs. of hay or chopped straw. Latterly, 1 lb. of bran was issued in addition for all horses, and 1 lb. of bran was always substituted for a similar amount of grain when required. The allowance of oats for the artillery was afterwards increased to 14 lbs. When not doing very hard work the ration of oats can be reduced to 10 lbs. In Turkey, where green forage was issued, 28 lbs. were given in lieu of 10 lbs. of hay or chopped straw. When no grain is to be had, the ration of hay should be 32 lbs., or 20 lbs. of unthreshed corn forms a good ration, 14 lbs. of bran = 9 lbs. of oats. When horses are stabled, 8 lbs. of straw should be issued per horse as bedding.

In India, Arabs and small horses have 8 lbs., and colonial horses 10 lbs. of gram daily. The grass provided by the grass-cutter is about 30 lbs. per horse daily. When none is to be had, 12 or 15 lbs. of hay should be given instead. Whenever gram or any sort of beans is given to animals, it should be split, and, if possible, bruised as well as soaked before eaten. In South Africa the forage ration for horses ranged from 10 to 12 lbs. of oats or Indian corn, and as much grass as they could pick up when turned out knee-haltered to graze; sometimes it was 8 lbs. of grain, and 10 lbs. of oat hay, and ¼ oz. of rock-salt per horse was sometimes added. At Suakin the ration for Arab and country horses was, 8 lbs. of barley and 10 lbs. of chopped straw (the boussa of India, the tibbiu of Egypt). When not actually at work bran was freely given at the rate of 2 lbs. to 1 lb. of corn. When compressed forage was issued, the ration per horse was 17 lbs. Horses, when not worked hard, will thrive well on 6 gallons of water a day, but require from 8 to 12 when at hard work, according to the climate. A couple of gallons extra should be allowed, when possible, for washing them. In Egypt or the Soudan the Arab and native horse will do well on half those quantities for long stretches at a time.

Grooming.—Grooming in moderation is all that horses on service should have. To leave horses unattended to when sweating, especially if in draught, when the harness and saddles are removed, is a fruitful source of chest and throat diseases. That continual grind at "stables" wears out men's spirit, and it is far from certain whether (carried to the extent it is in our service) it does not render horses very susceptible to cold when picketed in the open in bad weather, by opening the pores of the skin too much. In this, as in most other things about our army, we try to carry into the field the habits of life in barracks in England, and "go in" too much for appearance. In the field all animals should be groomed at least once a day, the mane, tail, and heels being especially attended to. The legs and heels should not be washed in the field; let the mud dry on them, and brush it off then with the hand or a wisp. The dock, eyes, and nostrils should be sponged or wiped with a wet cloth whenever the animals are groomed.

In grooming, begin cleaning at the off hind-quarter, and go to the head; first wisp and rub the dirt and dust out, and then brush until quite clean. All brushiug is to be done against as well as with the grain, preserving as much as possible a straight arm. No circular motions are to be allowed. The hand not immediately in use must be kept upon the horse, to prevent his closing too much on the groom. The curry-comb is also to be kept on the back of the hand, and never to be used on the horse. No horse is well cleaned unless he is quickly cleaned.

After a march.—Immediately after each day's march the feet are to be picked and carefully examined, heads and legs thoroughly wisped and dried, the backs carefully examined to see that they have not been galled or hurt in any way. The shoes should be looked to and loose ones refastened. All mounted offrs. should see to this themselves, as grooms are careless. *Wounds* occasioned by kicks and sprains should be continually fomented with hot water at first, to reduce the pain and inflammation; cold water and bandages to be applied afterwards. If you can rest the horse for a couple of days, give a mild dose of physic. For bullet wounds, applications of cold water, as with men, is the only cure. All gashes, or sword cuts, must be sewn up as quickly as possible. Officers going on detached duty away from any Vet., ought to take a small supply of horse medicine with them, such as balls, and discutient and astringent powders. *Hoof ointment*, for brittle feet or sand cracks, is made of tar and train oil in equal parts. *For mange*, one part of this ointment with two of train oil is good preparation; give a dose of physic, reduce the corn ration and give as much green food as possible. *Galls and sore backs:* relieve the horse from all pressure on the injured spot, and apply hot fomentations; if the skin is broken apply *healing lotion* of common carbolic acid, ½ oz., spirits of turpentine, 1 oz., in 1½ pints of water. *Purgative*, aloes, 5 drs., ginger, 2 drs., gentian, 2 drs., in 1 pint of warm water. *For colic*, rub the belly, inject warm water

(3 pints) give as *colic mixture*, tincture of opium, 2 oz., spirits of turpentine, 2 oz., in 1 pint of warm water.

Hogged manes.—I cannot write too strongly against the fashion of hogging manes and cutting tails extremely short. I have seen cavalry regts. and batteries of artillery at home which could not have been sent into the field where flies abounded owing to the tails of the horses having been so rendered useless by their silly C. O.'s. I wish all such gentlemen could be picketed out themselves in a fly country, with their hair cut quite close and their hands tied. Their sufferings then would teach them a lesson.

Shoeing.—It is much to be regretted that all offrs. in passing out of the Staff College, should not be obliged to learn how to shoe a horse. I strongly advise all who have an opportunity of learning, to avail themselves of it. Two spare shoes, with nails, should be carried on service with every horse : these shoes should be especially made to fit each horse ; and when a shoe is cast, not a moment should be lost in having it replaced. If obliged to do so yourself, use the least number of nails that will keep it on for the time, and in driving them in, incline them well outwards, feeling for the end along the crust of the hoof with the fingers of the left hand ; if, after the first few taps of the hammer, you do not feel the point coming out, draw the nail, and try it at another hole. A great part of the art is, in pointing the nail, to give it a slight bend outwards. The shoe to be beveled off, so as to leave a space, and prevent pressure on the sole. It is not to be grooved, or fullered, but simply punched, and the nails countersunk. Calkin is only to be applied to the hind shoe, and is to be confined to the outside heel. The inside heel to be thickened in proportion. The wt. of the shoe to be from 12 to 15 oz., according to the size of the horse. As a general principle, horses are to be shod with not less than 6 nails in the fore and 7 in the hind shoe ; and the shoe is not to be attached with less than 3 nails on either side. In preparing the foot for the shoe, as little as possible should be pared out, and the operation should be confined to the removal of the exfoliating parts of the sole. Both fore and hind shoes to be made with a single clip at the toes. The same shoe unless very little worn, is not to be removed and reapplied in consequence of a horse having been sick. No hot shoe, under any circumstance, to be tried on a horse's foot. Every horse to be newly shod once in a month.

THE MULE comes next to the horse in usefulness during war in most countries. He is far less liable to disease, and requires less grooming and attention than the horse, and is about twice as longlived : he almost rivals the horse in usefulness for general military purposes. The mule should not be worked under 4 or 5 years old, but they last well until 20 or 25 years of age ; the female is the most docile and the entire is often vicious and seldom carries well. In height they range from 13 to 16 hands. The average load of an average mule may be taken as 160 lbs. not including wt. of pack

saddle. Very fine mules if well fed will, however, carry as much as 300 lbs. ; height varies from 13 to 16 hands. They will eat almost anything, but are very particular and whimsical about their drinking water. The mule from the male ass and the mare is the best ; their voices take after the sire. The real value of the mule is felt most strongly in mountainous countries, where, as a rule, he is more useful even than the elephant, which requires good food to keep him in working order ; a mule will live, be fat and do useful work under circumstances that would kill the elephant. He can travel easily 3 to $3\frac{1}{4}$ miles an hour when loaded, and is very surefooted over rough, stony and precipitous or hilly roads. The mule is a good swimmer, and may be trusted to cross rivers in safety. He suffers much, however, from leeches and other jungle pests. His skin is tougher than that of the horse, and he is less liable to a sore back. In Abyssinia the load was reduced to 100 lbs. (exclusive of the pack-saddle) owing to the steepness of the roads. In Bengal a mule carries 2 boxes (1200 rds.) of M. H. ammunition. See article on "Ammunition" for information as to the conveyance of S. A. A. on mules in Europe. The Cyprus mule is an excellent beast of burden, and according to size will carry a load of from 150 to 220 lbs. for a march of 20 to 24 miles in about 6 or 7 hours, according to the nature of the road or path.

PONIES.—The common pony of India is inferior as a transport animal to both the mule and donkey. The good Kabulee pony will carry a load of 160 lbs., but the ordinary pony can only carry about half as much. The pony of Cyprus carries a load of from 130 lbs. to 200 lbs., and will do about 20 to 24 miles a day.

Mules and Ponies in the Crimea were given 10 lbs. barley and 12 lbs. of chopped straw. In America, where mules were very extensively used during the Secession war, the ration was 8 lbs. hay and 11 lbs. grain daily. In South Africa the mule ration was 10 lbs. of grain (mealies) or 20 lbs. of oat hay, or half of each together, and $\frac{1}{2}$ oz. of rock salt. They were at the same time turned out knee-haltered to grass almost daily. When regularly grazed they thrived well on 8 lbs. of grain. In Cyprus the mule ration (where they are not allowed to graze) is 8 lbs. of barley and 24 lbs. of chopped straw ; that laid down by our regulations was 10 lbs. of hay, 8 lbs. of barley, and 1 lb. of bran ; 2 lbs. of barley extra was allowed in winter when they were worked hard. In India, under similar conditions, it is 10 lbs. barley or 5 lbs. gram, and 12 lbs. chopped straw or hay. At Suakin the ration was 6 lbs. of barley and 8 lbs. of chopped straw. Mules, ponies and asses require 6 gallons of good water daily. Mules are more particular about the water they drink than most other animals.

The equipment gear for horses, mules, and ponies, is as follows :—

Pack saddles.—There are 3 patterns used by us at home ; the larger weighs $32\frac{1}{2}$ lbs., the second 28, and that for cacolets and litters 33 lbs. ; these weights include the pannels and girth straps, which are screwed on to

the saddle trees; the weight of the harness is 23, 21 and 23 lbs. for those three patterns respectively; the cover used to protect the loads weighs $4\frac{1}{2}$ lbs., and the baggage straps $5\frac{1}{4}$ lbs.

Mule equipment.—In India the mule and pony saddle complete with suletah and loading rope weighs 48 lbs. In India the following stores are issued with each mule or pony:—1 head stall with chain or rope, 1 heel rope or chain with shackle, 1 jhool and surcingle, 1 thobra or nose bag, 2 pegs (iron pegs were used in Afghan war), 1 wooden mallet to every 50 animals, 1 currycomb and 1 hand rubber to every 3 animals, 1 pack saddle complete, 1 bridle, 1 loading rope, 1 suletah or koorja; when iron pegs are used 1 iron hammer should be issued for every 3 animals. Picketing chains of light, galvanized iron are better than those made of rope for Indian work.

THE BULLOCK is admirable for slow draught, especially over rough roads, or through forests, or other places where there are no roads at all. They stand fire better than any other animals, and used to be employed extensively in India for draught in Fd. Batts. They must not be hurried; their ordinary pace is from 2 to $2\frac{1}{2}$ miles an hour; if used over hard roads they require shoeing. They want but little care, and thrive well on poor food. They attain their prime at 6 yrs.; age to be known by annular swellings on horns, allowing 3 yrs. for the 1st ring, and 1 for each of the others. They are used in many parts of India as pack-animals when they carry a load of about 160 to 200 lbs., including the weight of their equipment. In the plains of India the wagon or cart with 2 bullocks carries a load of 800 lbs., and with 4 bullocks 1600 lbs. In the recent operations in Afghanistan, the regulation load for the 2 bullock cart was fixed at 8 maunds, say 655 lbs. In Bombay these figures are 700 and 1300 lbs. respectively. In India the space allowed in shed stables is 10 by 4′ per bullock. The 2 bullock cart of Cyprus will carry 1000 lbs., and do from 20 to 24 miles in about 6 or 7 hours.

Rations for Bullocks that are used in India for draught in the siege train and artillery batteries are 4 to 6 lbs. of gram, and 12 or 14 lbs. of chopped straw. Oxen in the Crimea received 6 lbs. of oil cake and 12 lbs. of chopped straw; or, in the absence of oil cake, 6 lbs. of barley; they require from about 6 to 8 gallons of water daily. On board ship their ration is 2 lbs. gram 12 lbs. of hay or kirbee, and 6 galls. of water. In Cyprus the ration was $5\frac{1}{2}$ lbs. cotton seed, $5\frac{1}{2}$ lbs. bran, and 8 lbs. of chopped straw. They require from about 6 to 8 galls. of water daily.

Buffaloes in the Crimea received 20 lbs. hay or straw, 15 lbs. oats, or 12 lbs. bran, increased to 30 lbs. when no hay or straw was issued.

Pack bullock equipment consists of pad, suletah and loading ropes, all together weighing about 50 or 60 lbs.

CAMELS are used in the East from 3 to 16 yrs. of age; they are in their

prime from 4 to 12 yrs. old ; about 7′ high (to top of hump), about 8′ long from nose to tail, occupies laden about 70 sqr. ft., and unladen about 25. In Algeria the camel lives to 16 or 18 yrs. of age, and like the horse and mule dies then from the teeth being worn out and unable to masticate its food ; it is used to carry loads when three yrs. old ; all these Algerian camels are geldings. Elsewhere, they do not begin regular work until 5 yrs. old, are in their prime at 9, and are worked up to 20 and 25 yrs. of age. The Bactrian camel has 2 humps, whilst the Arabian animal used in India and in Egypt has only one. Pace about 2 or 2½ miles an hour, kept up steadily for the longest marches ; the pace of the camel of Sind is said to be exactly one pace of a yd. in length per second, which would be at the rate of 2 miles 80 yds. an hour. The day's journey of the desert or Soudan camel is from 16 to 25 miles, according to the nature of country. When worked for 3 days without water, its strength runs down rapidly, and after long journeys of 5 or 6 days without water, it requires several days to regain its strength. If allowed to go down in strength below a certain point, it will take weeks, perhaps months, to pick up again. The swift riding camel of India does about 7½ or 8 miles an hour for many hours over a level country ; its stride is from 6½′ to 7½′. Our best riding camels in the Soudan could do 5 miles an hour for 4 or 5 hrs., but in long journeys 4 miles an hour on the average is as much as you could expect from them. In India generally, the load should, as a rule, be from 300 to 480 lbs. (not counting saddle, &c.) according to the size of the camel. In Afghanistan the regulation load was 4 maunds, say 330 lbs. The carrying power of the camel is in India calculated to be equal to 2 mules or pack bullocks. Sir C. Napier fixed the camel load in Sind at from 250 to 300 lbs. exclusive of saddle. The average load for good Egyptian camels is 600 lb. exclusive of saddle, &c., but the Soudan camel carries only 300 to 400 lbs. The Algerian camel as loaded for French operations carries from 330 to 350 lbs., but as a rule in French trains the load is reduced to 264 or 286 lbs. They divide the load into 2 equal parts, never into 3. Two men, are required to load a camel. The pace of the train is about 2½ miles an hour : It is a little faster than that of the Infantry ; they manage so that the train should never halt except in case of attack, The great loss in camels arises from forcing the pace and from overloading. On the Upper Nile, we calculated losing 5 p. c. for every 100 miles done by loaded camels in the desert when not very well-fed, and kept together in military order, all preparations being more for sudden attack. When used under those circumstances, 1 driver is allowed to every 2 or 3. Frequent short halts are necessary to prevent undue opening out or straggling. For desert marches 5 to 10 p.c. spare, required. In selecting camels, reject all that show signs of brushing with the elbow ; hocks not too bent, chest wide, stomach well-rounded, molar teeth sound, boss in front on which it rests when kneeling to be large and round. Natives are given to

firing for all sorts of ailments, the marks are no signs of unsoundness, when on top of head show animal has been fired for madness, such sho be rejected ; camel should kneel and rise with ease when laden, examine b well for hidden fistulæ or sores containing pus under the skin. The l on tail turns white about 15 yrs. of age ; age is shown by a drooping of lower lips : at 8 yrs., they have full complement of teeth, viz. 2 canine upper jaw, 4 canine and 6 incisor teeth in lower jaw. Little is known their diseases : for *colic*, wrap up warmly and give 2 qts. of linseed o one dose ; *mange* is very common ; rub on mixture of sweet or train oil $\frac{1}{4}$ of its weight of sulphur ; wash this off in 2 or 3 days and rub it in aga each application will require 1 gall. of oil and 1lb. of sulphur, per can *diarrhœa*, give 2 drms. powdered opium in 2 qrts. boiled rice night morning and warmly clothe. Dougal's sheep dipping mixture is good *sores and galls* : for maggots, which appear very quickly in their woun use spirits of turpentine squirted in, or apply it on tow : a coating of ta a good remedy for sore or cracked feet or heels. They thrive well u leaves of trees, and can go without water longer than any other ani During temporary halts the laden camel can kneel down and rest. T are admirably adapted for carrying long articles, such as scaling ladd infantry pontoons, &c. The camel is at home in the desert, and works in the plains of India ; it is unsuited for hilly countries. After rai clay soil, or over rocks and stony places, they split up and are consequ useless there. They are good for fording rivers that are deep but rapid, and where (as is so common in India) the bottom of the for shifting sand, the passage of a number of camels over it renders it and firm. They are extremely delicate in constitution, and liable to dise little understood. When suffering from over-work they do not rec with rest like the horse or mule : they pine and die away. They requ long time to feed, at least 6 hours ; owing to their great height suffer severely from ill-balanced loads. The camel used in India is a vi brute, those of Egypt and the Soudan are not so. Average weight a 1,170 lbs. In Bengal when calculating for the conveyance of bagg 1 camel is allowed to each S. Sergt.'s tent, 1 to every 2 pal tents, 2 for 3 E. P. tents, 1 for the bedding, &c., of every 8 British soldiers, 1 per t or company for cooking utensils, 1 for every 2 arm chests, 4 per troo company for stores, 1 for the scales and weights of a British Regt., camel for the baggage of each regtl. Serjt. Major, Q. M. Sergt., schoolmaster. In the plains, a good camel can easily carry 6 boxes of M ammunition, or 4 in a hilly district. In forming *Camel Lines* the s required for each camel is $3' \times 8'$. The ground rope to which each ro camels is fastened should be at a distance of $22'$ apart, so that if at each some camels cross it, there will still be a clear space of $6'$ between their l The native plan is to make them lie down in circles, a good plan whe

wind is cold, or the position exposed, as they protect one another ; in this formation, a space of about 22 yds. sqr. is required for 50 camels.

For Camels in the Crimea the ration was 9 lbs. of barley meal and 12 lbs. chopped straw. When the latter could not be had, 9 lbs. of barley was issued instead. They ought to have green food if possible. The desert and Arabian camel when regularly worked, should be fed and watered regularly : from 3 to 8 lbs. of barley or other flour worked up into paste balls, are good food : they can be rammed down the camel's throat : others require crushed beans instead: those used in the Soudan received when possible from 10 to 12 lbs. of Dourha (millett). In our desert marches on the Upper Nile, the ration was from 8 to 10 lbs. of Dourha daily. Camels accustomed to the pasturage of one locality, do not thrive well on pasturage of a different nature. In addition to this grain, they ought to have about 20 lbs. daily of some sort of dry or green fodder. They thrive best when allowed to graze daily from 4 to 6 hrs. If not hurried and allowed freedom on the march, they browze as they go, and pick up food in places where none seems available. At all times they feed very slowly. It is most important that the grain should be given to them on a cloth or sheet or blanket, but never put on the ground. In India they are fed entirely upon the leaves of trees : those of the peepul are the best. When rationed in India they receive generally 9 lbs. of barley or 5 or 6 lbs. of gram, together with 20 lbs. of mixed bhoosa. At Suakin the ration was 12 lbs. of beans (generally split) and 15 lbs. of chopped straw. The Algerian camel is said to consume from 66 to 88 lbs. of forage daily, and requires from 3 to 4 hours grazing daily to be in good working condition. In summer it must be watered every 3 or 4 days. They should have 15 gallons of water daily, although a large Arabian camel, taking 5 or 6 gallons of water into its stomach, can exist, it is said, for 5 or 6 days without drinking. A camel will drink 12 galls. at a time. In stationary camps the daily routine should be somewhat as follows :—grain in two equal portions at 7 A.M. and 6 P.M. ; grooming and lines cleaning from 7.30 to 8.30 A.M., and from 5 to 6 P.M. grazing from 8.30 A.M. to 5 P.M. : to be watered about 4 or 5 P.M. when returning from grazing. On board ship the ration is 3 lbs. gram, 20 lbs. hay or kirbee, and 8 galls. of water. In Cyprus the ration is 8 lbs. chopped straw and 15 lbs. of cotton seed.

Camel equipment.—1 leading rope, 1 cotton belly band or jaraki (13½ ft. long and 1½ in. wide), 1 nakel or nose-peg, or a web halter instead, 1 gorband or breastplate, 1 doomchi or crupper, 1 daman or tethering rope, 1 mubar or nose rope, or when a halter is used instead of the nose-peg, a plain leading rope is sufficient—1 pillan or saddle (wt. 42 lbs.), 1 suletah (for 10 per ct. of the animals it weighs 16 lbs.), 1 suffra or feeding bag, 1 loading rope, and 1 jhool (wt. 16 lbs.), weighing altogether about 114 lbs.

THE ELEPHANT is the king of beasts of burden, becoming fit for work at 20 years of age, and lasting well to 50 and even 80 years of age. The

female is to be preferred to the male, as much more tractable. The loa for steady work should not exceed 1200 lbs. for the large-sized, and abou 800 lbs. for the small-sized animals: in Abyssinia the weights carried by th artillery elephants averaged from 1324 to 1844 lbs., including weight of pa (500 lbs.): the 12 pr. Armstrong guns (weighing 92¼ lbs.) were carried o elephants. In the plains of India the ordinary-sized animal can carr 16 boxes of M. H. ammunition in 8 suletahs, 4 on each side in 2 tie exclusive of the pad, pace from 3 to 3½ miles an hour in cold weather; whe laden can keep up well with infantry in their daily marches. The back an elephant is much higher—say on an average 6″—than the shoulder; n 1 in 50 females exceed 8′ in height at shoulder; the largest tame elephan in India measure under 10′ at the shoulder; those of the commissari average about 7½′. It is most tractable in disposition, is invaluable duri marches in countries flooded by rain for extricating carts, guns and wago that have stuck in the mud. They are now used in India for the draught guns in siege trains; before such guns are taken under fire it is necessary have the elephants taken out and replaced by bullocks, as the former w not stand fire. The average weight of an elephant in India is fro about 5,600 to 6,600 lbs. They are often used in hilly countries to car guns on their backs. (See article on Bridges for further dimensions.) trench 7′ wide is impassable to the elephant; the stride of a lar animal is 6¼′. He suffers much from great heat, and does not like worki in the sun; the skin is easily chafed by harness in wet weather; in goo health is always in motion. When listless, with the trunk gathered up, t animal is unwell. They suffer in very cold weather such as was encounter in Afghanistan, and require plenty of clothing. After very heavy work, soak their cheupatis in rum is a good stimulant. In moving them by ra they require protection from the sun, and during the day water should frequently thrown over them. Care must also be taken to screen their ey to prevent them seeing and endeavouring to seize passing objects with th trunks. They should not travel by rail at night. In loading them w baggage, they should not be kept long standing or kneeling. One eleph is calculated as equalling 3 or 4 two-bullock carts, or 3 camels. In Ben 3 S. S.'s tents are allowed as a load to each elephant, or 1⅓-elephant to ev 2 E. P. tents. They only sleep for about 4 or 5 hours in the 24, so w possible they should be left undisturbed from 9 A.M. until 3 P.M. da Elephants in India are given from 15 to 30 lbs. of wheat flour, accord to the size of the animal and the work he is doing. Mixed with it is 1 of coarse sugar or molasses. This is given to him in large thick cakes addition to about 400 lbs. of green food, such as sugar cane, branche the peepul and other trees, green corn, &c.; or, if green food is not t had, to about 240 or 250 lbs. of rice or other straw. Tree-food is heati and, if possible, should only be given n the rains; when plantain lea

re given they should be cut into lengths of about 12". On active ervice the ration is often reduced to 25 lbs. of flour, 2 oz. of salt, 100 lbs. f green food, or 175 lbs. of hay. In Bengal it is found that a full-sized nimal will eat 750 lbs. of sugar cane, which is more nourishing than oo lbs. of any other green fodder. As much as an elephant can bring in n his back may be considered as his daily ration of green fodder. Unless upplied with plenty of green food, they soon fall off in condition ; their food hould be clean and wholesome ; they require from 25 to 30 galls. of water aily. In India 15 lbs. of firewood is allowed daily to cook the cakes for ach animal. On board ship the ration is Atta (flour) or rice, 18 to 20 lbs. 70 lbs. dry, or 320 lbs. green fodder, $2\frac{1}{2}$ oz. salt, and 40 to 50 galls. ater. *The elephant equipment* consists of a gaddees, guddala, peyta, uletah bags, buntha ropes, and ropes for loading, weighing in all about 14 lbs.

In taking over transport of all kinds, an offr. should be careful to note n the receipt he gives for it, the general condition of the animals, carriages, quipments, &c., &c. All deficiencies of equipment to be recorded, as well s the number of sore backs or badly galled animals, &c., &c. All these emarks to be entered in the register book in which he keeps a list of all ne animals, stores, equipment, &c. which he receives and issues. He must lso keep a book with a nominal roll of all those serving under him, together ith their rates of pay, and all other useful particulars regarding them.

Loading of Pack Animals.—1st. Attach the end of the loading rope at the lower ore-ring of the saddle, pass it loosely through the lower hind ring, and then through ne upper hind ring or hook.

2nd. The load (which should always be as compact as possible) is then laid against ne lower part of the saddle, and the end of the rope passed through the slack which angs between the two lower rings ; it is then passed through the upper fore ring of ook, and secured.

Great judgment is required in loading pack animals, and care should be taken that he animals are not overweighted, that the load is well put on, that it is neither itched too high upon the saddle, thereby causing it to roll upon the back, nor too ow, which adds to the weight and encumbers the animal, but that the lower line of he load should be even with the shoulders. When the load is allowed to hang below he saddle on either side, the animal, especially the camel, is very much distressed y its striking against its legs at every step. Before starting it is essential that the ffr. in charge of the transport should go round and see that his orders have been ffectively carried out regarding the loading of the animals, as some little time spent n adjusting the loads before starting generally saves confusion and subsequent loss of ime when on the march. Ladders will be found of great service in loading pack animals. Loads should be fastened so as not to sway, and that the load on each side of the nimal is as nearly as possible equal. The placing of a third package on the top of he saddle between the loads on each side should be avoided above all things. For

horses, ponies, mules, and donkeys, the following should be the weight and si the packages: wt. from 80 to 50 lbs.: extreme L. 30″: extreme width 15″: extr height 20″. For small articles not easily broken or injured, panniers or saleet with or without waterproof covers: for perishable and destructible articles b with or without tin linings, bullock trunks, yak-dans, &c., should be used.

Pack Transport.—In hilly countries where no roads fit for wagons e all the impedimenta, guns included, must be conveyed on the back animals. I have already given the working load for pack animals. species of transport requires the most perfect organization, especially w the trying element of native drivers has to be considered. The chara istics of the drivers, and the nature of the theatre of war will gre influence the organization to be adopted. In my opinion, each animal c ing the regtl. S.A.A. should have an English soldier as a driver, and u the native drivers are most reliable, the same rule should apply to all ani that are to be taken under fire. In the case of mules, ponies or donkey required to go under fire, 1 native driver is generally enough to e 3 animals, 1 headman to about every 15 or 20 native drivers. The T port offr. should be assisted by 1 transport sergt. and 1 corpl. former, if not both, should be mounted), and by 2 men from each troo company. There should always be at least 10 p.c. of spare animals to casualties on the march. All animals as far as possible to retain at all t the same pack-saddle, which should be fitted to them, and also to always its own picketing gear. In cold weather the animals as well a drivers may require blankets. The organization should as far as possib for company and squadron units. All spare animals to carry pack sa on the march. For a battn. on war strength, 98 mules are required fo conveyance of the baggage, blankets, kettles S.A.A., intrenching tools litters, 36 mules to carry 1 day's provisions, and 14 are allowed as s making a total of 148 mules; no provision is here made for tents. regt. of cavly. on war strength, 72 mules are required for the convey of baggage, kettles, S.A.A., intrenching tools, forge, &c.; 62 mule required for conveyance of 1 day's rations; 2 mules for 2 additional and their chests, and 13 spare mules, or a total of 148 mules fo regt. The men's blankets are carried behind them on the horse, every horse and mule is to have a horse blanket to be carried unde saddle.

Native Drivers.—The scale of subordinates allowed when pack an are used in India is as follows. 1 Sepoy superintendent to every 300 m 1 muleteer to every 3 mules or for every 6 donkeys: 1 camel driver to 4 camels, 1 Duffadar to every 25 camels; 1 Jemadar to every 100 ca 1 Naib Chowdry, to every 500 camels; 1 Munshi to each Naib Chow 1 native shoeing-smith and 1 native saddler per Regt. Battery, or Com of supplies. For bullock-carts the establishment is 1 driver for every

first-class and 2 second-class inspectors, 2 head muccudums, 4 second-lass muccudums, and 1 native doctor for every 500 bullocks.

In Algeria the French allow 1 Native driver to 4 or at most to 5 camels ; hey divide the train into companies of 100 camels each, under the charge f 1 Native headman. A convoy of 1000 camels would be divided into 10 ompanies, 1 for "le matériel d'administration," 1 for "les vivres d'ad-inistration," 2 for conveyance of barley, 1 for offrs'. baggage, 1 for the aggage of the troops, and one for the carriage of water.

Previous to loading pack animals, the loads should be distributed in lines ith intervals of 2 paces between each load : the animals to receive the load hould then be placed opposite them, and if possible picketed there : this is ery desirable, for if loaded animals are permitted to wander amongst those eing loaded, great confusion will ensue, and many loads be rubbed or icked off in the *mêlée*. It is for the offr. in charge of each Transport ection to see that the saddles, harness, or other pack equipment fits the nimals, and that when these have been properly adjusted, they should lways be used for the same animal as long as it remains effective. When nimals fall-off in condition from hard work, sore backs, bad galls, &c. can nly be prevented by frequent readjustment of harness and pack equipment. Never load your animals a moment before it is necessary to do so.

Transport animals on the march should not be pressed beyond their ordi-ary walking pace. When an animal is unable to keep up with the others, ts load must be reduced by placing part of it on one of the spare mules, amels, &c., &c., which should invariably accompany each section of ransport to the extent of at least 10 per cent. of the loaded animals. A ery difficult points of the road in hilly countries, the animals should be dis connected one from the other as they are likely to be thrown down in sur mounting obstacles if fastened together in a string. Extra men, should, if ossible, be posted at such places, to remain there until all have passed, for he purpose of assisting the pack animals, temporarily supporting their loads, &c., &c. Trains of wagons on the march should halt for 5 or 10 minutes very two hours, when drivers dismount, down props, ease girths, lift saddles nd pads, and examine shoulders. When the halt is a long one, animals hould be fed, watered, nostrils, eyes, and dock sponged out. If the halt is ot long enough to feed, drivers should endeavour to give their animals even a mouthful of grass or hay and enough water to rinse out their mouths ; to do so, refreshes the animal greatly. On the nature of the peration immediately in hand will depend the order of march for the baggage ; sometimes it may be by battns., brigds., or divns. If a cart breaks down, or the load tumbles off a pack animal, all the transport of the battn. or regt. concerned must draw off, or at least to one side of the road, allowing the baggage of other regts. to pass on until the breakage, &c., has been rectified, when it will resume its march behind the baggage of the

regt. then passing it. This is a very necessary rule to make, for it is essential to keep each unit of baggage together, so that in the event of a break-down the drivers and all the transport establishment of the regt. concerned may be at hand to assist. Except in the case of illness, no one to be allowed to travel in any wagon or to ride any of the transport animals, and all armed men must carry their arms themselves. Transport offrs. cannot be too strict in carrying out this rule. All transport offrs. to be held responsible that every animal under their charge carries one day's corn with it.

Care of Transport Animals.—Transport offrs. to take care that all the animals under their care receive their full allowance of food, and have as much water as they can drink. The best time for watering is in the middle of the day. Nothing is more refreshing to an animal after a hard day's work than grooming, and every endeavour should be made to effect it. In South Africa to remove the saddles or harness from mules or horses for even a quarter of an hour during a march, so that the animal may roll and stale has a most reviving effect. The prejudice against removing the saddle when the horse is warm is not believed in by South African colonists. It is very necessary to keep animals warm at night ; if any description of bedding can be obtained, it adds greatly to their comfort and health. When transport is being worked by fixed stages along any line of road, lines for the animals in well-sheltered positions should be made. Every care should be taken to keep these lines clean and well drained. If possible the dung should be dried and burnt in fine weather. When it can be done, some sort of rough shelter should be erected to protect harness and pack saddles from wet, as wet gear is very likely to cause sore backs. *The lines for mules, ponies, and bullocks* should be divided into blocks to hold about 50, 60, or 80 animals each (according to the numbers in which they are organized in sections, divisions, &c). The animals of each unit should be ranged in 2 rows facing inwards, with a clear space of 8′ between the picket ropes to which their heads are fastened. Each animal to be allowed a width of 6′ in the rows. For ponies and mules, heel-ropes should be provided if possible, the pegs for the heel-ropes being 11′ in rear of the head picket pegs.

Food for Horses and Transport Animals.—*Hay.*—If possible, obtain that of last year's saving ; hay cut in the summer is not good until about October 1. It should smell sweet, be free from weeds and dirt. A load is 36 trusses of 56 lbs. of old, or 60 lbs. of new, each. It is shipped for use during voyages, and sent to armies wanting forage in compressed trusses bound with iron hoops, weighing 102 lbs. gross, and 100 lbs. net. and measuring 6 cub. ft. Hay is considered new for 3 months. A cubic yard of old weighs 126 lbs., of new 84 lbs. ; if well pressed, old hay weighs as much as 225 lbs. to the cubic yard. In inspecting hay, thrust the arm into it, and its age may be tolerably estimated by

ne ease or difficulty in doing so, for the newer it is, the easier is the arm nrust into it.

Straw should be sweet, clean, and unbroken—the longer it is the better ; nat which has been threshed by machinery is never nearly so good as that hreshed by hand. A load is 36 trusses of 36 lbs. each : a cubic yard well ressed, weighed about 145 lbs.

Oats, barley, and other grains should be free from dirt, well dried, without ny approach to mouldiness : they should have a sweet smell, and be heavy n the grain, and free from insects. All grain kept in store in large quan-ties should be turned over at least twice a week, to prevent fermentation. A bushel of oats weighs from 24 to 42 lbs. (according to contract in Eng-and, 38 lbs. to the bushel) : of barley, 47 to 54 lbs. ; of wheat, 60 lbs. ; of ye, 54 lbs. ; of maize (Indian corn), 56 to 66 lbs. ; buckwheat, 46 to 52 lbs. ; eans, 60 to 64 lbs. ; peas, 66 lbs. ; potatoes, 60 lbs. ; onions, 57 lbs. ; bout 32 lbs. of oats, and 48 lbs. of wheat go to the cubic ft. Grain should e about a year old.

Crops.—The following is a fair average of the number of bushels that go o an acre at home ; oats, 40 to 50 ; barley, 35 to 40 ; wheat, rye, and beans, 5 to 30 ; maize and buckwheat, 30 ; peas, 25 ; potatoes, 8 tons ; turnips vhite), 30 to 40 tons ; (yellow), 30 to 32 ; (swedes), 28 to 34 tons ; cabbage, 5 to 40 tons ; carrots, 10 to 20 tons. The weight of straw per acre of the ollowing crops is : wheat 3000 to 3600 lbs. ; barley, 1500 to 2100 lbs. ; oats, 700 to 3500 lbs. ; rye, 4000 to 4800 lbs. ; bean-straw, 2700 to 3200 lbs. ; ea-straw, 2700 lbs. An acre of meadow-land, according to its quality, ives from 1 to 3 tons of hay.

The Bushel measure is difficult to obtain abroad ; it may therefore be ecessary to make it at times ; to do so, see an article on "Weights and Ieasures."

COMPRESSED FORAGE.—*Forage cake.*—In our next wars we are certain o use compressed forage to a large extent as we have now tested its value or service in the field. That used in Natal in 1879 and 1881, and Egypt n 1882, was made up in 25lb. cakes containing 10 lbs. oats, 2 lbs. bran and 3 lbs. hay. In Egypt it was liked very much, and was most satisfactory ; here is, however, likely to be loss in feeding. It was supplied in bales of cakes of a gross weight of 77 lbs.

The "Graves Corn Cake" is made up in brick-shape cakes containing wo rations (18 lbs.), and then packed in bales of 4 or 5 cakes each. The ales of 10 rations, having a net and gross weight of 90 and 93 lbs. Each ation is made by crushing together 7·5 lbs. oats ; ¼ lb. linseed; 1 lb. beans, nd ¼ lb. of hay. We did not find it so good in Egypt as the compressed orage. One ton of these bales measures from 38 to 40 cub. ft.

The Bran cake for use at sea and for sick horses on land is of the same form nd weight as the forage cake, one ton of it measuring only about 40 cub. ft.

The Hay cake is made of compressed hay-chaff, and it is said that 9 lbs of it may be safely substituted for the ordinary 12 lbs. ration of hay. One ton of this cake measures only about 45 cub. ft. Lately it has been made up in cakes of 27 lbs. (3 rations); 3cakes go to a bale whose gross wt. is about 83 lbs. On service this hay cake can be advantageously mixed with the forage cake, but to obviate the excessive waste from feeding from the ground in the manner usual in the field, especially in windy weather, when quantities of the common hay ration are blown away from the picket lines, it will be necessary to use a large, roomy nose-bag of a new pattern instead of the old pattern corn nose-bag. With this forage cake it will be possible for cavly. to be sent away on detached duties, each horse carrying 37½ lbs. of it in the corn bag, which, supplemented by whatever straw or hay or grass is to be found in the country itself, will enable the detached party to be independent of all commissariat supplies of forage for 4 days.

SUPPLIES OF FOOD FOR MEN.—It may be accepted as a fact that the better the men are fed, the more you will be able to get out of them, the better will be their health and strength, the more contented they will be, and the better will be their discipline. *The two great necessities in the food line are bread and meat.* Biscuit may be used in lieu of bread, and preserved meat in lieu of fresh meat, when, comparatively speaking, only a small supply of fuel will be necessary; but, as a general rule, we may say that a liberal supply of fuel is also a necessity for an army in the field. It was the want of fuel more than of any other supply from which we suffered most in the Crimea during the winter of 1854–55. Our existing regulations direct that on service each man shall always carry about him "the iron ration" for 1 day's consumption, and when on the march should also carry 1 day's ordinary rations, meat excepted, which is to be carried regimentally in carts provided for that purpose, and that each horse and transport animal should carry 1 day's forage complete. (See details of regtl. establishments.) The Commissary attached to each Brigd. and Divn. and to Army Corps Details, is to have with him in his wagons 1 day's supply for every man for whose feeding he is responsible, of biscuit, preserved meat, &c., together with oats for every horse and transport animal belonging to his brigade, &c. The C. G. of each division will, in addition, have in a like manner complete supplies of provisions and oats for another day for every man or horse under his charge. That is, in addition to the iron ration carried by the men, 3 days' provision for the men, 1 day's hay and 3 days' oats for all horses and baggage animals, will accompany the troops on the march. These supplies are only to be used upon emergent occasions, the daily requirements of men and animals being daily provided for by the C. G., independent of these reserves. When it is necessary to draw upon them, the amount expended must be replaced as soon as possible from the advanced magazine,

n which there should always be 4 days' complete supply for all the men and orses in the front.

For daily consumption the meat should be killed as soon as possible after ne march for the following day's consumption, and drawn by the Regtl. Q. Ms., together with all the other articles of the daily ration. As a ule, this meat will be kept in charge by the Q. Ms. in the carts or agons told off for the purpose until the end of the following day's march, nd then issued to the companies. The bread or biscuit, together with all ne other articles in the ration, will be issued to the companies the evening ney are drawn by the Q. Ms. from the Commissaries, and will be carried uring the following day's march by the men for that day's consumption. t may occasionally be necessary to issue the meat to the companies also, o that it may be cooked at once and carried by the men the following day or that day's consumption.

Supplies of meat must be obtained as much as possible in the country. They will generally be driven to the front from the depots where they are ollected. At every stage proper arrangements should be made for their rotection and food: unless this is done, the loss of animals will be very reat before any drove reaches the army. You can never count on cattle oing more than 15 miles a day ; 12 is a safer calculation. On the march ith a force, meat should be killed every evening as soon as the march is ver, so that, as the animals are driven, no transport should be required or it. In sending dead meat by rail or cart, it should be laid on straw, nd air freely admitted, the sun and flies being excluded.

Packages in which preserved meat or other food is made up should, for onvenience in handling and distribution, never exceed 1 cwt. gross ; but as rule their gross wt. should not exceed 50 or 60 lbs. so as to be easily andled by one man. The duties of an issuer are very onerous, and every ffort should be made beforehand by having each box or package to contain round number of rations each to reduce his difficulties as much as possible. When intended for hot countries, packing cases should be nailed not screwed down ; we found in the Soudan that when the wood shrank from the dry eat, the screws fell out, or were too easily removed for security. Trade ases will not do for active service ; they are too flimsy ; all stores to be used n the field should be specially packed by Military Departments at home.

Field Ovens.—Armies taking the field now will carry with them steam or field ovens (according to the nature of the service) for baking. The steam oven on a carriage) is easily drawn along roads by a pair of horses, and can be aken across country, wherever guns can pass, by four horses. It requires coke or heating, a fuel easily carried, with the extra advantage that a little goes long way. These ovens will bake in each batch on an average 109 loaves of 3 lbs., or 2 field rations each. It may be estimated that 4 *batches* of bread will be turned out of one of them by fair tradesmen under ten hours,

The weight of this oven is about 2 tons. A smaller size weighs 1 ton 2 cwt and will bake a little over half the quantity that the larger one can. Th field ovens (Aldershot pattern) are made of sheet iron: each weighs abou 320 to 342 lbs. (according to the pattern), complete with their equipme of tins, &c., and can bake 100 rations (150 lbs.) at a time. On the Re River Expedition one of these ovens, worked by two men, turned out 47 loaves (of one ration, 1½ lb. each) in 12 hours; oven being in good workin order and the weather fair. Travelling Bakery Wagons are also now ap proved for the use of the A. S. C. The wagons are covered, and them the bakers can knead and prepare the bread for the ovens; they a constructed to carry the necessary dough-troughs and baking implements.

If you wish to reap great results from an impending action every exertio should be made beforehand to collect supplies for several days at some poi within one day's easy march in rear of the army. Two days' rations shou always be issued the evening before a battle; these arrangements will s free a large amount of transport for the removal of the wounded immediate the action is over.

MEAT.—An ox should not weigh less than 600 lbs.;* 800 lbs. may b taken as an average, but a very good one will weigh twice as much: cow may be a few pounds lighter. A deduction of 50 p. c. to be allowe for skin, offal, head, &c., &c. To find the wt. of animals the formula (G × ·08) L × 42 = wt. in lbs.; G being the girth in ft., taken close behin the shoulder, L the length in ft., measured from the fore part of the shoulde blade to the bone of the tail. In requisitioning cattle they may be take safely at 300 lbs. of meat each. A good sheep weighs from 60 to 100 lbs. 70 lbs. may be used as an average; 45 p. c. to be allowed for offal. Th ordinary sheep abroad may be accepted at 35 lbs. of meat each. *A full grown pig* weighs from 100 to 250 lbs.; 25 p. c. only being allowed for offa may be generally accepted at 80 lbs. each.

'Animals should be inspected by a V. S. 24 hours before being killed When possible, the meat should be killed from 24 to 48 hours in temperat climates, and 10 or 12 hours in the tropics, previous to being cooked. A animals for food should be in good health; if no V. S. is at hand, disease may easily be detected by a heavy sluggish look about the eyes, a hot dr feeling about the nose, and by a hanging tongue. The coat is also roug and staring; with cows the teats are hot. All runnings from the nostri are suspicious. If there is any suspicion of the rot being in sheep, throw the animal on its back, and push open the eyelids; if it be free from thi disease, the eyeball will be finely streaked with veins of a good healthy an bright red; if they are pale, the sheep is diseased. Meat, especially in ho countries, should always be inspected immediately before it is cooked

* *These weights do not apply to oxen, sheep, etc. that have been fattened for th butcher.*

The lean and the fat should be in proportion—the latter should be firm, and not too yellow ; the meat should not be bloody anywhere. When any doubt exists as to its condition, a doctor should examine it at once.

Salt Meat.—To inspect it have several casks opened ; if not full of brine the meat is to be suspected, as any portion of meat not continually covered by it is sure to become bad. Examine portions from both ends and centre of cask ; they should be of good colour, well provided with fat. Decomposition can be detected by the smell, by a greenish colour, and by an unnatural softness. When time permits, no salt meat should be accepted in large quantities as good without boiling and tasting pieces at hazard out of several barrels. This is more particularly the case in inspecting salt meat for a voyage. Care should be taken to keep the casks always full of brine. Fresh brine is made by dissolving salt in water. Brine is considered sufficiently strong when a potato will float in it. Salt ceases to dissolve in the liquid when the latter is completely saturated.

Bread.—'There should be a due proportion, not less than 30 p. c. of crust ; the exterior surface should be well baked, not burnt ; the crumb should be permeated with small regular cavities, no parts should be heavy and without these little cells ; the colour should be white, or brownish from a mixture of bran ; the taste not acid, even when held in the mouth. It will keep good for 4 or 5 days in warm, and for 7 or 8 days in cold weather. 30 p. c. is gained in wt. in baking. In making bread the following proportions are a good guide : 20 lbs. of flour, 8 to 12 lbs. of water, 4 oz. of yeast, and $1\frac{1}{2}$ to 2 oz. of salt, to which a little potato should if possible be added. 780 lbs. (1 sack) of flour will give from 90 to 105 4 lb. loaves : $6\frac{1}{2}$ lbs. of dough yields 6 lbs. of bread. When taken from the oven bread begins to lose wt. The 4 lb. loaf loses in the first 24 hours $1\frac{1}{4}$ oz. ; in 48 hours, 5 oz. ; in 60 hours, 7 oz. ; in 70 hours, $8\frac{3}{4}$ oz. Bread when stale can be rebaked once, and will taste quite fresh for 24 hours ; after that time it will then rapidly deteriorate. In baking the heat of the oven should not exceed 212°.

Flour should be white, with only a small amount of bran in it ; there should be no lumps, or if any, they should break easily on slight pressure : it must not be acid in taste, and there should be no smell of fermentation or mouldiness.* Barrels of flour when stored in houses should occasionally be rolled out into the open air. It was found on the Red River Expedition that flour kept in barrels is not injured in any large quantity when exposed to wet, as a caking of paste forms round it, immediately inside the wood of the barrel, which preserves the flour within it. The Hudson Bay Company keep flour during their great inland journeys in sacks which they soak in water previous to filling with flour, and á caking of paste is thus formed

* For further information on these subjects, consult Dr. Parkes' 'Practical Hygiene.'

which keeps the flour sweet within it. Wheat when ground yields 80 p. c. of flour, 16 of bran, and there is 4 p. c. of loss.

'*Biscuit* should be well baked, but not burnt; of a light yellow colour, and should float in water. When struck, it should give a ringing sound; a piece put in the mouth should thoroughly soften down. It should be free from weevils.'

FOOD IS NOW SENT TO AN ARMY IN THE FIELD PACKED AS FOLLOWS:—

Articles.	Description.	Weight.		Cubical Contents.	Remarks.
		Gross.	Net.		
		lbs.	lbs.	feet.	
Biscuit (ration 1 lb.) . . . tin lined	case	164	100	9·08	
Do. . . . . do.	case	85	50	4·33	
Do. . . . . do.	case	52	30	2·66	
Do.	bag	—	100	5·08	
Cheese	drum	67	60	1·66	Average.
Cocoa and milk.	case	69	48	1·4	
Coffee (ration $\frac{1}{3}$ oz.) . . . . 6 tins	case	80	54	2·25	
Erbswurst, 288 rations (2 oz.) . 4 tins	case	73	36	1·75	
Do. 180 rations.	case	46	22·5	—	
Extractum carnis, 18 lbs. . . 72 jars	case	70	18	2·16	
Flour . . . . . tin lined	case	80	56	2·33	
Do. (from Admiralty)	case	102	80	2·66	
Forage—					
Forage cake	bale	77	75	1·75	Average.
Grain cake	bale	93	91	1·66	
Hay cake	bale	74	72	1·75	
Hay, compressed	bale	102	100	6·0	Wt. varies very much.
Oats	sack	122½	120	4·08	
Do.	sack	82	80	2·75	If specially bagged for pack transport.
Grocery Boxes—					
Containing tea, sugar, pepper, and salt—					
For 1 Battery Artillery . . .	box	52	29	1·66	
For 1 Sectn. of C. and T. Compy.	box	26	12	0·75	
General service.	box	89	54	2·33	
Containing 300 rations, viz.—					
Pepper . . . . . 9 oz.					
Salt . . . . . 9 lbs. 6 oz.					
Sugar . . . . . 37 lbs. 8 oz.					
Tea . . . . . 6 lbs. 4 oz.					

FOOD IS NOW PACKED AS FOLLOWS (*cont.*):

Articles.	Description.	Weight.		Cubical Contents.	Remarks.
		Gross.	Net.		
		lbs.	lbs.	feet.	
Sugar—					
For ⅓ Regiment Cavalry . . .	box	49	31	1·25	
For 1 Company Engineers . . .	box	44	25	1·16	
For ⅛ Battalion Infantry. 456 Rns.	box	83	57	1·91	
Tea, Pepper, and Salt—					
For ½ Regiment Cavalry . . .	box	32	13	1·5	
For 1 Company Engineers . . .	box	30	11	1·41	
For ¼ Battalion Infantry. 456 Rns.	box	49	25	1·83	
ime juice (ration ½ oz.) . . 8 bottles	case	81	32	2·75	
Do. (from Admiralty) . . .	cask	125	95	3·5	9½ gallons.
Do. do. . . .	cask	234	185	6·5	18 do.
alt . . . . . tin lined	case	78	56	2·5	
eat, preserved, 2 lb. tins—					
Beef— (ration 1 lb.)					
Armour Brand. . . . .30 tins	case	83	60	1·83	
Belgravian Brand . . .24 tins	case	74	48	1·58	
Libby, McNeill and Libby's Brand 30 tins	case	78	60	1·66	
Sydney Brand. . . . 24 tins	case	76	48	1·66	
Mutton—					
Flemington Brand . . .24 tins	case	79	48	2·25	
Melbourne ,, . . .24 tins	case	79	48	2·25	
Sydney ,, . . .24 tins	case	80	48	1·91	
eat, preserved, 6 lb. tins—					
Beef— (ration 1 lb.)					
Armour Brand. . . . .10 tins	case	84	60	1·66	
Libby, McNeill, and Libby's Brand 10 tins	case	85	60	1·83	
Sydney Brand . . . . . 8 tins	case	72	48	1·58	
Mutton—					
Sydney Brand . . . . . 8 tins	case	72	48	1·58	
The gross weight and cubical contents of meat cases differ according to brands.					
edical comfort box	case	74	—	2·33	
Containing—					
Brandy . . . . . 3 bottles					
Candles. . . . 1 lb. in tin					
Cocoa and milk . . . 6 tins					
Corkscrew, folding . . . 1					

FOOD IS NOW PACKED AS FOLLOWS (*cont.*):

Articles.	Description.	Weight. Gross.	Weight. Net.	Cubical Contents.	Remarks.
		lbs.	lbs.	feet.	
Medical comfort box (*continued*)—					
Extract of meat, Liebig's, 4 oz. pots 12					
Matches, safety . . 2 boxes					
Milk, condensed . . . 4 tins					
Mustard . . . ½ lb. in tin					
Port wine . . . . 3 bottles					
Salt . . . . . ¼ lb. in box					
Tea, compressed, ¼ lb. pks. ½ lb.					
Tin opener					
Milk, condensed	case	68	48	1·16	
Pepper (ration $\frac{1}{30}$ oz.) . . . .10 tins	case	73	50	2·25	
Rice	case	77	60	1·83	
Rum (from Admiralty) . 18 gallons	k'ldrkin.	215	166	6·5	
Do. do. . . 9⅛ gallons	small cask	119	89	3·5	
Sago 1	case	77	60	1·83	
Salt (ration ¼ oz.)	bag	103	100	2·4	
	case	77	60	1·83	
Sugar (ration 2 oz.; or when lime juice is issued, 2½ oz.)	bag	103	100	2·4	
Do.	case	77	60	1·83	
Tea (ration ⅓ oz.) . . . . . 4 tins	case	72	40	3·66	
Tobacco	case	145	120	2·25	
Do., when repacked	case	80	60	1·66	Average.
Vegetables, compressed (ration 1 oz.) .	case	73	48	1·75	
Yeast powder	case	84	54	2·75	

Tea and *Coffee* can only be judged of by tasting them when prepared fo use in soft water. Tea should not be bitter; it should have an aromat smell. Coffee should always be served out roasted and ground (not to fine). It should be sent from England soldered up in 10 lb. tins.

Sugar should be tolerably 'white,' crystalline, not evidently moist to th touch, and should dissolve entirely in water, or leave merely sma fragments, which, on examination with the microscope, will be found to b bits of cane.

Lime Juice.—'The taste should be pleasant, acid, but not bitter.' Whe

resh fruit or fresh vegetables are not to be had in sufficient quantities, 1 oz. hould be given in water per man daily. When possible it is a good plan o mix it with half its wt. of sugar to make it palatable. 20 oz. of lime uice go to 1 pint: it is usually sent abroad in bottles holding 3 or 4 pints ach; in each there is a little olive oil, which excludes the air from the me juice. Good lime juice will keep for at least 3 years. The breakage of hese bottles was very great with the Nile Column in 1884–5. We should ry to crystallise our lime juice or else carry it in small kegs or stone jars.

Salt should be white, crystalline, and dry; it should dissolve completely n water.

Water.—In calculating the quantity of water required per man for rinking and cooking, it may be put down at 6 pints in temperate, and pts. in tropical climates. A similar amount will just allow men to wash heir bodies. In stationary camps, however, the minimum daily allowance er man should be 5 galls. for all purposes, washing clothes included. On esert journeys in summer when hot winds blow, a man requires 2 galls. a ay, but in autumn or winter 3 pints a day are sufficient. During Sir Herbert Stewart's operations in the desert, the allowance was at times only gal. per man per diem, and on special occasions was only half that quantity.

In selecting positions, particularly those that are likely to be of a per-anent character, a careful analysis of the water should be made by a edical man. A fair opinion can be formed as to whether it is wholesome r not, by the appearance of the inhabitants, and by tasting the water one-lf. 'It should be transparent, colourless, without odour, and tasteless; ell aerated, cool, and pleasant to drink; it must have no deposit; egetables should be easily cooked in it.' It should be moderately soft, o that a lather with soap can be easily made with it. Shallow well-water always to be examined with suspicion. The water of some rivers in ertain seasons is thick and muddy; in some, it is always so. To examine without the aid of chemical tests, fill a long tumbler or other glass vessel ith it. If the water has been drawn in a bucket or other vessel, shake it up nd stir it well before pouring it into the tumbler or glass cylinder; let it and for a day, or as many hours as possible; draw off the water without isturbing the sediment, which should then be carefully examined through he microscope of your telescope. Vegetable decompositions and iron are he chief substances that give colour to water. When water is very bad it hould be boiled before drinking; after boiling it should be placed in hallow vessels, and poured from a height from one into another. The irtiest water I ever saw in common use was that of the Pei-Ho, which was f a deep yellowish-brown when drawn from the river, owing to the large mount of clay it held in suspension. It was cleaned, and made most palat-ble by immersing the hand containing a lump of alum in it, and moving about for a few seconds. All the colouring matter sank to the bottom.

The longer the time that elapses between the operation and drinking, th better. I do not think it has been proved that growing vegetable substance are always injurious, although dead vegetable matter is so without doubt.

TABLE FOR CALCULATING THE NUMBER OF CASES, &c. IN WHICH ANY GIVE NUMBER OF RATIONS ARE CONTAINED, WITH THE BULK, GROSS WEIGHT, &c.

NATURE OF RATION.	Daily Ration.	Net Weight of 1000 Rations in lbs.	Gross Weight of 1000 Rations. in lbs.	No of Cases &c., &c., holding 1000 Rations.	Cubic Measure ment in Feet of 1000 Rations
Biscuit in bags. . . .	1 lb.	1000	1020	10	50·8
,, 85 lb. cases . .	1 ,,	1000	1700	20	86·6
Cheese	¾ oz.	46·875	52·3437	0·78125	1·29687
Coffee in 81 lb. cases . .	⅓ ,,	20·83	30·859	0·3857	0·8679
Erbswurst in 73 lbs. cases	2 ,,	125	253·456	3·472	6·076
Flour in 80 lb. cases . .	1 lb.	1000	1428	17·85	41·59
Lime Juice in 125 lb. cask	½ oz.	31·25	41·118375	0·32894	1·1513
Meat, beef in 75 lb. case.	1 lb.	1000	1604	20·83	34·5778
,, mutton, in 79 lb. ,, .	,,	1000	1645·57	20·83	46·867
Pepper in 73 lb. case . .	$\frac{1}{36}$ oz.	1·736	2·534	0·03472	0·0781
Rice in 77 lb. case. . .	1 ,,	62·5	80·203	1·0416	1·906
Rum in 9½ Gall. cask . .	½ gill.	146·44	195·8	1·6454	5·7589
Salt in 77 lb. case . . .	½ oz.	31·25	40·1039	0·5208	0·953
Sugar in 77 lb. ,, . . .	3 ,,	187·5	240·625	3·125	32·665
Tea in 72 lb. case . . .	⅓ ,,	20·83	37·44	0·52	1·9032
Tobacco in 80 lb. case .	½ ,,	31·25	41·6	0·52	0·8632
Vegetables in 73 lb. case.	1 ,,	62·5	94·9	1·3	2·275

The gross wt. of provisions that are made up in bales or other package may be roughly calculated by adding 15 p. c. to the net wt. 1000 fie rations on the simple scale described at beginning of following article men's ratio , will therefore weigh 2876·6329 lbs. gross, and occu 110·00342 cubic ft., the biscuit being in bags. If the biscuit is in 85 l cases, those figures will be 3556·6329 lbs., and 145·80342 cub. ft.

RATIONS.—*Provisions.*—All offrs. and other soldiers when in the fie draw the following field rations daily: 1½ lb. of bread or 1 lb. of biscu fresh or salt or preserved meat 1 lb., coffee ⅓ oz., tea ⅙ oz., sugar 2 o salt ½ oz., pepper $\frac{1}{36}$ oz. When troops are marching or doing hard wor ½ lb. more should be added to the fresh meat ration. It is usual to add gall. (½ gill) of rum, and instead of issuing both tea and coffee, to on the latter and double the former. As a rule 2 oz. of compressed veg tables, or 4 oz. preserved potatoes, are added to the foregoing ratio In estimating for the transport of rations allow 4 lbs. gross weight

each man per diem. In fixing the rations for men and animals do all you can to assimilate them to the food used in the country where you are about to operate. With ready money to pay for all supplies required, an army should never want in a rich country where there are good roads. Prompt and liberal payment goes far towards establishing a good feeling between the army and the inhabitants. The ration issued during our Autumn Manœuvres has been 1¼ lb. bread, or 1 lb. biscuit, 1 lb. fresh meat or salt pork, ⅓ oz. of tea, 2 oz. sugar, ½ oz. of salt, and $\frac{1}{36}$ oz. of pepper: ¼ lb. of cheese was occasionally added. This grocery ration is a great improvement upon the old plan of issuing a proportion of both tea and coffee upon the same day, as tea does not taste well when prepared in a pot in which coffee has been made a few hours before. The ration issued latterly in the Crimea included, in addition to the above, ½ lb. vegetables, 1 oz. of rice, and 1 oz. of lime juice; ½ a gill of rum was also issued daily to every man, and extra issues of it were made upon the slightest excuses, so that at the end of the war every man who survived was a confirmed dram-drinker.

The rations issued in Abyssinia when transport had become most difficult were for Europeans, 1 lb. of biscuit or flour, 2 oz. of vegetables, 1½ oz. of sugar, ½ oz. of tea, and 1 dram of rum. The daily ration for our men in Bengal consists of 1 lb. of bread, 1 lb. of beef or mutton, 1 lb. of potatoes or other equivalent vegetables, 4 oz. of rice, ⅔ oz. of salt, $\frac{5}{7}$ oz. of tea, 1$\frac{3}{7}$ oz. of coffee, and 2½ oz. of sugar. The rations issued during the Red River Expedition were, 1 lb. of salt pork, or 1½ lb. of fresh meat; 1 lb. of biscuit, 1½ lb. of fresh bread; ½ pint of white beans, or ¼ lb. of preserved potatoes; 2 oz. of tea, 2 oz. of sugar, ½ oz. of salt when fresh meat was issued, and $\frac{1}{36}$ oz. of pepper. Upon this ration the men did the hardest work I have ever known troops called upon to perform, and no force in the field could have been healthier. The ration issued during the Ashantee War to white troops was, bread, 1½ lb. fresh, or 1¼ lb. biscuit, or 1 lb. of flour; meat, 1 lb. fresh or salt, or 1 lb. preserved; vegetables, 2 oz. rice or peas, or 4 oz. of preserved potatoes, or 1 lb. of fresh; tea, ¾ oz.; sugar, 3 oz.; salt, ½ oz.; pepper, $\frac{1}{36}$ oz. On days when long marches were made, or when an engagement was anticipated, 4 oz. of sausage. The *native allies* not being Fantees, received 1¼ lb. of rice, or 1 lb. of biscuit; ½ lb. salt meat, or 6 oz. of preserved potatoes. The native carriers received 1 lb. of rice. The native allies (Fantees) received 1 pint of rice and ¼ lb. salt meat. This ration for white troops was the largest ever given up to that time; the exhausting nature of the climate rendered it necessary to give the men as much as they could possibly eat and digest.

The scale of daily rations for the Chinese Coolie Corps in 1860, was, for 5 days in the week, ½ lb. of salt pork or salt beef; ½ lb. of salt fish; 1 lb. of rice; ½ oz. of lime juice and ¼ oz. of sugar: and for the other 2 days in the week, 2 lbs. of rice and ½ lb. of salt fish.

In Egypt in 1884–85 the *Boat ration* was as follows. It was very liberal, because the men had to endure excessive fatigue. Preserved corned meat 1 lb. on 4 days out of 6; 1 lb. of preserved fresh meat 1 day out of 6, and 1 lb. of boiled mutton or bacon for 1 day out of 6. Fresh meat 1 lb. in substitution for 1 lb. of any of foregoing whenever procurable. Cheese $\frac{3}{4}$ oz. daily, biscuit 1 lb. 5 days out of 6, and flour 1 lb. for 1 day out of 6; fresh bread $1\frac{1}{4}$ lb. in substitution for the biscuit whenever procurable; $\frac{1}{2}$ oz. of baking powder to every 12 lbs. of flour issued. The following daily: 1 oz. of tea, 3 oz. of sugar, $\frac{1}{4}$ oz. of salt, $\frac{1}{36}$ oz. pepper, $\frac{1}{2}$ oz. rice, 1 oz. preserved vegetables, $\frac{1}{1280}$ gall. vinegar, $\frac{1}{320}$ gall. lime juice, $\frac{1}{2}$ oz. oatmeal, 2 oz. of erbswurst every 3rd day, and $1\frac{1}{3}$ oz. of jam or marmalade 2 days out of 6, and $\frac{1}{2}$ oz. of pickles 4 days out of 6. In each boat there was cocoa and milk at the rate of 3·3 lbs. per man for 100 days, to be issued occasionally as an extra. Every 15 days $\frac{1}{2}$ lb. of tobacco, and $\frac{1}{2}$ lb. of soap, making a total net wt. of 2 lbs. 9·5 oz., or a gross wt. of about 3 lbs. 14 oz. without tobacco or soap, or with them a net wt. of 2 lbs. 10·6 oz.; 1000 boat rations without tobacco or soap net, weighed 2534 lbs. or gross 3875 lbs. The ordinary *Field Ration up the Nile and in the Desert was:* $1\frac{1}{4}$ lb. fresh or 1 lb. preserved meat; $1\frac{1}{4}$ lb. fresh bread, or 1 lb. of flour or biscuit; $\frac{1}{3}$ oz. of tea, $\frac{1}{3}$ of coffee, $2\frac{1}{2}$ oz. sugar, $\frac{1}{2}$ oz. salt, $\frac{1}{36}$ oz. of pepper, $\frac{3}{4}$ lb. fresh or 1 oz. preserved vegetables, or 1 tin of erbswurst, $\frac{1}{2}$ oz. of lime juice; making total net wt. of 2 lbs. $5\frac{1}{4}$ oz., or a gross wt. of 3 lbs. $8\frac{3}{4}$ oz.

Koph or Erbswurst soup is now always sent into the field with an army, is made up in cylindrical tins, each containing 2 oz. of the pea-soup paste, gross wt. being $2\frac{3}{4}$ oz. Each tin contains a very good ration.

During peace, whenever it is practicable to do so, rations should be occasionally issued direct to the soldier in quantities to last two or three days. It teaches him to economise his food, so that when it becomes necessary, as it frequently does in war, to give him several days' supply at a time, it will not be a new thing for him to exercise discretion and care in using them properly. C.Os. in our army do the reverse invariably. When giving several days' rations for their men they keep it in bulk, if possible, and issue it in small quantities, telling you that if they gave it out to their men at once, they would eat it all in one day, or throw away what they could not eat after their first meal. This is the old story of treating our men as foolish children. Let us in future endeavour to teach them to reflect, and act as they would in civil life regarding their food. I am sure from my experience on the Nile in 1884–85 that the best economy to fix upon a most liberal, and to the soldier the most palatable ration: it not only conduces to health and strength, but also to contentment, and therefore to good discipline. Cheese, jam and pickles should in future be never absent from the soldier's ration when it is possible to supply those articles of food. In forced marches, or for a day's fighting, 4 or 6 oz. of good cheese is the very best thing you can issue, as it is

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Tobacco and soap.—In most campaigns these should be issued like all other ations : 1 lb. of each per man per month is a fair allowance. In case of having to lay in large supplies of these articles, they should be calculated or at this rate, or with more exactness $\frac{1}{2}$ oz. of each per diem.

Indian Troops.—The scale of rations for native troops and followers rom India adopted in Abyssinia may be taken as a standard : it was as ollows : rice or atta (flour), 2 lbs. ; dhall, 4 oz. ; ghee, 2 oz. ; salt, $\frac{2}{3}$ oz. ; urmeric, $\frac{1}{8}$ oz., pepper, $\frac{1}{8}$ oz. ; sugar, 3 oz. (or in lieu, if preferred, $1\frac{1}{2}$ oz. of obacco) and 1 lb. of mutton or goat twice a week when procurable. At first ne native followers were allowed $\frac{1}{2}$ lb. of flour less than the soldier, but the ull ration was subsequently issued to all. It is very desirable to issue curry owder made up, in lieu of the turmeric, &c., as is done when natives are on oard ship. It should be powdered and mixed and made up in 10 lb. tin nisters : the ration on shore should be $\frac{1}{2}$ oz. daily a man. It can be made the following ingredients: turmeric, $\frac{1}{4}$ oz. ; chillies, $\frac{1}{4}$ oz. ; black pepper, oz. ; coriander seed, 1 dram ; cummin seed, $\frac{1}{2}$ dram ; and cloves, $\frac{1}{2}$ dram. *In Egypt in 1882* the ration for Indian soldiers was, $1\frac{1}{2}$ lbs. of rice or 2 lbs. atta, 4 oz. of dhall, 2 oz. of ghee, $\frac{2}{3}$ oz. of salt, 1 oz. of onions, and $\frac{1}{6}$ oz. pepper. Once a week 1 lb. of butcher's meat was issued in lieu of half e rice ration.

In South Africa the ration for native levies was, 1 lb. of mealies or 1 lb. meal, 1 lb. Kafre corn, or 1 lb. of flour or biscuit ; $1\frac{1}{2}$ lb. fresh meat, or 1 lb. of lt or preserved meat, and, except when salt rations were issued $\frac{1}{2}$ oz. of salt.

FUEL, per British soldier per day, is 3 lbs. of firewood or $1\frac{1}{2}$ lb. of coal. hen the latter is issued, 2 lbs. of kindling wood is allowed to every 40 lbs. coal. In South Africa, where the fuel had to be carried on the march, bs. of Natal coal was issued in lieu of all wood. In the Crimea the allow- ce of fuel was increased latterly to $4\frac{1}{2}$ lbs. of wood. This is only intended cooking. The nature of the climate, and the nature of the huts or tem- rary barracks, must determine the amount required for heating purposes. a rule, whilst an army is campaigning in a country where wood is ntiful, no issues of fuel for cooking will be made by the Commissariat ; troops will provide themselves with wood every day when they halt, rties, each under an offr. being sent to cut it. In fixing the ration of l in rooms, the home daily allowance may serve as a guide : it was : for . 1 grate, with an opening of $1\frac{3}{4}'$, 320 lbs. ; No. 2 grate, with 17″ opening, lbs. ; No. 3 grate, 15 in. opening, 240 lbs. ; 6 lbs. of wood being owed for all 3 grates besides. The grates are of Galton's pattern, the size being for a room of from 7800 to 12,000 cub. ft., the 2nd for those from 3600 to 7800 cub. ft., and the 3rd for all under that size. The sent scale, which has been substituted for the above, is, for every 12 men

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or a fraction of that number in any room in winter, 37 rations of coal and of wood, the ration being 1 lb. of coal, and $\frac{6}{7}$ lb. of wood.

When under canvas at home the scale is the following number of rations: *Staff and Departmental:* Genrl. 80; Lt.-Genrl. 60; Majr.-Genrl. 50; Brigdr.-Genrl. 40; Col. 20; Lt.-Col. 15; Majr. 12; Capt. 4; Lieut. 2; Warrant offrs., all N.C. offrs. and private servants 1. *Regimental:* Offrs. Commg. Regt. or Battn. 8; all other F.Os. 4; all regtl. Staff offrs. 2; for the offrs. of each troop, battery, or compy. 8; warrant and N.C.Os. and privates and civil servants, 1 each.

Straw for bedding will be issued when troops are halted for any length of time, at the rate of 36 lbs. per every 2 men, to be refreshed at the end of 16 days with 18 lbs.: of 32 days the whole to be removed, and a fresh bedding issued, and so on as before. In wet weather it must be changed more frequently; see "*Internal Arrangements of Camps.*"

Light.—Where rations of light are issued the ration is $\frac{2}{3}$ gill of oil for each lantern, with 1 drachm of wick for every 8 gills of oil issued, or 2 oz. of candles.

THE ORDNANCE STORE DEPARTMENT will provide, receive, hold, issue and account for munitions of war required for the service of all branches of the army and R. N. and all military stores, except clothing and necessaries for the army. Clothing and necessaries will, however, be consigned to the O.S.D. at the B. of O. In fact this department will be responsible for the custody and supply of all articles required by the army, food for man and beast and remounts and transport animals excepted. All stores in the possession of troops, which the G.O.C. may consider to be unnecessary, surplus camp equipment, all unserviceable articles, all arms and military stores captured from the enemy will be handed over to this department. Articles issued on payment will not be taken back into store.

Our regulations do not allot any O.S. officers to Divns. or Brigades; the O.S. establishment for an Army Corps is as follows:—

* Includes 2 Armourers, 10 Collar Makers, 8 Wheelers and Saddletree Makers, 8 Carriage Smiths, 2 Shoeing Smiths, and 8 Tent Makers.	D. C. G.	A. C. G.	Commissy.	Depty. Commissy.	Asst. Commissy.	Clerks.	M.-C. Os. & Men.	Batmen.	Riding.
Head-Quarters of Army-Corps	1	1	1	..	2	6	..	7	
For general duty, as may be ordered	3	5	3	4	9	25	200*	32	
Total . . .	4	6	4	4	11	31	200*	39	

NOTE.—The actual rank of these offrs. is subject to variation. The offrs. and men be posted where the G. of C. thinks they are most requisite for the wants of the Ser

The senior O.S.O. will as a rule be with the Hd. Qrs. of the army, and the next senior offr. will be with the G. of C., as the post of next importance, and this latter offr. will have under his orders all O.S.Os. on the L. of C. By this arrangement the duties of the Dept. will be divided into 2 sections—viz., (*a*) those in connection with the supply of ordnance stores from the Advd. Depot to the troops in front, and (*b*) those in connection with the landing of stores at the base, their custody in the various magazines and storehouses formed along the L. of C. and especially in keeping the Advd. Depot fully supplied with all such stores ammtn. &c., that the army may require from day to day. All correspondence on purely O.S. subjects, will be conducted by the offrs. of the O.S.D. under the authority either of the G.O.C. the army conveyed through his C. of the S., or of the G. of C. according as the O.S.O. concerned be either with the troops in the field, or employed on the L. of C. All general instructions on O.S. subjects, intended for the information or guidance of the troops, must be conveyed through the only recognised channel of doing so, viz., through G.Os.

*All demands as to stores, clothing or personal equipment** are to contain full and exact details as to the number and particular description of every article required, according to the authorized nomenclature or vocabulary of stores, and to be made on the prescribed forms. In the case of stores to be issued upon the authority of a G.O. according to the strength of the regt. or in certain proportions (for instance, a second blanket per man, the further issue of a pr. of boots, &c.), the requisition will be transmitted direct to the O.S.O. of the Divn. of Brigd., no other authority being necessary beyond the G.O., the number and date of which must be quoted on the requisition. The C. corps when in the field will cause inspections to be made of all equipment after an action, as well as daily when halted after a march, in order that their condition may be constantly known and reported upon when necessary to the G.O.C. They will immediately make requisitions, in duplicate, direct to the O.S.O. of the Divn. or of the Brigd., for the replacement of any articles which may have been lost, or have become unserviceable either from fair wear or through the neglect of individuals. When arms, equipment or stores of any kind are lost, destroyed, or injured, and it is a matter of consideration on whom the expense of repairing or replacing should fall, the G.O.C. will assemble a court of inquiry, composed of offrs. not belonging to the corps interested, if practicable, to investigate the matter. O. S. Os., under the authority of the G.O.C., will arrange as to the mode and time of supply, acting in direct communication with the offrs. by whom the issues are to be made.

* *Under the term 'personal equipment' will be included all small arms, accoutrements, small-arm ammunition, harness, saddlery, and other appointments supplied for men and horses, as well as tools and materials for their repair and preservation.*

Marks for Stores.—All stores sent to an army in the field are marked as follows, so as to be easily identified :

	Colour.
Artillery Stores	*Dark Blue Triangle.*
Artillery Explosives	*Red Triangle.*
Engineer Stores	*Light Blue Circle.*
Engineer Explosives	*Red Circle.*
Commissariat Stores	*Green Trefoil.*
Clothing, except Hospital Clothing	*Brown Heart.*
Medical Stores, including Hospital Clothing	*Yellow Square with Red Cross.*
Officers' and other Baggage	*White Diamond.*
Army Signalling Corps' Stores	*Cross Flags, with A. above, and S. below, all Yellow.*

AMMUNITION, SMALL ARM AND MACHINE GUN.

Martini-Henry.		Revolver, Pistol.		Nordenfelt.		Gardner or Gatling 0·45 in.
Rifle.	Carbine.	Enfield.	Adams.	Service, or Steel.	Practice, or Iron.	
Red Rectangle.	*White Rectangle on Red Rectangle.*	*White Circle on Brown Circle.*	*Brown Circle.*	*Green Diamond.*	*White Diamond inside a Green Diamond.*	*Black Triangle.*

Camp Equipment includes all articles that are not personal equipment required by troops for themselves and horses in the field, except food. It is distributed by companies or troops, and captains are responsible for it. All requisitions for it are made direct to the O.S. Dept. by the C.Os. of corps and must be accompanied by a statement of the strength of the corps or detachment for which it is required, giving the information as follows :—

Mounted Corps.	No.	Dismounted Corps.	No.
Batteries		Batteries	
Troops		Companies	
Officers { Field		Officers { Field	
Officers { Other ranks		Officers { Other ranks	
Staff-sergeants		Staff-sergeants	
N.-C. Os. and men		N.-C. Os. and men	
Horses { Officers' chargers		Officers' chargers	
Horses { Troop (ridden as chargers by officers)		Public bât animals	
Horses { Troop		Private bât animals	
Public bât animals			
Private bât animals			

The quantity of each article demanded that may be in possession is also to be stated, specifying how many are serviceable and unserviceable, and the reasons for demanding them. Any articles lost otherwise than by unavoidable accident, or damaged beyond what may be considered as fair wear and tear, will be charged against the troops. All articles may be purchased by offrs. when in the field, provided the state of the store admits of the sale. It is the writer's conviction that tents cannot possibly be carried by an army when engaged in temperate climates in active operations before an enemy. The Prussians during their late wars had none, neither for some years had our army in the Peninsula. As the L. of C. will generally be along railways, tents can easily be brought up for use when the army is stationary for any length of time as at a siege. At other times the men must bivouac and be billeted in villages. The authorized quantities of camp equipment for Cavly. and Infy. have been already detailed in the organisation of those arms. The R. A. and R. E. train have theirs always in possession.

The circular tent is the one used in our army (except in India, where it is only used in hill expeditions). It is issued at the rate of 1 to every 15 men in the field, and 1 to 12 men in standing camps ; * it is 10′ high, diam., at base is 12·5′, the ropes extend about 18″ all round ; its apex forms an angle of 70° : wt. from 70 to 74 lbs. complete with pole when dry ; it is made of canvas. (All canvas tents increase in wt. by from 30 to 40 p. c. when completely wet.) It consists of a valise, 1 pole (in 2 pieces), and a bag containing 42 pins and 2 mallets.

The shelter tent consists of 2 sheets, 2 poles, and 7 pins, and weighs about 11 lbs. when dry ; it is issued at the rate of one to every 2 or 3 men, when supplied.

The Hospital Marquee complete weighs, when dry, 512 lbs., and about 560 lbs. when wet : L. 30′ : B. 15,′ and H. 15,′ : its sides are 5′ high : it consists of 1 valise, 1 bundle of poles, 1 bag containing 4 large and 180 small pins, and 2 mallets, and 1 bottom. It is intended for the accommodation of 16 sick, lying on the ground ; when beds are provided, not more than 10 can be conveniently accommodated in them, and contains 3·336 cub. ft. of air. This hospital marquee is most inconvenient and cumbersome ; its accommodation is small, its wt. is excessive, and it is very difficult to pitch. The Indian E. P. tent is a better for hospital purposes. The tent for hospl. use in the field, is *the double circular*, without lining, weighing 100 lbs., and accommodating 4 patients.

In Bengal tents are issued to British troops as follows : 1 S. Serjt. tent to

* *In Abyssinia, when transport became very difficult, these tents were issued at the rate of* 1 *to every* 20 *men,* 1 *to each brigadier and his staff, and* 1 *to every* 2 *other offrs.*

each of the following—Regt. Serjt.-major, Q. M. serjt. musketry serjt., pay-master serjt, orderly-room clerk, band master, and armourer-serjt. Privates' tents (technically styled E. P. tents) 1 to every 16 men, or 8 to 12 sick men when it is used for hospl. purposes. 1 for rear and 1 for Qr. Gd., and for hospl. purposes 1 for every 200 men, and 1 for apothecary's and purveyor's stores. Its wt. when dry is from 600 to 631 lbs. : it is 22′ by 16′. The offrs. provide their own tents, the limit of wt. being 80 lbs. A S. Serjt.'s tent weighs 400 lbs. when dry. A Lascar pal weighs 248 lbs. : interior space 16′ × 16′ : a useful tent everywhere. The Sepoy double pal, wt. 512 lbs., interior space 32′ × 16′ ; accommodation, 22 British, or 44 native soldiers, or 50 followers. Double-fly pal or "Mountain Battery Tent," wt. 100 lbs. ; interior space 12′ × 8′ and H. 8,' holds 6 to 8 Europeans or 10 to 12 natives : it was found of great use in standing camps in the Soudan.

NOTE.—*A hand hatchet weighs* 1 *lb.* 14 *oz.*; *a felling axe* (*Canada pattern*) 4 *lb.* 8 *oz.*, *with handle*; *a pick-axe*, 6½ & 5 *lbs.*, *with handle*; *a shovel*, 4 *lbs.* 12 *oz.*; *a spade*, 6 *lbs.*; *a blanket*, *old pattern*, 3 *lbs.* 12 *oz.*; *new pattern*, 4 *lbs.* 10 *oz.* (7½′ × 5′ *in size*). *The Flanders camp kettle*, 3½ *lbs.* (*holds* 12 *quarts*, 12″ *B. at top and* 11″ *at bottom*, *D.* 12″, *and cooks for* 8 *men*): *the Torrens' kettle weighs* 3½ *lbs.* (*holds* 6 *quarts*, *and cooks for* 5 *men*). *Reaping hook*, 10 *oz.*; *sickle*, 14 *oz.*; *horse blankets*, 6½ *lbs.*; *billhook*, 1 *lb.* 12 *oz.*; *lifting jack*, 19 *lbs.*; *carpenters' tools*, *plane*, *set of*, 77 *lbs*; *box*, *tin*, *grease*, *half-round*, 18 *oz.*; *linchpin*, 4 *oz.*; *washer*, *dropped*, 19 *oz.*; *lashing rope used in transport*, 20 *oz.*; *waterproof sheet*, 3 *lbs.* (*when used*, 1 *is allowed for every* 2 *men*); *buckets*, *leather*, 2 *lbs.*, *canvas*, 1 *lb.*; *rope*, *picket*, *white*, 25 *yds. long*, 23 *lbs.*; *corn sack*, *cavalry*, 1¼ *lb.*; *crowbars*, 5′ 6″, *and* 4′ 6″; *cross cut saw*, 7 *lbs.*; *hand saw*, 1 *lb.* 13 *oz.*; *maul*, 10 *lbs.*; *gabion knife*, 4 *oz.*; *handspike*, 6′ *long*, 12 *lbs.*; *field grindstone*, 20 *lbs.* 4 *oz.*

AMMUNITION.—The A.G. of an army in the field is responsible to the G.O.C. for the supply of Amtn. for that army. To enable him to perform this duty efficiently he will be furnished as often as he may deem necessary, by the O.C, the R.A., with returns of the reserves in R.A. and O.S. charge respectively. G.Os.C. Divns. are responsible for maintaining their reserves of Amtn. and they will be furnished as often as may be required with the necessary reports from the O.C. the R.A. of the Divn. Any deficiency in the regulated amount of Amtn. is to be immediately made known to the A.G. of the army. As a general rule, subject to such modifications as the nature of the service may require, the proportion of Gun Amtn. is calculated at 500 rds. per gun, and of S.A.A. at 480 rds. per man. These proportions are usually be distributed in the following manner, subject to the approval of the G.O.C.

	Rounds of Ammunition.			
	Per Gun.			Small Arm for each Rifle.
	9-pr.	12- & 13-pr.	16-pr.	
In possession of the troops, on gun and limber	40	36	28 } 100	70 } 100
Regimental Reserve, in wagons with Battery .	108	106	72 }	30 }
Field Reserves with the Artillery . . { Divisional	76	76	90	30 } 60
{ Army Corps, in 3 sections	76	76	90	30 }
Grand Depot and Intermediate Reserves with the O.S.D.	300	294	280	160
	200	200	200	320
	500	494	480	480

In my opinion there should in action be 200 rds. per Infantry soldier, either on his person or close to him. I would strongly recommend as a general rule the issue of an extra 30 rds. per man when going into action.

The *Regimental Reserve* of 30 rds. for each rifle (in addition to the 70 rds. in possession of the troops) will accompany each battn. in the field in charge of the O.C.; it will always accompany the battn., and be kept supplied by demands on the divnl. Reserve. The Transport of the Regtl. Reserve for a battn. of 1000 men will require, 4 S.A.A. carts (each carrying 12 boxes = 7200 rds. rifle ammtn. There will also be in each cart a box of pistol ammtn.) 4 drivers, 1 N.C.O., and 8 draught animals. The total amount of rifle Amtn. carried = 28,800 rds. = 3804 lbs. in wt. Pack animals, however, will be exclusively employed, where, from the nature of the country, carts would not be available.

The load for a pack animal will be :—

2 boxes, weight, 79 lb. 4 oz. each	158½ lbs.	Total weight, 215 lbs. exclusive of forage.
1 canvas Amtn. Bag	1 ,,	
Pack saddle	48½ ,,	
Rope Lashing	1 ,,	
Line Gear and Mule Shoes	6 ,,	

Each company will have 3 mules, so loaded. The men will carry 2 canvas Amtn. Bags.

As the killed and wounded have fired but little, and as a large proportion of men in great battles never fire a shot, nothing is more fallacious than to determine the quantity of S.A.A. that should be carried by the soldier, and in Regtl. and other reserves by a calculation based upon the number of rds. fired by battns. in any well-known battle. It is only on very rare occasions, and under exceptional circumstances,

that the Infy. soldier fires over 100 rds, in any one day; we know that at König-grätz one Regt. fired on the average 72 rds., and two companies 80 rds., and at Plevna it is said that some Battns. fired 150 per man. In fitting out expeditions into wild countries or to places at great distances from the B. of O., special calculations must be made in each instance to meet the peculiar circumstances of the case. In Abyssinia the Regts. beyond Senafe had in their own charge 200 rds. per man (including what was carried by the men): the 2nd reserve was 250 rds. per rifle, and at Zuala there was a 3rd reserve. In the Red River expedition there was a large reserve of Amtn. at the B. of. O., and each man carried 60 rds. besides which the only reserve was at the rate of 100 rds. per rifle. Of the troops who crossed the Prah for the final advance on Coomassie, each man was provided with 70 rds. in pouch, and 50 rds. per man were carried regimentally as the 1st reserve: the 2nd reserve (which was in charge of the R. A.) consisted at first of only 50 rds. per man, but was subsequently raised to 70 rds. a man, and large field reserves were collected at Prahsu to be pushed on to the fortified posts in advance as required: at each of these posts the garrisons were supplied with 200 rds. a man. The returns giving the expenditure of Amtn. in battles before breechloaders were in use, are no guide now on the subject. In fixing the quantity of Amtn. both for R. A. and Infantry, to be taken with an army, it is essential to provide the troops in front most liberally, so that they may be prepared for any extraordinary expenditure, calculating the quantity to be at the Advd. depot, and in charge of the O.S.D. on the average expenditure which we know has taken place in the battles of recent wars. As regards Gun. Amtn., it has been generally considered that 150 rds. per gun are ample for one battle, and this may still be regarded as a fair allowance, although 3 French Batts. at Gravelotte are said to have fired 212 rds. per gun, and an Austrian Batty. at Königgrätz 218 rds. a gun.

For Brigds. and Divns, the G. O. C. will distribute his reserve Amtn. transport, as mass it as he may think best; while for smaller bodies of troops, pack animals could accompany and supply one or more detached companies over any ground or on outpost duty. The Divnl. and Army Corps or general reserves will be in charge of the R. A., and will be conveyed and replenished as hereinafter directed. These reserves will form part of the fd. equipment of the R. A., and will not be in charge of the O. S. D. The remaining reserves will be in charge of the O. S. D. and will be placed in depots. The first reserve of Gun Amtn. (108 rounds per gun for 9-pr., and 72 per gun for 16-pr.) is contained in the divisional reserve. The divnl. reserve for small arms (about 40 rds. per rifle) will be conveyed in Amtn. carts attached to each division reserve. Should the state of the country in which the army is acting render it necessary to adopt any other method of transporting this reserve, the means will be determined by the C. in C., and carried out by the R.A. The divnl. reserve of S.A. is under all circumstances to be at hand, and in the event of its being found necessary to separate the carts from the divnl. reserve to which they are attached, the D.A.C.O. of R.A. must make arrangements for their being placed under proper charge and the safe spot, easily accessible to the troops, in order that no unnecessary delay

may occur when occasion shall arise for making issues to corps whose supplies are exhausted. The Army Corps or general reserve is always to be kept up with the army, and as far as practicable out of fire. The offrs. of R.A., commanding the reserves, will be responsible to the G.Os.C. Divns. or Army Corps respectively, that the Amtn. of each divisional reserve is from time to time completed, so far as circumstances will permit, from the army corps or general reserve. The latter reserve will be completed from the reserves in charge of the O.S.D., upon requisitions of the O.C. the R.A., supported by the receipts for the issues made to the troops. On emergency, however, the O.S.Os. will make issues on requisitions of the Os.C. the several R.A. reserves, but such issues will be reported by the Commissary in charge of the Depot to the C.G. at Hd. Qrs. for covering approval. Should the B. of O., where the grand depot of reserve is placed, be further distant than an ordinary 3 days' march from the advd. depots last mentioned, intermediate depots will be required; upon the organisation and disposition of which the A.G. of the army in the field and the C.G. of O. should take the orders of the G.O.C. who will determine what course should be followed to insure a regular and sufficient supply of Amtn. from the grand depot of reserve, for the use of the army. Os. C. corps in the field will obtain their supplies of Amtn. on requisitions direct from the Os. C. the R. A. *In fortresses or garrisons*, the G.O.C. holds the C.G. of O. responsible that the reserve of S.A.A. is equal to the authorized proportion, and available at all times for issue. In fortresses abroad, the number of rds. for S.B. guns will be according to a scale fixed for each, and for rifled guns as follows: 250 rds. for each 12·5″, 12″, 11″, and 10″ R.M.L. gun: 300 rds. for each 9″ and 7″ R.M.L. and for each 20-pr. R.B.L. gun: and 200 rds. for each 64-pr. and 80-pr. R.M.L., and for each 7″ R.B.L. and each 40-pr. R.B.L. gun.

Gunpowder is packed in barrels, ½ barrels and ¼ barrels; the wt. of the 1st (empty) is 30 lbs.; it contains 100 lbs. of common, or 125 lbs. of P. powder, owing to its greater density; its height is 21·5″, circumference at bung 55·75″, and occupies 2·5 cub. ft. of magazine space; the ½ barrels hold 50 lbs; its wt. is 18 lbs., height 17″, circumference at bung 42·5″, and occupies 1·4 cub. ft. of magazine space. Powder is sent abroad in lots of 100 barrels at a time. A cubic ft. of powder weighs about 56 lbs. In damp or temporary magazines it is packed in metal-lined rectangular cases of 3 sizes, viz. 17″×20½″ (holding about 120 lbs. of powder in bags), 13½″×16½″ and 10½″×14.″ The powder used by Fd. Arty. is known as "Rifled Large Grain" (marked R. L. G.). The grains are about the size of barley. Pebble powder (marked P.) is used for large ordnance, and is made in cubically-shaped grains about ½″ long. That used for M. H. rifle is known as R. F. G^2; its density is somewhat greater than that used for other rifled small arms, which is known as R. F. G. (Rifle Fine Grain).

Ammunition for Fd. Guns.—The projectiles fired from the R.M.L. Fd. guns are common and shrapnel shell and case-shot. The light 7-pr. has in addition a double shell and a star-shell. About ¼ of all projectiles in our equipment are shrapnel. The *common shell* when filled weighs almost exactly according to the denomination

of the gun; thus the 16-pr. shell weighs about 16 lbs., the 13-pr. shell 12 lbs. 10 oz., the new 12-pr. shell 12·5 lbs, the 9-pr. shell 9 lbs, and the 7-pr. (single shell) 7 lbs. 4¼ oz.; the double shell 12 lbs. 3¾ oz. For particulars of weights &c., of the ammtn. for guns see p. 44, where that for each of our guns is fully described.

Gun Amtn. is carried on service in the following manner and proportion per gun by our Fd. Artillery:—

		Horse Battery.			Light Fd. Battery.			Heavy Fd. Battery.			Fuzes, &c.
		On gun carriage.	In gun limber.	With ammtn. wagon.	On gun carriage.	In gun limber.	With ammtn. wagon.	On gun carriage.	In gun limber.	With ammtn. wagon.	
9-pr.	cartridges, gun, service	4	36	108	4	36	108	..	..	..	9-pr. batteries carry 135 time fuzes, 50 percussion fuzes, and 200 friction tubes.
	shells, filled common	..	8	24	..	8	24	..	..	..	
	shells, filled shrapnel	..	28	84	..	28	84	..	..	..	
	shot case	4	..	..	4	..	..	..	..	..	
	or										
13-pr.	cartridges, gun, service	2	34	106	2	34	106	..	..	..	13-pr. batteries carry 140 time fuzes, 7[illegible] percussion fuses, and 175 friction tubes.
	shells, filled common	..	8	22	..	8	22	..	..	..	
	shells, filled shrapnel	..	26	82	..	26	82	..	..	..	
	shot, case	2	..	2	2	..	2	..	..	..	
16-pr.	cartridges, gun, service	..	..	..	..	..	..	4	24	72	16-pr. batteries carry 90 time fuzes, 6[illegible] percussion fuzes, and 150 friction tubes.
	shells, filled common	..	..	..	..	..	..	..	6	18	
	shells, filled shrapnel	..	..	..	..	..	..	..	18	54	
	shot, case	..	..	..	..	..	..	4	..	..	

S.A.A. Box.—The external dimensions of the new pattern are, L. 21·75", 6·962", and B. 8·325." Mark XI. weighs 11 lbs. 6 oz., and Mark XII. 11 lbs. 12 oz. tonnage 0·0182 ton. Mark XI. is of mahogany and is for general service; Mark XI[illegible] is for home and special service, and has its sides and bottom of deal, ends of elm and top of Kawrie pine. The top of both patterns has a sliding lid on broadest side. When filled with 600 rds. of M.H. it weighs 79·25 lbs. and 76 lbs. 7 oz., with a[illegible] without tin lining; with 630 rds. of M.H. carbine, 4 lbs. less; with 560 Sneid[illegible] 9 lbs. less; with 2136 rds. for Adams' Revolver, its wt. is 103·5 lbs.; with 200 r[illegible] of 65' Gatling, 81·25 lbs.; or with 680 rds. of ·45", 89 lbs. 13 oz., with tin-lining for all these 3 last-named cartridges. This box takes up ·757 cub. ft. of magazine space.

The S.A.A. Cart used to carry 16 of these boxes, and in addition, in its under l[illegible]

1200 rds. of revolver ammunition ; its wt. when empty is 8·5 cwt., and about 20 cwt. when filled as just stated. Now only 12 boxes of rifle (954 lbs.) and 1 of pistol (13 lbs.) are carried, the space left vacant by the 4 boxes subtracted being filled with a few useful tools, that weigh in all 56 lbs. The cart in future fully equipped will weigh 19 cwt.

S.A.A. on pack animals. 2 boxes form a load : a camel can carry 6 boxes in the plains and 4 in the hills in India.

M.H.A. is made up in bundles of 10. For the Infantry arm, the powder charge is 85 grs. R. F. G.^{2} powder ; wt. of bullet 480 grs., it is 1·27″ long : wt. of a bundle of ten, 18 oz. The cartridge is 3·15″ long.

The Carbine Cartridge is about $\frac{1}{8}$″ shorter : the charge of same powder is 70 grs. The wt. of bullet is 410 grs. : of a bundle of cartridges, 17 oz.

The new rifle cartridges are in bundles of 10 ; each bundle weighs 17 oz. The bullet weighs 384 grains : charge 85 grs.

The Sneider bullet weighs 480 grs. : the powder charge 70 grs. of R. F. G. : wt. of a bundle of 10 cartridges about 16 oz. The same cartridge is used for both long rifle and for carbine.

Revolver, Adams'. Wt. of bullet 225 grs. : charge 13 grs. The cartridges made up in bundles of 12, weighing 8 oz. 3 drs. each bundle.

Ammunition for the regulation revolver is made up in bundles of 12 cartridges, weighing $8\frac{3}{16}$ oz. each bundle. It is packed in boxes 11·75″ L., 8″ D., and 4·25″ W. weighing empty 4 lbs. 7 oz., and when filled with 600 rds., 30 lbs. 1 oz. ; or in smaller boxes 8·5″ L., 5·5″ D., and 4··25 W., weighing empty 2·25 lbs., and when filled with 240 rds. 12 lbs. 9 oz.

Gatling ammunition is made up in bundles of 10 rds. each, the ·65″ weighs 7 lbs. $7\frac{3}{16}$ oz. ; the ·45″, 18·25 oz. ; the bullet of the ·65″ is 1422 grs., the powder 70 grs. ; in the ·45″ those amounts are 480 grs. and 85 grs. respectively.

The Medical Department.—The P.M.O. with an Army Corps in the field will be a Surgeon-Genrl. The medical staff laid down in regulations for an Army Corps is too large ; if it must be appointed, I would recommend the superfluous officers being left at the Base. That staff in addition to the P.M.O. is 1 D.S.G. as Sanitary offr. ; 1 S.M. as secretary to P.M.O. ; 1 S.M. in charge of Hd. Qr. Staff, 2 Surgeons as his Orderly M.Os. ; 2 privates as orderlies ; with 5 N.C.Os. and privates as clerks and compounders ; 9 privates as batmen and 13 chargers, 4 of which are alone intended for the P.M.O. The P.M.O. might have 2 chargers and all the other M.Os. 1 each ; this would be ample for the work they have to do. All arrangements for care and treatment of sick and wounded, are made by the P.M.O., through the C. of the S. and G. of C. He will direct the disposition and movements of the bearer Cos. and the movable Hd. Hospls. He will bring to the notice of the G.O.C. all circumstances affecting the health of the men, and recommend any changes he may

consider necessary in their rations. It is advisable that the earliest information regarding all expected engagements may be given to the P.M.O. so that due arrangements may be made for the establishment of the necessary hospls., &c.

The medical staff for each Divn. will be 1 Deputy S.G. with 3 chargers and 1 N.C.O. and 1 privt. as clerks; 1 Surgn.-Majr. in charge of Divl. Sta and to act as Divl. Sanitary offr. with 1 N.C.O. as Compounder; he allowed 2 chargers. Both these offrs. have 1 privt. each as an orderly, an one is allowed 2, the other 1, batman. All offrs. of the department belo the relative rank of Majr. are supplied with public service horses. Or Bearer Compy. and 2 Fd. Hospls. are attached to each divn.

Sanitary Officer is the creation of recent years, and as a general ru he is a very useless functionary. In the numerous campaigns where have served with a sanitary officer, I can conscientiously state I have nev known him make any useful suggestion, whereas I have known him mak many silly ones. It is not his fault, for with an army moving it is in possible to drain a town, as I have known suggested, or carry out any oth great sanitary measure. There is not time for any great sanitary work and for the ordinary cleanliness of temporary camps or bivouacks, t P.M.O. with each divn. can do all that is necessary. In future, as long this fad continues, my recommendation is to leave him at the base, whe he may find some useful occupation as a member of the Sanitary Boar which I think should have charge of all sanitary arrangements at t Base.

The Medical Staff Corps is organized for duties in connection with t Hospital service and is an integral part of the A.M.D., the P.M.O. subj to the G.O.C. having supreme authority over it in matters of disciplin The corps is chiefly recruited from the ranks of the army. In the field i divided into 2 branches—I can scarcely term them units,—viz., the Bea Company and the Field Hospital.

The Bearer Company will be provided with either mule or wagon tra port, according to the nature of the country operated in. These Compan form the 1st Line of medical assistance in the field. The detail o Bearer Compy. is as follows:

OFFICERS AND MEN.

OFFICERS.

Surgeon-Major (in command)	1
Surgeons	2
Qr. Masters	1
Total Officers	4

MEDICAL STAFF CORPS.

Serjeant-Major	1
Staff-Serjts. and Serjts.:	
,, Compounder	1
,, Qr. Mr. Serj.	1
,,	4
Buglers	1
Corporals	6
Privates	11
,, as bearers	32
,, as batmen	5
Total (officers included)	66

The Surgeon-Major is allowed 2, the other officers 1, horse each, and the erjt.-Majr. and the Q.-M.-S. are mounted. When wheeled transport is sed, 10 Ambulance wagons are with each Bearer Company; in lieu of ese wagons 18 prs. of cacolets, and 10 litters to be carried by 28 mules re used when the Company is equipped with pack transport. The Transort for the Bearer Comps. will be furnished under the order of the Director f Transport, by the C. and T. Corps. There will be 1 Bearer Compy. to ach Brigd.; for 1 Army Corps there will be 8 Comps. including 2 attached o the Cavly. Brigd. and Corps troops.

All our regulations for the provision of ambulances are based upon the ssumption that 10 pr. cent. of the 32,000 men in an Army Corps that would ossibly be under fire, would be wounded. The duties of a bearer column ill be to render first assistance to the wounded, and remove them from the eld to dressing stations and Fd. Hospls.

Before an action begins, the P.M.O. of each Divn. will advise with the .O.C. in regard to the positions where dressing stations will be established. n the absence of the G.O.C. or other C.O., this P.M.O. will issue the ecessary instructions to the bearer compy. When no orders have been eceived from the G.O.C. or from the P.M.O. of Divn., the M.O. in charge f the Compy. will on his own responsibility organize the collecting and ressing station or stations, and take such measures as may be necessary or the relief and transport of the sk. and wdd.

The collecting station will be in charge of the Serjt.-Major, who will leave N.C.O. with him in charge of the Fd. Companion, waterbottle, dressing, c. Here the ambulances or cacolets will assemble. The 2 sections of earers with stretchers and haversacks, under a M.O., will range about ollecting the wounded. Having placed them in the ambulances, &c., at ie collecting station, they will at once return to search for more wounded. hese parties are not to go further to the rear than the collecting station ntil all the wounded have been collected.

Dressing stations will be established, if possible, at points not exposed to fire. If there be suitable buildings near the scene of action they will be utilised, otherwise an operating tent will be pitched under cover, and the M.O. in charge of the bearer compy. will issue such directions as he may consider necessary for the organization of the dressing stations, and apportion to each M.O. his duties. At the dressing stations the wagons and carts will be placed in position under the orders of the M.O. in charge. The dressing station will be distinguished during the day by 2 Geneva flags, and during the night by 2 red lanterns. During the action wounded straggling from the field will be attended to at the dressing station, and transferred to the rear with all possible speed. At the close of an action the M.Os. with the sick bearers will do all they can to collect the wounded that may possibly remain hidden in ditches, woods, &c. lanterns are provided for this purpose at night. When the wagons have been loaded they will proceed to the dressing station, each wagon being followed by an attendant—if possible, a N.-C.O.—who will assist in the removal of the wounded from the wagons. Whenever practicable, the wounded will be carried to the dressing station, or even to one of the Fd. Hospls. in the vicinity, without removal from the stretchers. The arms and valises of wounded men will be carried with them in the ambulances to the dressing stations and Fd. Hospls., and will be handed over to a serjeant of the M.S.C. Officers and N.-C.Os. of a bearer compy. will be responsible that the private property of the dead and wounded is not appropriated. A severe punishment will follow any such act of appropriation. The 2nd line of ambulances will be in charge of an offr., and under ordinary circumstances about ½ a day's march in rear of the compy. When the wounded begin to arrive at the dressing station, the M.O. in charge will send an offr. of Orderlies with orders for the 2nd line of ambulances, or as many of them as may be considered necessary, to advance to the dressing station to remove them to the nearest Fd. Hospl. In case of the troops retiring, the P.M.O. of Div. or, in his absence, the M.O. in charge of the bearer compy. will determine what portion of the medl. establt. will be left behind.

Field Hospls. form the 2nd Line of medl. assistance.

The establishment of a Fd. Hospl. is as follows; it is intended for the accommodation of 100 patients, but it is divisible into 2 half hospitals, each half for 50 patients.

OFFICERS.

Surgeons-Major	2
Surgeons	2
Qr. Masters	1
Total Officers	5

N.-C. Os. and Men.

Serjeant-Major (Steward)	1
Staff-Serjts. and Serjts.	7
Corporals	4
Privates	22
,, as batmen	6
Total (Officers included)	45

It should be an understood thing that all hospitals in the field, especially here wounded men are cared for, should be dieted by the Medical Department, a good cook with efficient assistants being invariably with each Hospital.

The transport required, whether pack or wheeled, will be furnished under he orders of the Director of Transport, by the C. and T. Corps.

There will be 4 Fd. Hospls. to each Divn., one of them attached to each Brigd., with 2 in Reserve; there will be 14 Fd. Hospls. with each Army Corps, including 2 for the Cavly. Brigd. and Corps troops. They will e fully equipped, and supplied with transport. Each Fd. Hospl. will ave 40 single bell tents and 4 double bell tents. (As a rule, 4 patients in ach tent.) On the line of march, they will follow the Bearer Comps., the en of which will assist to pitch the tents of the Fd. Hospl. The men take heir arms and accoutrements to Hospl. with them. The Hospl. will be istinguished by a red cross flag by day, by a red lantern by night. Before n action the movable Fd. Hospls. should be cleared of any sk. or wdd. that an be removed to the rear. In selecting a site for a Fd. Hospl. before an ction, due precautions will be taken that the position is as close as possible o the 1st line of assistance, and that there is a practicable road for the mbulances from the front, and a sufficient water supply in the vicinity. dvantage will be taken of any available and suitable buildings in towns and llages for the establishment of these Fd. Hospls. When there are no uildings available, the hospl. tents will be pitched, and the carriages drawn o under the direction of the M.O. in charge.

Hospls. on the Lines of Communication, constitute the 3rd line of medl. ssistance. They are fitted and equipped for the accommodation of 200 atients each. In choosing sites for stationary hospls., due attention will e paid to the character and elevation of the country, the nature of the oil, the proximity and purity of the water supply, the practicability of rainage, the shelter afforded by woods or high land from cold winds; the osition should be easy of access and at a convenient distance from the ain road. If possible these hospls. will be established in buildings or ooden huts at the port of embarkation, and in towns, villages, or farm-ouses along the Ls. of C. Hospl. marquees will be stored at the B. of O. nd issued for stationary hospls. when other shelter is not available. These

Hospls. will be placed at convenient intervals so as to suit the general require ments of the Army. The sk. and wdd. from the army in front will be con veyed to these hospls. under the orders of the G. of C. All the details fo sending the sk. and wdd. from the Fd. Hospls. in front to these Hospls. i rear will be made by the G. of C. and the P.M.O. of the Army Corps.

The "washing" in all hospls. must be done by the men of the hospl. esta blishments. The establishment of a Stationary Hospl. consists of 1 Brigg Surgn., 4 S.M., 4 Surgeons, 1 Qr. Mstr., 1 Serjt. Majr., 8 Staff and othe Serjts., 8 Corpls., 48 privts., and 11 batmen. The officers have 15 chargers none are necessary, so some money allowance should be given them in lie

General Hospl. at Base.—One or more as may be required will be est blished. The establishment required for 500 patients is: 1 D.S.G., P.M.O., with 1 S.M. as secretary, 18 other M.Os., and 1 Qr. Mstr., Nursing Sisters, 3 Serjts. Mjr., 13 Staff and other Serjts., 1 Bugler, 12 Corpls 94 privts. and 25 batmen. 11 chargers are allowed for the senior M.O but it would be much better to give them a money allowance in lieu forage, so as to avoid having to feed that number of horses to no purpose

The custody of the arms of men in hospital.—The M.O. in charge of t hospl. is responsible for the arms, accoutrements, and such of the soldie clothing or private property as may be handed over to his charge. F each patient upon arrival a kit inventory should be made out on which articles received must be entered, with the soldier's name, regt., number, & together with the number marked on his rifle, arms and accoutrements. the man returns for duty with his regt., all these articles must be return to him, a list of them being furnished to his C.O. If he dies or "invalided" out of the country, his arms and accoutrements will be hand over to the nearest O.S.O. with full details and a receipt obtained, by wh the circumstance will be reported to the regt. concerned.

Sanitary Board at Base should be formed at once when the first troo are landed, with a military officer (of the R.E. if possible) as president: many instances it would be desirable to have the O.C., the police, and Harbour Master or some other naval officer on this Board, together w any local functionaries of weight and authority. Some police should specially told off for sanitary duties under this Board.

Hospital Ships, for the transport of sick and wounded from the theatre war to England, should be fitted up immediately that war is determi upon; those prepared for the Ashantee war in 1873 can be followed as mod Standing bedplaces should be provided for the sick, who should have ab 300 cubic feet each. We have numbers of old screw i ne-of-battle sh suited above all other ships for this purpose. If the voyages are short, the weather sufficiently settled to permit of vessels being towed by steam good roomy sailing ships are the best for hospl. purposes. Steamers the "Ganges" are extremely costly for the number of patients they

accommodate, as so much of their internal space is taken up by boilers and engines. These vessels should be under the order of the P.M.O., and no naval offr. should have power over them except upon purely professional points. At present the responsibility is divided between the Admiralty and the W.O. in the following manner. The Admiralty undertake the lodging, victualling, and conveyance of the sick, and for that purpose will provide the necessary shipping, fittings, bedding, food, medical comforts, disinfectants, and mess utensils of every kind. The W.O. undertake to furnish the medl. and other attendance necessary for the proper treatment and nursing of the sick, and the washing of all hospl. clothing and bedding used by them, and supply all articles of personal and hospl. clothing, medl. and surgl. appliances, and hospl. utensils. Floating hospl. accommodation, whether stationary or for transport purposes, will be separate, and exclusive of the hospl. accommodation for the force on land. The following should be the floating hospl. accommodation for an army corps. Each divn. of an army corps to have a depot hospl. ship capable of making up 200 beds, or 250 on an emergency. There should be one or more swift, powerful steamers, each making up 60 beds, to be employed as relieving ships for the depot hospl. ships, to take the worst cases home. It is desirable to have despatch vessels, each fitted out with about 30 canvas cots, to carry less severe cases to any neighbouring port of call to meet the packets on their way home. Special arrangements to be made for carrying a small number of invalids in each packet. Each depot hospl. ship should have attached a good steam launch ; it is desirable to leave a medical store ship in the harbour at base, from whence the hospl. ships can be kept supplied. It is very useful to have a floating stage alongside each hospl. ship to facilitate the embarkation of the sick and wounded. We found this a great boon in Suakim harbour. The companion ladders should be protected and wide enough to admit of men being carried on board in chairs. Each hospl. ship should be supplied with 400 canvas cots in addition to the cots required for use on board. These can be used in the transports remaining at the B. of O. if additional hospl. accommodation is required. Each of these hospl. ships will be provided with a sufficient staff of the M. S. C. for carrying out the hospl. duties. See article (further on) upon hospl. ships, under the heading of "SEA TRANSPORT."

A commander should leave no stone unturned to get his sick and wounded removed from the theatre of war as quickly as possible. An army or a fighting force, no matter how small, should not have its action hampered by having to care for the welfare of sick or wounded men, or in warfare with barbarous people, with their actual safety, which is still more embarrassing. Unless the L. of C. is along a navigable river or a rail, this becomes a matter of serious difficulty, as was the case for instance during the advance upon Coomassie. On the other hand the commander will

have to exercise a most careful watch over the medl. department, to preven soldiers being sent away who are either malingerers, or whose state of healt does not warrant their removal from the theatre of war. It is the natura tendency of all medl. offrs. to clear out their hospitals by sending home th sick with too little discrimination ; unless this is checked, the fighting strengt of an army will soon fall off.

Sk. or wdd. soldiers should be classed under 2 heads, 1st, those slightl wounded or only suffering from some passing ailment, who only requir rest and good food for a few days or weeks to enable them to resum their duties ; and 2nd, those not likely to be again fit for work durin the campaign. These latter should be again divided into 1st, thos seriously wounded or so ill that they must be conveyed to the B. of O. in recumbent position ; and 2nd, those who can be removed in a sittin position on board steamboats or by rail. This 2nd class might perha with advantage be divided into two ; *a*, the men who may safely be treate like ordinary passengers, and made to travel night as well as day, time being course allowed for certain hours of halt during the day to dress wound obtain food, &c. &c. ; and *b*, the men who must be provided with sleepin accommodation every night, in either houses or tents.

As in most future wars the L. of C. will be a railway, I shall dot dow briefly the general principles to be attended to for the evacuation of the s and wdd. by rail., which will, however, as principles apply equally to Ls. C. along ordinary roads by means of horse transport, or by boats alon lines of rivers. The difficulties of arranging for these services are in mensely increased when there is only a single line of rails, for in suc cases, even with the utmost foresight, frequent delays must necessarily occ from accidental interruptions on the line, and from the fact that trains goi in the opposite direction, carrying reinforcements and supplies of food an ammunition to the army in front, must be given precedence, thereby frequent necessitating the detention of ambulance trains at intermediate station The line of rail connecting the army with its base—whether single double—must be divided into such distances as it can be safely calculat trains will easily accomplish in the day, allowing a good margin for the d tentions in the case of single track lines. At the end of such distance sleeping accommodation should be provided for 200 or 300 sick a wounded men, intermediate stations having been prepared for supplyi food. The carriages must be carefully prepared for the conveyance of t badly wounded ; the various methods for doing so are tolerably well know now. Each train must be provided with a sufficient number of doctors one of whom should be in charge—and hospl. attendants, and one wag should be fitted as a kitchen, to prepare coffee, &c. &c., for the patien In every carriage there should be a filter, to be replenished with water at eve stopping-place. A great deal of the comfort of those being sent to the re

epends upon the goodness of the arrangements made at the feeding and ospl. stations along the line. (See article on Journey by Rail.)

MEDICAL ARRANGEMENTS.—The system of regtl. hospls. which existed o long in our army has been at last entirely abolished; but on service in he field, 1 M. O. will be attached to each Regt. of cavly., Battn. of infy., Battery, Company R.E., &c., to afford temporary aid when required. All slight cases of illness, such as diarrhœa, colds, bruises, &c. &c., should e treated by him. He will have attached to him 1 corpl. and 1 orderly rom regts. of calvy. and battns. of infy., 1 pr. of Fd. Medl. panniers, 1 Fd. Medl. Companion with water bottle, and 1 surgical haversack; those attached o batteries, troops, or comps., 1 orderly, 1 Fd. Medl. Companion with vater bottle, and 1 surgical haversack. All cases that require the patient to eceive more careful treatment and diet than can be afforded to men in bell ents, without hospl. appliances or equipment, should be sent to the Fd. Hospl., except cases of an infectious nature, such as typhus fever, small-pox, &c., which should be sent direct, and with the least possible delay, to ome general hospl. appointed especially for their reception. It will be for he M. Os. in charge of Fd. Hospls. to decide what cases shall be retained here for treatment until fit to return to their duty, and which shall be sent o the rear. Two men a compy., trained as stretcher-bearers, will be under he orders of M. Os. doing duty with regts. and in cases of outpost duty or letached battns. will perform the duties that are performed divisionally by he men of the bearer compy.; in extensive actions they will also assist the vounded. It is desirable that Os. C. Regts. should cause 4 men a company o be trained to meet casualties. The regtl. stretcher-bearers will never be emoved from battns. without the special sanction of the G. O. C. the divn. When the battns. are detached, or whenever it is considered necessary by he P. M. O. of Divn., he will cause additional medl. supplies or assistance o be furnished. A fd.-stretcher for each compy. will be carried on the line of march in the battn. compy. carts. When an action is expected, the regtl. bearers (2 per compy.) will leave their rifles and valises in the carts, and march under the direction of the M. Os. to the scene of action. In minor actions M. Os. doing duty with the regts. engaged will be assisted by M. Os. of regts. which are not engaged, in applying first dressings to wounded. In serious actions, M. Os. doing duty with regts. will only afford such temporary aid to the wounded as may be necessary until the bearer compy. arrives, and will not, as a rule, undertake any serious surgical operation, but always keep in close proximity to their respective regt., &c.

In estimating the proportion of sick for whom provision should be made in any army or expeditionary force, the climate, the diseases common to the country to be operated in, the age, health, and physique of the soldiers, are most important considerations. Thus, in making this calculation for the Force sent to the Red River in 1870, and for that sent to Ashantee in 1874,

very different rates of sickness had to be provided for, the climate in one instance being about the best, and in the other the worst in the world. The greater the care you can bestow upon the well-being of your men, the more attention you can pay to their food and clothing, the less you expose them to night duties, the fewer the straining demands you make upon their physical powers, and the more the sanitary precautions you can take against disease, the smaller will be the sick rate to be provided for. The medical history of the Crimean war is a shameful story, and tells of how an army may be destroyed by a Ministry through want of ordinary forethought and through culpable ignorance of military science; the general can learn from its pages the important lesson that the greater the attention he pays to the health of his men, the stronger will be his Battns. on the day of battle. History informs us that every war has really had its own special rate of sickness; climate, the season of the year, the length of the war, the care or negligence of the offrs. in looking after the welfare of the men, and many other circumstances peculiar to certain campaigns, account for this fact. The statistics published in our annual Army medcl. reports lead to the conviction that the age of the men employed greatly influences the rates of sickness and mortality, the young suffering most from disease, but having a smaller death rate than their seniors. The following table speaks for itself:

	Under 20 years.	20 to 24	25 to 29.	30 to 34.	35 to 39.	40 upwards
Admissions to Hospital in the U. K. per 1000 soldiers	1000·2	989	678·6	520·2	513	778·4
Death-rate per 1000 living	3·03	5·27	6·35	12·24	17·55	23.82

Troops in the field when well cared for should be quite as healthy as when in quarters in the same country, and for the following countries the number per 1000 of mean strength in our troops constantly non-effective from sickness may be taken as follows:—United Kingdom, 40·06; Gibraltar, 33·2; Malta, 41·15; Canada; 31·17; Bermuda, 35·47; West Indies, 43·96; Cape of Good Hope and St. Helena, 49·63; Mauritius, 56·58; Ceylon, 50·7; China and Straits Settlements, 56·19; Bengal, 55·46; Madras, 50·4; and Bombay, 49·12. Except for the Indian Commands, which are based upon the 1876 returns, these figures are based upon the medical returns of the last 10 years. To be on the safe side, allow for sick at double these rates when preparing for a war in the countries named. In many instances a margin to meet epidemics should also be allowed in calculating the hospital accommodation to be provided for an army or expeditionary force. Gene

Sherman says that all experience proves that in a large organized modern army, not more than 66 p.-c. of the total force can be reckoned upon for actual battle. In Abyssinia the proportion of doolies or dandies allowed was, at first, , and then 3 p.-c., but as the army advanced into the interior, and the difficulty of supply became very great, carriage for the sick was fixed at 1 dooley nd 2 pad mules per 100 fighting men, and 15 doolies to each Fd. Hospl. n Ashanti, hammocks were allotted to English regts. at the rate of 6 p.-c. of ll ranks, and arrangements were made for sending back daily to the B. of). sk. or wdd. at the rate of 1 p.-c. of all the British soldiers employed in front. *For operations generally on the West Coast of Africa* carriages should e provided for sick at the rate of 10 p.-c. for all Europeans employed in he proportion of 8 cots or hammocks to 2 stretchers. The hammock equires 4 and the stretcher 2 carriers. For a force of 1000 Europeans you would require 80 cots, 10 stretchers, and 340 carriers; spare 10 of each ith 60 carriers; water carriers 1 p.-c. (10 barrels carried by 10 men: each arrel to hold 6 gals.); spare water 2 barrels, 2 men; 14 hammocks for nedical offrs., 56 carriers; to carry stores for these 14 M. O.'s, 56 carriers; 4 native interpreters; this gives a total of 538 natives, and allowing 5 p.-c. pare to cover sick and casualties amongst carriers, the total number equired for medical purposes per 1000 European soldiers would be 565. *In Egypt in 1882*, provision was made in the Indian Contingent for sick nd wounded at the rate of 15 p.-c. of fighting men, and 3 p.-c. of native ollowers, $\frac{1}{3}$rd. to be in field, and $\frac{2}{3}$rds. in genrl. hospls. The medical stablishment for this Contingent (131 English offrs., 1713 British soldiers, 961 native soldiers, and about 6478 native followers) was:—I. D. S. G. as . M. O.; 2 brigade surgeons; 10 surgeon-majors; 26 surgeons; 12 apothearies; and 12 assist. apothrs.; 5 passed hospl. apprentices; and 45 hospl. ssistants. Its ambulance was 222 Lushai dandies, 68 dhoolies, 12 sirdars, 7 mates, and 1426 dhoolie bearers (including 130 spare for casualties). his sick carriage was at the rate of 5 p.-c. of fighting men and 1 p.-c. of native ollowers. Each dhoolie had 6 and each dandie had 4 bearers. A full earer column consisted of 23 dhoolies, 74 dandies, 5 sirdars, 19 mates, and 75 bearers, each column divisible into 4 parts with a sirdar in command of ach; and each of these 4 parts was again divisible into 4, each under a mate; his subdivision had often to be made. There were 3 of these bearer columns. *The proportion of wounded* to be calculated for previous to a battle is very ifficult to determine, as every action would seem to have its own special ate, the loss on the losing side being generally much the heavier, and the nore decisive the action, the more this fact becomes apparent. When the round is soft and deep, as is generally the case after very heavy rains, the oss is less than when it is hard and stony, and some generals, either from ecklessness of life, or from ignorance of their science, lose more men than thers. Then again the nature of your enemies' arms, and their dexterity in

using them, will always affect the rates of kd. and wdd. in any engagement. The statistics of wars prior to the introduction of the breech-loader are of little value in calculating the probable proportion of losses in an action between two European armies of the present day. During the great battles of the Franco-German war, the numbers engaged were so great that seldom more than $\frac{2}{3}$rds of those present were ever under fire at all. On the data afforded by a large number of recent battles, the rate of total loss may be fixed at 81 per 1000 men of those actually exposed to fire, whose number may be fairly arrived at for one or more army corps by deducting 360 from every 1000 soldiers present on the field.

The following Table, for all the battles named, gives an average of 0·7 killed, of 2·83 wounded; of 0·54 missing or 4·12 p.-c. as a total loss on the total numbers present, whether exposed to fire or not. For the battle of Königgrätz, the 1st line of figures gives the total strength of the Prussian army on the field; the 2nd line (*a*) gives the number of Prussians actually exposed to fire; the 3rd and 4th lines (*b* & *c*) give the same information

Names of Battles.	Number of men engaged.	Percentage of				Proportion of w'nded to every
		Killed.	Wounded.	Missing.	Total Loss.	
Königgrätz	220,984	0·87	3·14	0·12	4·14	3
,, (a)	129,000	1·49	5·38	0·21	7·08	1
,, (b)	215,028	2·69	8·28	3·64	14·61	3
,, (c)	150,000	3·86	11·87	5·22	20·95	3
Weissenberg	106,928	0·27	1·01	0·15	1·43	3
Saarbrüc and Spikeren	119,033	0·72	3·05	0·31	4·08	4
Woerth	167,119	0·97	4·53	0·86	6·36	4
Vionville	151,858	2·16	6·77	0·82	9·75	3
Gravelotte	278,131	1·60	5·46	0·33	7·39	3
Sedan	190,239	0·86	3·40	0·48	4·74	3
Orleans	56,553	0·30	1·17	0·15	1·62	3
Coulniers	38,951	0·18	1·37	1·59	3·14	7
Amiens	52,43	0·34	1·95	0·06	2·35	5
Le Mans	123,749	0·23	0·72	0·09	1·05	3
Lizaine	64,735	0·36	1·66	0·35	2·37	6

regarding the Austro-Saxon army. The statistics of the battles in Franco-German war refer exclusively to the German troops present at each whether exposed to fire or not. The proportion of killed to wounded throughout the whole war according to the above table is 1 killed

very 3·9 wounded, and of the latter, ⅓rd may be classed as severe, he other ⅔rds as slight injuries. As a rough calculation you may assume hat in a battle between two European armies the total loss will never s a rule exceed 10 p. c., on either side, whilst frequently it will be less han half that amount, and that if you provide for the care and transport f wounded men at the rate of 6 p. c. of the total force you take into ction, irrespective of whether they may or may not be exposed to fire, you ill have done all that is necessary. According to the German medical eturns, the number of all ranks in the German army killed and wounded y rifle-bullets during the war of 1870, was 6969 kd. and 49,093 wd., whilst y artillery fire the numbers were 695 kd, and 4389 wd. ; that is, out of very 100 men 91 were hit by Infy. and only 9 by artillery fire. In revious editions of this pocket-book I have laid stress upon the fact hat the effect of artillery fire is more moral than actual, and I trust that hese figures will make the army, especially the Infy., fully recognize the ruth of that assertion, and put a stop to the cry for more guns which one till hears occasionally. The medical arrangements for the march from Caubul to Kandahar in 1880 may be taken as a very fair guide for Indian warfare, when a column has to depend upon what it takes with it, being in act cut off for some weeks from any base of supply. Conveyance for the ick and wounded was provided at the following rates :—

	Bearer Carriage.	Conveyance on Mule or Pony.
European Troops	5 per cent.	2 per cent.
Native ,, ...	3 ,, ,,	4 ,, ,,
Followers	1½ ,, ,,	1½ ,, ,,

Sick transport of all kinds was attached to corps, and its maintenance and discipline provided for regimentally. 2 doolies and 2 dandies accompanied each battery ; 2 doolies and 4 dandies each European regt., and 2 doolies and 6 dandies each native regt. The remainder of all sick transport and all the sick marched with the hospital of their respective brigades. The sick transport, and the sick of the native regts. rejoined their corps at the end of each march. The Brigade-Surgeon of the Brigd. on Rr. Gd. furnished the sick transport required for all stragglers in rear ; when 2 or more Brigds. marched together, the Brigade Fd. Hospls. moved in rear in their allotted position in the column, *i.e.*, immediately in front of the 2nd Reserve of Ammunition. In calculating the number of M.Os. required to take care of and attend upon any given number of patients, it may be put down at one M.O. to every 40 sick or wounded. The regulations only allow one hospital orderly to every 10 men : this allowance is too small, and, when possible, double that number of attendants should be provided. In providing for the care of the sick and wounded of an army, it is

advisable to avoid collecting more than about 500 of the former, or 250 o the latter, in any one spot, when such can be avoided; and when tempora buildings are erected for hospl. purposes, they should be spread over r much space as possible without interfering too much with facility of admin tration. No one tent or small building should have more than 20 beds. the experience of late years goes to prove that sick and wounded, particula the latter, do much better under canvas than in buildings; it is, therefo advisable that in establishing temporary hospls. for large numbers, $\frac{1}{4}$ of t wounded should be provided for in tents, the other $\frac{3}{4}$ in huts.

Weight, &c., of articles of Medical equipment.—Ambulance wagon, n pattern, complete, with 2 stretchers, weighs 18 cwt.; it carries 8 wound men, 2 of them lying down; when full, its weight would therefore be o 32 cwt., a load greatly in excess of what 2 horses—its regulation comp ment—could draw across any country off the roads, and too great regular work even along first-class roads; we are greatly in want of a li 2-horsed ambulance wagon that can accompany troops wherever I Artilly. go. *Stretcher*, old pattern, weighs 16 lb.; new pattern, 31 lbs. *Pharmacy wagon*, when packed, weighs about 30½ cwt.; and the *G. wagon*, when fitted for hospl. equipmt., weighs 24⅜ cwt. *One pr. of cacol* 56 lbs., *pr. of litters*, 106 lbs.; *packsaddle complete* with bridle, harne &c., 44½ lbs. *The Indian Dooly*, 123 lbs. or 136 lbs., according to patte those made in Hong Kong for the war in 1860 only weighed 58 lb and answered very well. *The Dandy*, used in Abyssinia, 54 lbs; it is u in the hills in India for sk. and wdd. *The Lushai Dandie*, used in Egy weighed only 35 lbs. *The Hammock*, used in Ashantee in 1874, weigh with the pole, about 45 lbs.; it was carried on the heads of 4 men. *A of Medcl. Panniers* packed complete, 160 lbs. *The Medcl. Fd. Compan* contains an assortment of the most urgently required physic, bandages, & and weighs 11¼ lbs.; it is carried by an orderly. *The Hospl. Marquee* holds patients; *the operating tent*, double, circular, holds 4 patients; see p. 1 *A Field Hospital* for 100 beds weighs 1 ton, 3 cwt., 2 qrs., 2 lbs., and measurement 3 tons, 6 ft. 306 inches. *A General Hospital* for 100 beds wei 1 ton, 3 cwt., 2 qrs., and by measurement 4 tons, 1 ft. and 200 inches.

Grave-yards.—There must be one in the vicinity of each large hos station, but well to leeward of it: the prevailing wind should be studie this is all the more important, if, owing to the nature of the soil, gra cannot be dug deep; it should not be within view from the hospl., nor wit easy lounging distance of convalescents. The dead-house should be i retired spot, so that funerals can take place without attracting attention. T French, who wisely studied every trifle that may affect the moral of th soldiers, used to bury the dead from their large genrl. hospls. in the Crim before daybreak in the morning. This should always be done wh practicable. If on the sea-shore, the dead might be taken out daily a

iles and buried in the sea, as it is much better in a sanitary point of view an burial on shore ; but care must be taken to prevent them rising to the rface, or being washed ashore, a circumstance that created such horror in ir army in Egypt, in 1809, when some hundreds of bodies that had been ried at sea were washed ashore. In all cemeteries the graves should be ig about 6 feet deep, and charcoal and lime should be freely used.

Convalescent Depots should be established in connection with genrl. hospls. is not necessary that there should be equal numbers of each, for one of ch depots may be made to receive the men discharged from several hospls. stablishments of this nature are much open to abuse, and are, unless well oked after, merely places of refuge for skulkers of all ranks. They should e under the command of a military offr. of standing, who should be care-lly selected for this duty ; he should be stern and determined, but just to l. Frequent inspections should be made of these places by G.Os.C., who ould carefully examine all men who have been more than a fortnight ere, going minutely into their cases with the M.Os. in charge. They ould send in written confidential reports to the C. of the S. upon all frs. at such establishments, as it is advisable to force men to leave the rvice who are physically unfit, or *imagine themselves so*, for the hard work a campaign. It must however, be remembered, that the old saying of *a an being either in hospital or at his duty*, is absurd ; a man may be so far covered that it is cruelty to keep him in the restraint of a hospl., although the same time he is really unfit for work. To send him direct to his regt. is erely sending him back to hospl. by a roundabout way, whereas if he is sent some healthy depot, away from the depressing influence of a hospl., where e will be well fed for a fortnight, he returns to his duty a new man, both in ind and body. The distance of the theatre of war from England, and the robable duration of the campaign, must determine the nature of the cases that all be sent to England and those that are to be sent to the convalescent depots.

Pay Department.—The pay duties of an army in the Fd. will be carried ut by the offrs. of the A. P. D. in accordance with the Finance Regs., and ubject to the supervision and direction of any offr. who may be specially ppointed by the S. S. for War to assume the general charge of the finance uties of the army. The principal Pay Office, and the principal Treasury hest will, as a rule, be placed at the B. of O. where the senior offr. of the . P. D. will be stationed. Military chests will also be established at the dvd. depot, and with the Hd. Qrs. of the Army, and at such inter-ediate depots or stations on the Ls. of C. as the senior offr. of the A. P. D. ay find necessary, subject to the orders of the C.-in-C. or the G. of C. When a chest is ordered to be established at any station, the paymaster in harge becomes responsible that he calls on the O. C. the station for proper ccommodation for his office and for the chest, and for military protection. When specie is sent along the L. of C., whether by road or railway, an offr,

of the A. P. D. will, when possible, accompany it, and a military escort w
be demanded. On halting at any station on the L. of C., the paymaster w
report his arrival to the Comdt., who thereupon becomes responsible for t
security of the specie until the escort again moves on. Heads of Depmts. wi
as far as possible, keep the senior offr. of the A. P. D. informed of the amou
and description of specie they are likely to require at each station where the
is a chest, so as to enable him to meet their wants. The senior offr. of t
A. P. D. will be careful frequently to inform the C. G. of the description
specie or bills in which it is desirable to stipulate that payments to contra
tors are to be made at Hd. Qrs. and at outposts. All payments by the p
offrs. at the several stations, other than authorized imprests, will be, as
as possible, made on properly rendered accounts or claims, duly vouched
final transactions. Imprests will, as a rule, only be made to offrs. du
authorised by Regs. to receive them. When offrs. are detached on spec
service, and in other exceptional cases, imprests may be made upon
written authority of the C.-in-C., the G. of C., the O. C. the B. of
the C. G., the C. R. E., or the Senior Commissariat offr. on the L.
C. Any offr. receiving an imprest, will be held responsible for the to
amount thereof until the account of its expenditure is rendered by h
and found to be correct, and the pay offr. issuing the imprest will take st
for obtaining, in proper time, a due account of the disbursements. Wh
the S. S. for War deems it advisable, he will appoint an offr. who will
specially charged with the direction of the finance duties of the army. T
offr. so appointed will act under special instructions as financial adviser
the G. O. C. He will superintend, on behalf of the Treasury, the duties
the Treasury Chest, and will conduct, so far as it can be conducted loca
an examination of the accounts of the army. His office will be at the h
of operations, or at such other station as the G. O. C. may determine to
more convenient for the necessary personal communications with the H
of departments. The C. Gs. of Divns. should always have a small suppl
ready money (if possible, in the currency of the country) for the daily purch
of supplies. It should be carried in a wagon built expressly for
purpose. As stated under the head of Correspondence, all papers connec
with accounts, whether of stores or cash, should be despatched weekly
as often as necessary, to some depot in rear, where there should be
account and credit department to compile, classify, and finally close all
accounts of the army. With us, usually, a long time elapses before
accounts are audited ; the consequence is, that for months, and in s
instances for years after money has been paid away, queries are sent forw
regarding them to offrs. who have perhaps forgotten all about the circ
stances. To force offrs. in the field to keep elaborate store accounts i
prevent them doing their duty to the army as well as they ought. Offi
and others drawing pay, frequently require to remit money to their fam

: home : every facility should be afforded for doing so by the issue of drafts n the treasury at home. This plan, if well carried out, would somewhat educe the amount of bullion to be sent from England to the seat of war. utlers with an army are only too glad to obtain the cheques of offrs. on their ankers at home in exchange for money which they have no means of keep- g. How much more willingly would they accept orders on the treasury. proper arrangements had been made in the Crimea, much of the money aid out from the treasury chest might have been returned to it in exchange or orders on the treasury at home.

Veterinary Department.—There will be a P. V. S. in charge of the hole department, who will be with the Hd. Qrs. of the army. He will be esponsible for all the veterinary arrangements connected with the army.

The proportion of V. Ss., and Serjt. Farriers to number of animals horses, mules, oxen, and all transport and slaughter cattle) should be, V. S. (administrative) for every 3000, and one executive V. S. for every 50 animals : 1 farrier Q. M. Serjt. to every 500 animals. 1 Farrier Serjt. nd 1 shoeing smith to every 50 horses or mules.

The veterinary establishment for an Army Corps, &c. &c., in addition to ie V. Ss. belonging to the Regts., &c., is as follows :—

* Farrier's and shoeing-smiths' work done by sections of Transport.	Officers.				Men.				Chargers.
A Division.	P. V. S.	I. V. S.	V. S.	Total.	Bâtman.	Farriers.	Shoeing smiths.	Total.	
Head-Quarters . . .	..	1	..	1	2	..	..	2	2
Divisional duties . . .	..	..	1	1	2	3	3	8	2
1st Brigade*	..	..	1	1	2	..	..	2	2
2nd Brigade*	..	..	1	1	2	..	..	2	2
Total 1st Division. .	..	1	3	4	8	3	3	14	8
Total of three Divisions .	..	3	9	12	24	9	9	42	24
Hd.-Qrs. of Army-Corps.	1	..	1	2	4	3	3	10	4
As a Reserve	..	..	..	..	..	2	2	4	..
Cavalry Brigade . . .	..	..	1	1	2	..	..	2	2*
Grand Total . . .	1	3	11	15	30	14	14	58	30

A pair of Fd. Vety. Medicine chests complete will be taken by each V. S., nd a public animal and pack saddle will be allowed for their carriage when

necessary. Each chest weighs 29 lbs. when empty, and measures externall 26¾ ins. by 15½ ins. by 14 ins., when filled it weighs about 77 lbs. On chest of tools (forge and shoeing) is required for every 4 farriers or shoeing smiths; a chest of farrier's tools, packed, weighs 124 lbs.; of smith's tools packed, 360 lbs.; 60 nails per set of shoes is required to allow for waste of wheeler's tools, packed, 299 lbs. and of collar-maker's tools, packed 65 lbs. One forge wagon is allowed for every 400 horses. A farrier ca shoe about 50 horses per mensem in the field.

Between the B. of O. and the Advd. depots there will be a 6 month supply of medicines, in charge of O. S. D., for which a V. S. will be appointe to act as purveyor, who will be responsible that this supply is always kep up, and for the care of these stores. V. Ss. will from time to time draw fo the medicines they require through the I. V. S. of their Divn., &c. &c All horses and transport animals to be newly shod before taking the field and all should carry a complete set of spare shoes fitted previously to th feet, and in addition 15 p.c. to the number of animals should be carrie regimentally. Four months' supply of horse shoes—say 50,000 sets po Army Corps, will be kept by O. S. D. in Advd. depot and at B. of O. t be issued on payment to mounted corps. When mules or other anima requiring peculiar shoeing are used, the services of persons in the habit shoeing them must be obtained, and a supply of the necessary shoes, nail and tools provided by the O. S. D. When horse blankets are not in gener use, 3 per cent. should be carried regimentally for sick horses. When a offr. or other person drawing forage requires his charger or bât anima to be shod, he will make a written requisition upon the V. S., whose du it is to attend to the animals, who will on that document order the servi to be performed. The document will support the expenditure of the sho and nails, and will enable the amount to be recovered from the individu by the pay department. The prices to be charged for shoes, nails, shoein removing, &c. &c., will be published in G. O. The Vety. duties in conne tion with the L. of C. and remount depots will be found under the heads "*Line of Communications*," and "*Supply of horses*," &c.

The Staff is to an army what steam is to a locomotive. The machi itself may be of the highest order, the engineer who directs it may be a m of first-class talent, but without the motive power of steam it is merely huge collection of well-polished material. Every successive invention app cable to military science adds to the necessity for a staff, increases duties, and entails the employment of more offrs. on it. A knowledge fortification, of the field-engineer's duties, of artillery, of military histo and of the military sciences generally, is essential for the S. O. if he is perform his duties in a thoroughly efficient manner; above all things should possess a complete and intimate acquaintance with the regulations a customs of the army; this he can only secure satisfactorily by the perf

mance of reglt. duty. It is not necessary that he should know every minute detail in the drill of all three arms, but he must have a general comprehension of the system upon which each manœuvres. Our plan of making Staff and regtl. offrs. interchangeable is admirable; when a man who has been for some years on the Staff returns to his regt. for duty, he takes with him information which to a great extent he imparts to his brother offrs. almost without knowing it, whilst he learns from his association with them what no books could teach him. In this way a proper sympathy is maintained between the staff and regtl. offrs., and prevents the former from being regarded or from feeling themselves as a corps apart from the great bulk of the army. It is not possible for the most transcendent genius to command an army successfully without able assistance from others in matters of detail. Armies are held together by discipline, and discipline is essentially a matter of detail and attention to small things. By no means the smallest talent of great soldiers has been that which they have displayed in their selection of able assistants. The best example of how helpless an army must be without an efficient staff is that afforded by the army organized at Washington by M'Clellan, and, in a lesser degree, by his successors. Many thousands of men were enrolled, splendidly equipped, abundantly fed, provided with all sorts of artillery and engineer material of the most approved patterns and upon the most lavish scale; yet, as a distinguished offr. said, it was a huge giant lying prostrate on the ground, who, though powerful in outward appearance, was destitute of bones and muscle, and consequently helpless for action. The bone and muscle required was a good staff to put it properly in motion. In the Southern Army, affairs were never so badly conducted as at the North, which, in a great measure, is to be accounted for by the fact of its having received into its ranks the large proportion of regular offrs. who had been educated at West Point.

The greatest care should be exercised in the selection of S.Os. The principal S. Os. should be chosen by the G. O. C, an army in the field. If he is to be held responsible for its safety and success, it is not fair to force him to use confidential agents selected by others, and of whose ability he may, perhaps, have no opinion. If he is fit to command, he is qualified to make a good choice; and if not, it is criminal to leave him in command for an hour. If he had no higher motive than personal interest, it would be enough to make him select the best men. Since the establishment of the Staff College, all zealous offrs. can fit themselves theoretically for the highest duties in our service, and in our next great war we shall have but few on the staff who have not taken degrees there. The fatigues and privations of war, sickness, wounds, &c., soon make serious gaps in the ranks of the regts. with which you begin the campaign, but the abler your staff, the stronger will be those regts. in the day of battle; for if their arrangements have been good, the men will have been spared all unnecessary exertion, and will have been well cared for in every way. To watch over the fighting efficiency, the spirit

of the troops, to see that their physical wants and comforts are provided for, are duties that should never be absent from the thoughts of the S. O.

With modern armies it is almost an impossibility that a man can be fit for any important command without long study and deep reflection thereon. We have the greatest of all General's authority for this, and he was ever most emphatic in urging upon others the necessity for pondering over the histories of all great soldiers. Doubtless there will always be men of weak minds, to whom reading can only impart a smattering of knowledge, which, in moments requiring promptness, will cause them to theorise instead of to act; men who make their doings subordinate to their book knowledge. Well may it be said that a little knowledge is dangerous. See them in action, and they are busy attempting some grand manœuvre learnt from Jomini, which is probably only completed in time to have a long shot at the enemy's Rr. Gd. The higher qualifications for command can never be learnt from books, although he who is endowed by nature with the mental and physical power indispensable for an offr., can develop his ability a hundredfold by study. The S. O. should be young in body but old in mind; unless gifted with good eyesight he cannot be of much use on service, as it is essential that he should be quick and skilled in judging distances, and in forming correct estimates of the number of men formed in columns or deployed that may be occupying any position he has to examine from a distance. The practice acquired by the eye in surveying is invaluable, as it accustoms one to be observant of ground and of landmarks, and to estimate distances correctly. The three great qualifications for all offrs., from the general to the lieutenant, are, 1st, daring courage; 2nd, quick ability; and 3rd, a healthy, powerful physique. We are prone to forget how much the last-named enters into the attributes of a good soldier. A man who cannot bear fatigue, who is not of active habits, and who cannot ride well, is useless as a S.O. Being a good sportsman, a good cricketer, good at rackets, or any other manly game, is no mean recommendation for staff employments. Such a man, without book lore, is preferable to the most deeply-read one of lethargic habits. The worst S.O. I knew in the Crimea had taken the highest degree in the senior department at Sandhurst, and the most useless and impossible General I have ever served with in the field, was most deeply versed in the theory of war. I do not wish to depreciate the value of military knowledge, but to point out that scientific attainments alone can never make a S.O. or a good leader.

We have no distinct staff corps like that existing in many foreign armies, and we include under the title of staff all offrs. of the A. G. and the Q. M. G. departments. Such confusion exists in our minds as to the term staff, that all the regtl. offrs. of the native regiments in India are styled as belonging to a "staff corps." Many advocate the formation of a staff corps on the old French system; but, beyond all doubt, our plan of selecting offrs. from regts. as required is much better; they remain on the

staff as long as required, and then return to regtl. work. It is desirable that all men should have opportunities of serving on the staff, and that employment thereon should not be strictly reserved for one especial corps. When an offr. who has never done any but regtl. duty all his life, becomes a general, he finds himself in a difficult position, which a little staff experience in war would have rendered him familiar with. To command all three arms on service is not so easy as it seems at a field day. When employed in the active duties of a campaign, S.Os. have such an extensive field for their study, and, being behind the scenes, such opportunities of learning their profession, that regtl. offrs. can seldom compete with them in the art of war. The amalgamation of our staff has not yet been officially carried out; its theoretical division into two branches, the A. G. and the Q. M. G.'s is in my opinion very much to be regretted, the heads of each at all our stations being co-equal. All who have served much on the staff in either or both of these departments during war will generally admit that this system leads to great friction which is seriously injurious to the service, practically however this regulation division of the Staff is only a paper affair, except in India, where the two departments are still kept distinct at great cost and inconvenience. When an army takes the field a C. of the S. is appointed to it; in a similar manner every Army Corps, Divn. or Brigd., should have a D. A. G. to be the mouthpiece of his general, assisted by as many A. As. G., and D. A. As. G. as may be required. The nature of operation to be undertaken, of the troops to be employed, and local and other considerations will always greatly affect the number of S. Os. to be employed.

Detail of Executive Staff for Corps, Divisions, &c., with an army in the field, is as follows:—

DETAIL OF THE STAFF OF A BRIGADE OF CAVALRY OR INFANTRY.

Tentage.				† The baggage and equipmt. of the Staff of each brigade is carried by the Transpt. Co. allotted to each brigd.	Officers.	3rd Class Clerk.	Servants.	Horses.	
Miscel.	Office.	Servants & Saddlery.	Officers.					Private.	Public.
Guard, 1.	..	1	1	M.-General Commg.	1	..	3	5	..
	1	1	1	Brigade Major	1	1	2	3	..
	..	..	..	A. D. C.	1	..	2	3	..
	..	1	1	D Commisy	1	..	1	..	1
			1	Chaplain	1	..	1	..	1
			1	Assist. Vet. Surgn.	1	..	2	2	..
1	1	3	3	Total . . .	6	1	11	13	2

DETAIL OF THE STAFF OF A DIVISION AND OFFICERS ATTACHED.

Tentage.				* This is the Regulation, but the best system is to have 1 A.A.G. and 2 D.A.A.Gs. † 2 horses would be ample. ‡ 1 horse ,, ,,					
Miscel.	Offices.	Servants and Saddlery.	Officers.	Detail.	Officers.	Warrant Offrs.	N.C.Os. & Men.	Servants & Bâtmen.	Officers' Horses.
Staff Clerks . . . 1	..	1	1	Lieut.-General	1	..	..	4	6
Divisional Guard . 1	..	1	1	Aide-de-Camp	2	..	..	4	6
	1	1	2	A.A. and Q.-M.-G.*	2	4	..	4	6
	..	..	1	D.A.A. and Q.-M.-G.* . . .	1	..	..	2	3
	1	1	1	L.-Colonel, R.A.	1	1	..	2	3
			½	Adjutant, R.A.	1	..	..	2	2
	1	1	1	L.-Colonel, R.E.	1	1	..	2	3
			½	Adjutant, R.E.	1	..	..	2	2
	1	..	1	Ass. P. Marshall.	1	..	..	1	1
			1	Inspect. Vet. Surgeon . . .	1	..	..	2	2
	1	1	2	Commist. Offrs.	3	1	11	6	6
	1	..	1	Medical Department	2	2	3	3	5
		1	1	Chaplains	2	..	..	2	2
2	6	7	14	Total.	19	9	14	36	47
29 tents requiring 2 G. S. Waggons, if Tents are carried.									

The Baggage and Equipment of these offrs., &c., is carried in the wagons of one of the two C. & T. Companies belonging to the Divn.

DETAIL OF THE STAFF OF AN ARMY-CORPS AND OFFICERS ATTACHED.

Tentage.				Detail.	Number of Offrs.	Warrant Offrs. & Clerks.	N.C.Os. & Men.	Servants & Bâtmen.	Chargers.
Miscells.	Office tents.	Servts. and Saddlery.	Officers.						
	..	1	1	G. O. Commanding	1	..	..	5	8
	..	1	2	Aides-de-Camp	4	..	..	8	12
	2	1	2	D. A. and Q.-M.-Gs.* . . .	2	6	..	6	8
	..	1	2	A. A. and Q.-M.-Gs. . . .	2	4	..	4	6
1 2	..	1	1	D. A. A. and Q.-M.-Gs. . .	2	..	..	4	6
. .	..	1	1	Officer C. R. A.	1	..	..	3	5†
.	1	1	1	Brigade Major, R. A. . . .	1	1	..	2	3†
			1	Aide-de-Camp, R. A. . . .	1	..	..	2	3†
	..	1	1	Commg. R. E.	1	..	..	3	5†
			1	Brig.-Maj. R. E.	1	1	..	2	3†
Guard Staff Clerks.	1	..	1	Aide-de-Camp, R. E. . . .	1	..	..	2	3
			1	Commdt. at Hd. Qrs. . . .	1	..	..	2	3
	..	..	1	Provost Marshal	1	..	..	2	2
	1	2	4	Princpl. Vet. Surg.	1	1	..	2	2‡
	1	1	1	Commisst. Offrs.	6	2	13	12	11‡
	1	1	1	D. C. G. (Ordnance)	1	1	..	2	3
	..	1	1	Medical Department § . . .	6	3	4	9	13
				Chaplains	2	..	..	3	3†
3	7	13	23	Total	35	19	17	73	99

40 tents (2 G. S. Waggons, if carried).

* This is the Regulation, but it is best to have only one Deputy who acts as C. of the S. to the Army Corps.
† 2 horses would be ample.
‡ This ought to be 1 horse less.

For conveying the Baggage and Equipment of these 31 offrs., 67 servants and 18 clerks, &c., one Co. of C. & T. Corps is attached to each Army Corps Hd. Qrs.

§ The number of officers and chargers here allotted to the medl. department is absurd, and should not exceed 3 offrs. and 4 chargers, indeed 3 chargers would be ample.

COMMANDANT OF HEAD-QUARTERS.—His duty is to regulate all matters concerning the quartering of everyone that is attached in any way to Hd. Qrs.; he marks out the camp, when tents are used, and allots quarters to every one according to their seniority, when Hd. Qrs. are to be in buildings. The best form for a Hd. Qr. camp is in 3 sides of a square, the General being in the centre, all the tents facing inwards, the clerks, orderlies, servants, &c., being in a second row. The commandt. is responsible for the clean-

liness and police duties in and around Hd. Qrs., and it must be clearly understood that all offrs. and soldiers, no matter what their rank may be, are implicitly to obey his orders as coming from the General himself. When a move is to be made, the commandt. sends round a memorandum of instructions to all concerned, giving full details as to the order of march, the hour at which the baggage is to be loaded, tents struck, &c. Any offrs. failing to receive such instructions should understand that it is their duty to see the commandt. to ask for information. The commandt. should keep a nominal list of every individual attached to Hd. Qrs. and a return of the number of their horses. Heads of departments must notify all changes to him as soon as they occur. All ranks going to Hd. Qrs., if only to remain there for a night, must report their arrival to the commandt., who will allot them quarters, or point out where their tents are to be pitched. He also has charge of the forge, and the shoeing-smith at Hd. Qrs. will take orders only from him. He should have under him a couple of the military police, to assist in carrying out his orders. He will also be paymaster, and will estimate for, and draw from the military chest, the pay of all N.-C. Os. and privates attached to Hd. Qrs., consequently No. 1 reports must be sent to him with every man arriving there.

GENERAL DUTIES OF STAFF OFFICERS.—The following extracts are mostly from the Queen's Regulations, and intended for the guidance of Generals and all S. Os.

It is by the zealous exertions and constant superintendence of the G. Os. C. that the system of discipline essential to the reputation and success of Her Majesty's arms is to be maintained. G. Os. C. intrusted with command are responsible, not only for the discipline of the troops, and their constant preparation for active service, but likewise—in case of attack—for the immediate and advantageous disposal of every description of force placed under their control. They are to inform themselves of the resources of their commands in regard to provisions, labourers, horses, and the means of transporting troops and stores, and to obtain an accurate knowledge of the strategic features of the country, of all fortified places and their means of defence, and of every particular which may increase their power of acting with advantage against an enemy. G. Os. C. are also to ascertain that the Generals and S. Os. under their command are well versed in their several duties, and competent both from general intelligence and acquired local information, to render that assistance which the nature of their appointment requires. They are to be prepared at all times to afford the C.-in-C. any information he may require, as to the efficiency of any particular corps with regard to its discipline, equipment, and preparation for immediate service. They are not at any time to change the quarters assigned them, nor under any circumstances to quit their commands without special permission. In applying for temporary leave of absence from the C.-in-C., they are to report to the C. of the S. the name and rank of the offr. on whom their command will devolve. When any General or other offr. relinquishes his command, he is to deliver to the

offr. who succeeds him all the official books and papers, including all confidential documents relating to his command.

Duties.—S. Os. should consider it a part of their duty to make themselves thoroughly acquainted with the nature of the country in their vicinity, more particularly with the roads, passes, defiles, bridges and fords; this should be done, not only by consulting maps and plans, but also by personal observation, and by acquiring local information. They should further obtain a general knowledge of the resources of the country in the neighbourhood, as regards the description of crops usually grown, the supply of provisions, the means of transport. The zeal and industry which an offr. may exhibit on these points will not only afford a ready means of bringing himself favourably to notice, but will also enable him, when requisite, to render that assistance which, from the nature of his appointment, his superiors have every right to expect from him. In order to avoid the possibility of being misunderstood, S. Os. are to make it a rule to deliver all verbal orders intrusted to them in the plainest and most concise terms, and these orders are to be obeyed with the same readiness as if delivered personally by the G. O. C. to whom such S. Os. are attached.

When the staff is unfortunately divided into 2 separate departments, the detail of the duties is confided *to the A.G.'s department*, the senior officer of which is responsible for the accuracy of all returns. He is also the channel through which the orders are issued in the name of the G. O. C. It is essential, therefore, that he should have a clear and concise mode of communicating such orders. The various subjects of correspondence which should pass through the A. G. department, are detailed in page 139.

The officers of the Q.M.G. department, are entrusted with the duty of quartering, encamping, embarking, disembarking, and moving the troops. Their special duties will be to regulate the order of march, to define the positions to be taken up, to direct the preparation of military surveys, to conduct reconnaissances, and to superintend the arrangements necessary for collecting information regarding the movements of the enemy and the resources of the country.

The Military or Assistant Military Secretary is the confidential S.O. and the head of the personal staff of the G.O.C. to whose staff he belongs. He is the channel of communication on all subjects connected with promotion and patronage, and such as do not fall within the province of the departments of the A.G. and Q. M. G. When a press censor is necessary, the duties of that post can be, as a rule, most conveniently carried out by the Military Secretary to the G. O. C. in Chief in the field.

The B.M. is the S.O. of the Brigade and is not on the personal staff of the O.C. t. He issues the orders of the Brigadier, and keeps and regulates the roster of the Brigd, duties, inspects all the guards, outposts, and piquets furnished by the Brigd., and he is responsible for such guards, piquets, &c., being withdrawn when the Brigd. s to march. His station on a march is in front of the leading regt. of the Brigd.; e is to encamp in rear of the centre of the brigade, and he or an orderly adjutant is o be constantly in the lines of the camp. All reports and correspondence for the information of the Brigadier are to be addressed to, and transmitted through the B.M.

Strictly speaking, staff work is purely administrative, and not executive; S.Os. do not immediately command troops; they are the mouthpiece of the general in whose name and on whose authority they issue orders. As, however, they are generally the ablest men in the army—at least they should always be so—it is by no means uncommon to see them entrusted with the command or execution of some special or very important operation. As soon as an army takes the field, a *Topographical Department* should be formed; it should be an integral portion of the staff. All surveys and most of the reconnaissance work should be done by the offrs. of this topographical branch. Indeed, although road reports and many of the minor reconnaissances may be made by cavly. offrs., the greater and most important portion of those duties are done in nearly all armies by offrs. of the general staff. S. Os. should carry in their heads all general information regarding the army with which they are serving; the composition and distribution of corps, Divns., Brigds., &c.; they should remember as accurately as possible the strength of each battn. in their immediate Divn., and the names of the respective C. Os. All offrs. of the Hd. Qr. Staff should know the position of every Divn. or detachment each night; their composition and strength and the names of their commanders, &c. In communicating orders to others, S. Os. must speak and write in the name of their generals. They have no power of themselves to confer favours, a privilege that rests with the General. In theory they are merely his agents, and although in practice S.Os. of importance have much in their power, they should be careful to prevent its being generally known. Their commander must never be ignored, even when they know him to be a fool. It is not that you injure an individual by slighting him, but that by doing so you deprive him of that general confidence which, for the public good, it is essential he should possess.

With young offrs. first appointed to the staff the position is for some time very novel. The operations and movements they may have taken part in previously had been performed mechanically, their object being unknown and but few caring to inquire into the subject. On the staff it is otherwise; one is more or less behind the scenes, and young men thus sometimes become the repository of important news, secrets, or orders. Regtl. offrs. look to their friends on the staff for information as to what is going on, and endeavour to pump them accordingly. Reticence is therefore a virtue that cannot be too much practised and fostered by all S.Os. Some seem to think it necessary by their manner to cause the outside world to believe that they are oppressed with hard work, and engaged upon secret duties of paramount consequence: that they are in possession of important secrets and know exactly the G.O.'s intentions, and what operations are contemplated. This is not only foolish but wrong, for if the impression they convey is correct it is nearly as bad as if they revealed all they had been ordered to keep secret

It is always advisable to profess entire ignorance regarding coming events. If men try to pump you, parry the questions by "indeed," and with all sincerity lead them to believe that you do not answer them because you do not know yourself. S.Os. should never be exclusive in their acquaintance, but should mix freely with regtl. offrs., as it is essential that they and the Generals through them should know every camp-rumour and the opinions of the army as to events and the actors in them. Camp-rumours are sometimes of importance, for the information transmitted to the enemy by spies will for the most part be framed upon them. Many a success has been obtained by circulating rumours of intended movements and then doing the very reverse.

It should be imperative for every S.O. to keep a journal; all that he does during the day, together with a precis of what goes on around him, to be noted therein. An official journal must be kept in the office of the C. of the S. in which must be entered all minute details of events, the measures adopted to carry out every operation, the nature of the country, the weather, climate, its effects upon the soldier's health, all large questions of sanitation, a daily summary of the enemy's doings, the disposition of the troops on both sides, &c., &c. In fact, it should be a full but dry history of the war as it was known from day to day by those behind the scenes at Army Hd. Qrs. A similar journal to be kept by the A.A.G. of each Divn., in which full details should be given regarding all its particular doings, the actions in which it is engaged, its effective strength, number of deaths, admission to and discharges from hospl.; the weather, &c., &c.

Correspondence.—The first necessity of all official correspondence is that it should be legibly written, and that it clearly expresses what is intended in the fewest possible words; the names of all foreign men and places to be written in printed characters. The management of official correspondence in the field is a most difficult matter; the sooner an authorized system is established for it the better. When an English army begins a campaign, some system has to be inaugurated by the C. of the S., or, in his absence, by the heads of the several depts. The following practical suggestions may be of use to offrs. called upon to do so. On service the smaller the amount of paper and pen work the better. A certain quantity cannot be dispensed with, but the absurdity of heads of depts. corresponding with one another when their tents are close together, should be put an end to.

Under any circumstances there is a great deal of work that is now done in writing which can be done verbally, and when it is necessary to send letters or memoranda to the several Divns., instead of entering them in a letter-book, they should be marked '*to be returned*,' the recipient signing them as seen, and returning them by the same messenger; when returned they should be kept in a guard-book, or sent to the depot for correspondence in rear. All papers should, when written or received, be classed under 3 heads, say A, B, and C; A to be papers that must be retained with the army or

divn. ; B to be papers that are to be preserved, but which without inconvenience to administration can be sent to some depot in rear named for their reception ; and C to be those of an ephemeral nature that may be destroyed at once, or within a few days after date. To carry out such a system there should be an organised office for the correspondence of the army, somewhere in rear of the army, to be situated on a line of rail, or on the best L. of C. between the base and the army. Circumstances should determine its position and the distance it is to be in rear. There should be an offr. in charge of it, to whom all papers of class B should be forwarded by the heads of departments at Hd. Qrs., who should collect them weekly from Divns. At such depot there should be a printing-press, and a special telegraph-wire should lead from the depot to army Hd. Qrs. If the war is of considerable duration, the offr. at the depot will take the orders of the C. of the S. as to the disposal of all papers over 3 months old, for it is advisable that they should be forwarded to England to the several departments concerned, or collected in some one office at the Horse Guards. This is the general outline of how an army in the field may be kept clear of piles of correspondence. The R.A. above all other corps seem to revel in complicated returns ; it would be well if a Board were assembled upon the breaking out of a war, to be composed of S.Os., who should go minutely into the question of the returns to be furnished by corps which are really necessary for the due administration of the army ; they should take the opinion of able offrs. of the several arms, and having heard all that can be said in favour of the returns required in peace, determine those that are absolutely necessary in a period of war. The existing system is for corps to send in their returns to the staff of their Divns., by whom a general return is made out from them, and sent to Hd. Qrs., where the divinl. returns are collated into one general return for the authorities at home. This is a little farce which should not be acted in the field. The returns should be sent home in original.

In official letters there is some twaddle that can be dispensed with : the prelude is too long and the style too ceremonious. By substituting memoranda for letters, much can be done towards curtailing clerical labour. The ½-sheet of foolscap on which they are written should be folded in four divisions, as is the custom. On the back of the 1st of these divisions a 2nd memorandum can be written by the recipient in answer to it, or in forwarding it on to some other department. A sheet thus folded has places for 4 memoranda on the back, so that if it has to go to that number of people, all that they have to say on the subject is on the ½-sheet of foolscap. This system is common in India, where it works well ; the writer introduced it in Canada, where it answered well. It is a great improvement on the system of turning down corners, for if there are several memoranda on the same paper, it is difficult to follow them in proper

sequence when they are written without any order, and in all sorts of directions. Each dept. should have a registry book, in which should be recorded every letter or memorandum received and sent out, the latter to be in red ink ; there should be columns for the date and hour of receipt or despatch, the name of orderly intrusted with its delivery, from whom, or to whom sent, date and purport of the letter, and a spare column for other communications on the same subject, and for stating how the matter has been finally disposed of. To each will be given a general register *No.*, which will be recorded also on the paper itself in red ink. To this book there will be an alphabetical index at the end of each volume for facility of reference ; 2 volumes will be retained at Hd. Qrs. ; as soon as it is necessary to begin a 3rd, the 1st will be sent to the depot in rear, where a general index will be made from all such books according to subjects, so that if the C. of the S. requires to refer back at any time to a subject disposed of some months previously, he can telegraph to the depot of correspondence, to have papers regarding it sent to him by next post. The offr. in charge of the depot should be especially selected for the post as being accustomed to the routine of office-work, and the classification of correspondence. The proper channel of communication, and the departments to which the several subjects connected with an army in the field should be addressed, are as follows :

Despatches and Reports of Military Operations.—With troops employed in the field, the G.O.C. is to address his despatches to the S.S. for war. The invariable rule is, that the senior general present at any action, great or small, alone writes a description of it in the form of a despatch to the S.S. for war. This must be clearly understood, for I have known subordinate generals to be very angry because their reports as to the parts taken by them or by their divns., &c., were not published. If they were to be published, why not publish also those of Os. C. Batts. ? It is not uncommon for a C.-in-C. to accompany a Divn., &c., during operations that may include some hard fought actions, without his actually taking direct command of the troops himself. In such cases he must use his own discretion as to whether he will himself describe the operations, or merely forward the report of the officer—whatever his rank be—who actually commanded the troops in action, with a covering despatch expressing his opinion as to the manner in which the general instructions had been carried out.

General or other offrs. in command are to sign all official letters and reports which are intended for submission to the C.-in-C. ; and all offrs., in making reports or applications, and in fixing their names to any public documents, are to specify under their signatures—which must be legibly written—their rank and the regiments, or departments, to which they belong. Official letters are to contain full information of all particulars upon the subject to which they relate, and are to be headed thus :—

From _____

To _____

Each letter is to refer to one subject only, and is to be written on foolscap paper,

with a convenient (*i.e.*, from half to quarter) margin; the margin always to be left on the inner side of each page. The paragraphs are to be numbered and the enclosures (if any) described in the margin or in a separate schedule. As a general rule short letters should be written on a ½ sheet, but when the letter extends beyond one page, or is accompanied by inclosures, it should be written on a whole sheet. The transmission of unnecessary inclosures is to be avoided, and when additional papers are forwarded all blank fly-leaves are to be removed from them. Superior offrs. and other intermediate authorities are responsible for the correctness of what is set forth in documents submitted by them. It is their duty to endeavour to adjust all matters that come within the scope of their authority; and in transmitting applications or correspondence to Hd. Qrs., they are invariably to state their concurrence, or otherwise, adding such additional observations, based on local knowledge, as may be necessary to enable the authorities to come to a final decision on the question without further reference and correspondence. Applications from regtl. offrs. are, in the first instance, to be submitted to the C.Os. of their corps. Applications from N.C.Os., trumpeters, drummers, and private soldiers are to be made personally through the captains or C.Os. of their troops, batteries, or companies to the C.Os. of their corps. C.Os. are to forward, through the prescribed channel, for the consideration of the C.-in-C., a statement of such application or claims as are deemed to be correct and reasonable, specifying at the same time the grounds on which they recommend that the requests be granted.

In direct correspondence between one G.O.C. and another, between C.Os., and between heads of depts., letters are to be signed by the superior offrs., and not by their staff or subordinate offrs. When an offr. employs his staff to conduct any correspondence with another offr. of similar rank or position, the staff of that offr. is to be addressed. As S.Os. carry on their duties under the authority of the G.Os.C. to whose staff they are attached, they will always, in communicating orders to others, write in his name or sign "By Order."

Whenever General or other offrs. in command obtain temporary leave to be absent from their divns., brigds., or stations, the offrs. next in command are to open any official letters that may arrive, and act upon their contents. In addressing letters the official position and not the names of those for whom they are intended, is to be written on the envelope. Access to official records is only permitted to those who are intrusted with the duties of the office or depts. to which they belong, and the same are not to be made public, or communicated to individuals unconnected with such offices or depts. without the knowledge or sanction of the authorities concerned. The only legitimate use an offr. can make of documents or information of which he may become possessed in his official capacity, is for the furtherance of the public service in the performance of his duty. If his officlal conduct be impugned, he is at liberty to seek redress by an appeal to superior authority through the regular channel. On the other hand, his publishing official documents, or availing himself of them for carrying on personal controversies, or for any private purpose, without due authority will be viewed and treated as a positive breach of official trust.

THE CHIEF OF THE STAFF.—All correspondence will in future, on active service, be forwarded through the usual channels to the C. of the S. Where the nomenclature of Adjutant and Q.M.G. is still maintained, the following subjects will be sent to those respective departments.

Adjutant General.—Correspondence connected with the personnel, duties, discipline, and general efficiency of the troops.

Quartermaster General.—Strategical and topographical subjects: The movement by land and sea and quartering of troops: Signalling and cooking.

Military Secretary or Assistant Military Secretary.—All applications regarding promotion, the bestowal of decorations, and other rewards. The confidential reports on officers, and appointment of officers to the Staff.

Orders.—The G.Os. are published by the C. of the S., or the A.G., as the case may be. They should only contain what it is advisable that every one in the army should know. The movements of individual Divns. or detachments should be directed by special memoranda issued by the C. of the S. The G.Os. should be telegraphed daily to the depot of correspondence in rear, and printed at once; they will be forwarded without delay for distribution to the several corps. They should be upon paper with a margin, so as to be put into a guard-book. It is a good thing to classify G.Os. under two heads—1, those that are of a nature not requiring to be constantly borne in mind, such as the promotion of an ensign to a lieutenancy; 2, those that should be read to the men once a week or fortnight, such as regulations connected with marching and discipline, &c. The latter should not appear in the daily G.Os., but be printed on separate paper in small type, so as to be easily pasted into the pocket-book. It would be a good plan to reprint, every 3 or 6 months, in a collected form, all such special orders, printing a sufficient number of copies, so that every officer might have one. They should be printed in small type, and on one side of the paper only, for the purpose of being pasted into the pocket-book. The A.A.G. of each Divn. will attend daily at a named hour, at the office of the A.G. or C. of the S., at Hd. Qrs., to receive orders. The B.Ms. will attend daily, at a later fixed hour, at the tents of the A.A.G. of their Divns., to receive the divnl. orders, and the Adjts. of Regts. will assemble at the brigade office, at a still later fixed hour to receive the brigade orders. Circumstances may, of course, render a change of hours sometimes necessary. All orders received by adjutants to be read to the men at the first parade. On marching days, the A.A.G. of each divn. will attend at the Hd. Qrs. of their army corps as soon as the camp is pitched. When there is not time to write out several copies of an order, S.Os. in communicating it to the Brigds., and so on to the Regts., can send it round by an orderly to the several corps concerned, by whom it will be copied at once, and signed by the C.O., who will return it to the orderly to take it on to the next Regt.,

and so on; when all have signed it, it is brought back to the S.O. who wrote it, who can see by the signatures that all have seen and copied it. All orders must be signed by the S.Os. that issue them.

Detailing Duties.—When any particular number of men are required for a duty, the largest possible unit of formation from an Army Corps to a company should be employed. When less than a Battn. is wanted, the number of men and not the number of companies should be stated in the order to the C.O., who will, however, send as many complete companies as possible—a discrepancy of say 10 per cent. either above or under the number ordered being allowed—so as to prevent the necessity of breaking up companies.

Written Messages of all sorts sent by mounted orderlies should have the address written legibly on the covers, full particulars being given regarding the corps (and their locality) for which they are intended. The pace at which they are to travel and the hour of despatch to be also noted on the cover. The recipient will sign the envelope as received, stating the exact hour of receipt, and send it back by the orderly. The Italians have usefully introduced velocipedes into their army. In a level country fairly provided with roads they would be of great use. We could obtain excellent soldiers from our Volunteers for employment as messengers on velocipedes. and I hope this may be done whenever we have a war in a country where they can be used. They would save the keep of a large number of horses.

In sending important messages where it is possible the bearer may fall into the hands of the enemy, only the most trustworthy men should be employed. When time admits they should carry 2 despatches—1 real, the other false. The latter, to be made up like an ordinary letter, will be carried in the pocket or sabretash. The real one, written in cypher on very thin paper, to be rolled up and placed in a short piece of quill, which can easily be concealed about the person or in a cartridge. Never trust to 1 messenger for the safe delivery of important messages; send a duplicate, and sometimes even a triplicate, at 2 or 3 hours' interval, without allowing the bearers to know that their messages are the same. All messages sent during an engagement or other military action should be carefully numbered, so if No. 5 is received before No. 4 the recipient will know that one has missed its destination, and if it does not agree in any particular with any order previously received he will know that the latest issued order is to be his guide. Messages must be expressed in simplest words and terms, and the names of men and places should invariably be written in Roman characters to prevent any possible mistake about words with which the receiver of the despatch may not be familiar: this should be laid down as a rule never to be departed from. These names of places should always be spelt as they are on the official map in use, and written in printed characters. Never be afraid of tautology, it is often admirable in giving unmistakable clearness to

the meaning of sentences. Instead of referring to the "right" or "left," "front" or "rear" of a village, position, &c., use the expressions north, south, east, or west, as the case may be. Before despatching a written message read it over slowly to be sure that the words used convey the ideas and the orders intended. In all reports clearly discriminate between what you are certain of and that which you have merely been told by others, and never be afraid to be too minute in your descriptions. The battle of Inkermann might probably have ended unfortunately for us had these points been attended to by the Russian S.O. who issued the orders for the attack upon our position. Even in delivering verbal orders this point should be attended to. During an action or any extensive operations, it is frequently necessary to send written orders or instructions to the G.Os.C. detached forces or columns acting beyond the immediate control of the commander. These are always written in haste, but it is essential that they should be free from clerical errors, and expressed in the clearest terms; nothing can be worse policy than overhaste in writing such orders. Indicate at top of the paper the spot where you are writing; it is to be presumed that all the staff have the same map; find out on yours where you are, and describe the spot as it is there shown. For example: "Farmhouse on road to —— close to letter L of Ripley on staff map, about — miles from ——; 6° 34′ A.M. 4th June, 1885." Never omit to state the exact hour. It is also advisable to give a rough outline of what is taking place in your immediate vicinity, and of the last reliable information obtained regarding the enemy's position, distribution, movements, and strength.

Verbal Orders and Reports.—In delivering verbal orders, and in their dealings with superior offrs. the staff should be most respectful, remembering that they are but the agents of the General, and paid public servants. The S.O. should feel bound by his position, if not by his breeding, to treat every one with the courtesy due from one gentleman to another. Some S.Os. acquire a notoriety by brusqueness and incivility. When such men are tolerated it is always to the detriment of the army. The motto for the staff should be "Affability and reticence." In delivering orders or reports verbally, be as distinct and as little hurried or flurried as possible. Before reaching the offr. to whom they are to be delivered, be quite sure what you have to say and how you will say it, and make quite sure that it is fully understood by those who hear you. In a similar manner never bustle a man who comes to you with a verbal message or order or report. If you don't clearly comprehend his meaning, ask him in a quiet tone of voice such questions as you may deem necessary, and the calmer your manner, the calmer he will be and the better able to afford you the information you require. When you send any one with a verbal message, make him repeat it before he starts, so there may be no mistake about what he will say in attempting to deliver it. If you have any doubt of his knowing the way,

send a similar message by another offr. 5 or 10 minutes after the first has started. If possible the 2nd message should be in writing.

Staff Duties during an Action.—The S.O. in action should be all eyes and ears. When stationary anywhere, his telescope should be employed without intermission, and everything remarkable that he sees at once reported to his immediate superior. The staff should accompany their General, but should not remain too close to him. Generals should indicate beforehand what offrs. they wish to remain with them, and at what distance they wish the others to be. A large staff is likely to attract attention, and draw fire. It is advisable that a General should keep with him that S.O. in whom he confides, and whose opinion he most values. Two or three As.D.C. should follow at about 30 yds. distance. Unless called by name, they should take it in turn to go with orders. The rest of the staff should remain about 100 yds. off, the senior offr. with it taking care, when all the As.D.C. have been despatched with orders, that their places are taken by well-mounted, good riders, selected from the offrs. of the Hd. Qr. Staff. Every S.O. should take notes during an action of all remarkable occurrences; his watch must be frequently looked at, and the hour when the first shot was fired, &c., &c., noted; the time when the order is given for all important movements to be recorded, as well as the time when they were executed.

The S.O. should be cool to the utmost extent. If by nature he is excitable, a strong curb must be placed upon his manner, for no one has confidence in reports that are made in an excited way. His verbal reports should be almost impassive in the style in which they are made. He should always look jolly and as unconcerned as if engaged in that complicated operation of attacking a supposed enemy at "Cæsar's camp." Excitement is painfully catching. A staff offr. galloping, in a high state of excitement, with an order to a column, may play "old Harry" with the spirits of the men, and cause them to think there is some unknown danger, or that things in other parts of the field are not going on as they should: it gives rise to a hundred speculations of a gloomy nature; whereas the man who gallops up, no matter how quickly, but with a smiling face, and gives his orders precisely without any flurry, having a nod for his acquaintances in the ranks and perhaps a flying remark for them, spreads abroad a feeling of security and success, which soon reaches the smallest bugler, making all feel that they are on the winning side. I once saw a S.O. gallop with an order to a column of cavly. and artillery, which had been drawn up behind a village to be sheltered from fire, and as he was near it a round shot struck the ground under his horse's belly. The horse made an effort to swerve a little, which was checked by its rider without taking a cigar he was smoking from his mouth, apparently taking no notice whatever of the occurrence. He galloped up to the column, coolly gave his orders, and galloped back again over the open space outside the village, where the round shot were striking pretty thickly, still smoking

his cigar, as if he were taking his morning exercise. A few shots had previously plunged into the column and caused some excitement, as it always does when horses get knocked over ; but the jolly indifference of this offr., in fact the manner in which he appeared to ignore altogether the existence of any danger, had a capital effect upon the men, most of whom saw it, as every one watched him coming, thinking he was perhaps the bearer of an order to advance. Every one who has been often under fire with troops knows how much the coolness of individual offrs. influences those around them ; but a S.O. being mounted, and his approach being always a matter of interest, being generally seen by the majority, he has a greater opportunity of displaying this quality than any other offrs. ; he cannot therefore be too careful about his manner.

As S.Os. are the agents for carrying out the views of those in command, it is essential that before going into action they should be made acquainted with the general outline of the operations to be performed, of where the real attack is to be made, and which are to be the false ones, as they may frequently find themselves in positions where they must take upon themselves the serious duty of interpreting, as it were, the wishes, and of giving expression to the intentions, of the G.O.C. To order movements upon their own responsibility is, indeed, a serious matter, and can only be justified by the extreme urgency of the case. It is a matter of history that Lord Hardinge at the battle of Albuera, when serving as an A.A.G., on his own responsibility directed the movement which won us the day. There is now but little doubt that a junior S.O. is in a great measure responsible for the manner in which our Lt. Cavly. charged at Balaklava. A similar instance occurred at Sabugal, and others might easily be enumerated, where either peculiarity of temper or reasoning caused S.Os. to misinterpret the orders they were the messengers of, or where, in default of definite orders, want of judgment led them to originate movements that resulted in failure. S.Os. assuming such responsibility should have great confidence in their own judgment, based upon war experience, and must be prepared to assume all the consequences in case of failure, without claiming for themselves any special recognition of their services in the event of success, for it must be remembered that the orders they give are in the name of the G.O.C.

In conveying a verbal order during a battle or operations executed in presence of an enemy, they cannot be too particular in the first instance in understanding the exact intention, and in afterwards communicating it in a clear, intelligible manner, throwing full light upon the spirit of it, should the recipient be somewhat dull in catching its precise meaning. S.O.'s in such instances, should be respectfully firm in insisting on its being carried out correctly ; and having remonstrated in vain in case of any difference of opinion, they should lose no time in galloping back to the C.-in-C. to report the circumstance, so that the affair may be rectified in time. G.Os.C.

cannot be too particular in supporting their messengers in such instances and should be most severe upon C.Os. who fail to obey the orders so conveyed, or who do not act upon them as promptly as if they had been delivered personally by the General himself. Generals who do not lend their staff support in this way, and who will not always back them up cannot expect to be efficiently served. It is essential that in many instances S.Os. carrying orders should wait to see them executed, so that when they return to their Generals, they can announce not only that the orders have been communicated, but that they have been carried out. In giving orders to their staff for transmission to others, Generals should state at what time they should be executed. In such instances, a S.O. should look at his watch immediately on his giving the order, and note the time, also when the movement has been put in execution or completed as the case might be. It sometimes happens that, before a S.O. bearing an order reaches the Divn. it is intended for, circumstances have changed so as to render its execution no longer applicable or advisable. He ought to take upon himself the responsibility of galloping back for fresh instructions. If there is any doubt in his mind upon the point, he ought to communicate the order to the General for whom it was intended, but informing him at the same time that it was ordered by the C.-in-C. under the impression that the position of affairs was quite different. It will then be for the General to decide as to its execution. Whatever decision he arrives at must be communicated to the offr. who bore the order, so that, having galloped at fastest speed back to the C.-in-C., he might inform him of what was done.

During an action it is at times very desirable that the G.O.C. the army or even the Army Corps, should detach one of his staff with a few orderlies to remain with the troops engaged, for the purpose of keeping him constantly informed of how affairs are going on in the fighting line, especial care being taken to let him know immediately whenever the enemy show signs of giving way or of retreating. During operations in the immediate vicinity of the enemy, it is at times eminently necessary for the superior General on the spot—it may perchance be the C.-in-C. himself—to withdraw for a moment a Brigd., a Regt., or a detachment, from the command of the G.O.C. a Divn. or an Army Corps alongside of you without first obtaining his permission. As a rule, of course the temporary loan or use of such troops should be obtained with the sanction of the General in immediate command of them, but there may be cases when the emergency of the moment will not admit of your doing so, and in this event you should take care to lose no time in informing him of what *you have* done: it is a responsibility you should avoid as much as possible, it should not be assumed lightly, but at the same time it is one you should not hesitate to undertake, if you believe it to be emergently necessary. Like so many other things in war, and especially in action, it is purely a matter for the exercise of your own individu

judgment: if your judgment is sound, you will be justified generally by results; if not, those who have entrusted you in a position carrying with it so much responsibility, or who allow you to retain it for an hour after your unfitness has been ascertained, are guilty of treason to their country. It is an invariable rule that the O.C. the troops so detached should at once, when he receives such direct orders through an unusual channel, inform the G.O.C. the Divn. or Army Corps to which he belongs, at the same time obeying without any delay or hesitation the direct orders he has received from a superior, although not from one immediately commanding the military unit to which he himself belongs.

The Obligation of obeying Orders implicitly.—The general rule is to act ntelligently upon the order received which is of the latest date. Hence the ıbsolute necessity for noting on every order sent to Generals and subordinates, ıot only the date, but the exact hour when it was written and despatched. An offr. who designedly disobeys an order, because in his opinion the condition of affairs in his own immediate vicinity at the moment he receives t, are different from what he knows, or presumes the writer of it imagined hem to be, rendering it he thinks most necessary that he should act in a ıanner differing from the course indicated in the order last received, takes ıpon himself a responsibility so serious, that even the success of his own mmediate operations may in no way justify his conduct: he may not know, r fully grasp the great object generally aimed at by his commander. There lways will be cases, however, when disobedience is fully justified, but it is nly men who have the fullest confidence in themselves and in their own ıdgment, and who feel they are fully in possession of the aim and view of ıeir commander, who should presume upon it. The C.-in-C. is fully jus- fied in depriving a disobedient subordinate of his command, a deprivation hich is the worst of deaths to a soldier. This all points to the great neces- ty of fully and freely imparting to your subordinate commanders the aim nd object of the operations to be undertaken. Officers taken prisoners ıould be careful to give the enemy as little information as possible; their ames and rank and regts. is all they should communicate. S.Os. ıould not state more than this, and be careful not to mention the name of ıeir General, or the designation of the Brigd. or Divn. to which they elong. If the Regt. to which they belong is not present with the force ıgaged, they may state it with a view to puzzling and misleading the enemy s to the battns., &c., in front of him.

Staff Duties after an Action.—A list of all captured guns, property, and risoners remaining in possession of the Divn. to be made out by the A.G., and transmitted to the C. of the S., whose orders are to be taken to their disposal. The R. A. Staff should, as soon as possible, make ıt a general list of the captured ordnance, giving full particulars regarding Os.C. corps to submit to their respective A.A.Gs. a detailed list of

killed, wounded, and missing. These returns to be collected into one paper for each Divn., and sent without delay to the C. of the S. The A.A.G. of each Divn. will make arrangements for the safe custody and provisioning of all prisoners remaining with it: their private property to be strictly respected. He will see to the burial of the dead; if there are any graveyards near, they should be used. When there are large numbers to be buried, trenches 7′ wide should be dug for the purpose, the bodies being packed in layers as close together as possible, the upper one being at least 2′ below the natural level, the surplus earth being piled up as a mound over the place. If troops are to be encamped in the neighbourhood, all the lime and charcoal to be had should be used in such burials. Officers detailed for this duty should be careful to note the Regt., number, and if possible the name of every man he inters, reporting this information to his B.M. He will also see to the formation of the camp or bivouac, and to collecting the several corps in his Divn. that may have been accidentally detached during the day. Every exertion to be made to clear out the Fd. Hospls. the day after an action, by sending sick and wounded to the rear. The reserves of ammunition to be replenished, if possible, the very evening of an action.

The G.O.C. must make up his mind quickly as to what he intends doing; there is a general tendency to idle during the first moments of relief to the strained nerves which victory brings with it, the best men even are apt to indulge in idle talk of the events that have just taken place instead of making arrangements for what still remains to be done. The enemy has retreated: is he to be pursued? if so, by what force and what troops? The men are tired, perhaps very hungry, and are lying about to snatch some rest. Before anything further is attempted, the reorganisation of your units is of the first importance. In war there are frequently such sudden changes of fortune, that even when victorious you must be prepared to ward off dangers, and you are ready for nothing when your troops are dispersed and intermingled. The G.O.C. must always have under his hand, and at his disposal, a sufficient military body—to be in proportion to the force engaged—which shall have all the coherence that organisation alone can give; no body of men can be thus efficient if men of various battns. and companies are intermingled. No time should be lost in detailing the troops to furnish the outposts, and in at once fixing upon the position to be occupied by the several Divns. and Brigds. Advantage to be taken of all shelter afforded by houses, villages, woods, &c. Nothing is more aggravating to tired men than being shifted from a position which they had taken up with the idea they were to stay there for the night. They have made, or partly made, their cooking places, possibly have actually begun to cook, they have collected firewood and prepared their bivouacs, &c., &c., and then to be told they must move elsewhere is trying beyond measure to the temper of wearied men. For all this the staff is responsible. The hour of sundown is known, so when a

action ceases the G.O.C. is aware of how much daylight still remains at his disposal, and he must take care to make the most of it. His men must have rest and food to be of use next day.

Prisoners.—The safe custody, &c., of prisoners the night of an action is often embarrassing. All men should be at once disarmed when taken, except those offrs. who will promise on their word of honour not to attempt to escape who may be permitted to retain their swords, the names of such offrs. to be carefully noted, and they should sign a declaration in their own language to this effect. The offrs. and N.C.Os. should be kept, at least for the first night, with their men, and told they will be held responsible for their good conduct. Prisoners should have their wants as regards food, &c., attended to, and every consideration should be shown to the feelings of brave men in this distressing position. At the same time, all must be warned that those who attempt to escape will be shot, and that in the event of any combined hostile act on their part the escort told off as their guard will fire upon them without any hesitation. As soon as possible detailed lists of all prisoners taken should be prepared and arrangements made for sending them to the rear under escort, the O.C. which should be selected for his knowledge of the prisoners' language; when he cannot speak it an interpreter should accompany him. This offr. before starting should make out a list of the prisoners handed over to him, tell them off into squads or companies under their own offrs. and N.C.Os. If proceeding through an enemy's country all communication between the people and the prisoners should be prevented. At night they should be placed in walled enclosures, or in any large buildings that may be at hand, and a cordon of sentries placed round them with orders to shoot anyone attempting to run the gauntlet through them. On the march it is essential to have some mounted men with the escort. The O.C. this escort cannot be too kind or considerate to his prisoners, but he must also be very firm and determined in putting down ruthlessly all attempts on their part to resist or to escape.

Position of General Officers in Action.—We have no regulations on this subject, and in our drills and peace manœuvres our Generals contract a bad habit of commanding their troops from the front instead of from the rear of their men. The G. O. C. a Divn. forming part of an Army Corps in action should occupy some position in rear of his troops from whence he can obtain the best view of what is going on in his fighting line: the nearer he is to the reserves that he retains under his own immediate control, the better, but the first necessity is that he should be able to watch through his glass what is going on in his front. It is very desirable that the G. Os. C. Divns. and Army Corps should be easily found when in action: the plan of each General being accompanied by a small flag is a good one for this reason. The distinguishing flags for G. Os. C. Divns. might be three-cornered, and square for G. Os. C. Army Corps: each Divn. might have these flags

of a distinctive colour, and all transport and equipment might most advantageously be marked with the colour or symbol peculiar to the Divn. or Army Corps to which they belong. The C.-in-C. should in a similar manner have a small union-jack carried by his escort, and the C. of the S. should invariably take care to leave behind an orderly with information as to where the Hd. Qrs. are to be found, when during the progress of an operation or of a battle it may be found necessary to shift their position from the spot previously notified to all concerned as that where the Commander would be found. Negligence concerning such little trifling matters leads frequently to great inconvenience; and as our staff is not organised as a corps, but is collected from regts. at the commencement of a campaign, it takes some time to systematise its duties and organise their detail.

In action the General should above all things avoid fuss and hurry: having given his orders, he must calmly await their execution, allowing his subordinate commanders sufficient time to carry them out, interfering himself as little as possible in the details of the movements, except under very peculiar circumstances, such as an evident misapprehension of his orders by those entrusted with their execution. Nothing is more pitiable to see, or more injurious to the success of an operation, than a G. O. C. galloping about endeavouring himself to personally direct the movements of Regts. and Brigades. The General's mind should be clear and cool, so that at every varying phase of an action he may be able to grasp the real and true condition of affairs, and so be in a position to decide quickly and positively what steps he should take next. This is out of the question if he occupies his time in galloping fussily about from place to place. He must use his own discretion as to when it is time to take up a new position with his staff nearer to the enemy: it will be generally advisable for him to do so when his attacking troops have been successful, indeed, at some supreme moments it may be even desirable, nay absolutely necessary, that he should mingle in the charge, encouraging all ranks by his cool daring, and giving a direct impulse to some final blow he wishes struck. This is very frequently necessary for subordinate leaders, such as Os. C. Brigds. or C. Divns, but the higher the General's position in the army engaged, the more he should, as a rule, abstain from taking any direct part in the operations of the fighting line, in order that he may properly fulfil the more important function of his position. The configuration of the ground, the object for which the action is engaged in, and the particular movements undertaken for that purpose will generally indicate the best position to be taken up in action by the G. O. C. an army, or any part of it. The C.-in-C. should change his position in action as seldom as possible with all due regard to its successful issue.

The feeding and supply of an army in the field.—No army can be thoroughly effective, unless it be well and regularly supplied with food

ammtn., and military stores, and unless it be almost daily relieved from the encumbrance of sick and wounded. To secure these essential objects it is necessary that the L. of C. connecting the manœuvring army with its base, should be secure against all attack, and that the traffic over it should be organised upon a good system. There have been instances where armies have cut themselves adrift altogether from their base of supply, trusting to the country to furnish food—Sherman's march to the coast in 1866, for example—but it is only under very exceptional circumstances that such an operation should be attempted, and the experiment will always be fraught with some danger in an enemy's country. Towns and villages may always be relied on to furnish food for one day for as many soldiers as there are inhabitants in them. Advd. Gds., the covering screen of cavly. and troops in pursuit of an enemy will, as a rule, have to live on the country. It is certainly the best policy to pay well for all you require, exacting contributions in money afterwards from all the districts passed through. Commissariat offrs. well supplied with the proper money of the country to pay for all that is required, should be attached to each brigade and independent detachment.

An army actively engaged is in daily need of food and warlike stores, a very considerable proportion, if not all, of which must be drawn from the base in rear, perhaps at a great distance, to which it must send back its non-effective men and horses, and the prisoners taken in action. Along the L. of C. there will always be therefore two streams flowing in opposite directions, one of food and stores, of reinforcements of men and horses to replace casualties, from the base to the army, and the other consisting of sick and wounded men and horses, and of prisoners from the army to the rear. To feed and provide transport and accommodation for these detachments whilst on the journey, without in any way interfering with the transit of supplies to the army in the field, is no easy matter.

The wants of an army are so much greater now than they were in past times, that it may be accepted as a rough, practical axiom, that no force much stronger than a Divn., except at a most ruinous cost to the country, can in future operate successfully for any length of time in an enemy's country where food is very scarce, at a distance of more than from about 100 to 200 miles from its base, unless it has a railway or a navigable river for the conveyance of its supplies. Without the assistance of railways, the supplies not only of food, but of the heavy war material now required for sieges, could not have been sent to the German armies in France in 1870. Had Moscow been connected by a railway with the river Nieman in 1812, Napoleon's expedition to Russia would not have ended as it did. In the China war of 1860, our L. of C. was a navigable river; in Abyssinia by a road passable for pack animals, and in Ashanti by a track over which all supplies were carried by men and women; in both these two latter instances the manœuvring force in front was very small.

LINE OF COMMUNICATIONS.

General of Communications.—In order to relieve the C.-in-C. of these many duties, so that he may have ample time to devote himself to the proper discharge of his higher functions, it is essential that the Ls. of C. should constitute a distinct command under an executive officer, who should take his orders from the C. of the S. and be in constant personal communication with him and with the C. of C. This sytem was adopted in the Ashanti war and in the campaign against Sikukuni, and in Egypt in 1882, with the most satisfactory results. It was reduced to a system in the Soudan Expedition up the Nile in 1884–85, where the L. of C. was about 1400 miles long, and it worked admirably. The greater the simplicity in the administrative machinery, the more effectively it will work, and this is best secured by a well thought-out division of labour and by decentralisation worked under an absolute unity of command and responsibility in the person of the G. of C. In all matters of supply, the less the circumlocution and the more direct the correspondence the better. The offr. selected to be the G. of C. should possess great staff and military experience, be gifted with considerable powers of organisation, and well versed in the science and practice of his profession. His rank should depend upon the strength of the army, and the probable length of the L. of C. : with a force consisting of a Divn. only, his rank should be that of Brigadier ; for any larger force it should be that of Major-General. Under all circumstances he should be junior to the C. of the S. The etappen system of Germany should be carefully studied by all our staff and superior offrs., for without doubt, the successes of 1866 and 1870 were due to a great extent to its excellence and to the admirable manner in which it was administered. The German regulations, however, apply to the communications of a vast army operating over a wide extent of country. Our regulations on this subject are drawn up for a small army of one or two Army Corps employed in a country provided with roads and railways. When operations have to be carried on in a wild country like that where our army was recently employed in South Africa, these regulations must of course be modified to meet the altered circumstances of the position, but the system indicated will still hold good. The L. of C. will extend from the B. of O. to the advd. depot, the command of the G. of C. to include both. This L. of C. should be divided into stages, there being an offr. in command at each.

The Hd. Qrs. of the G. of C. will be at the most conveniently situated station on the L. of C. The staff of the G. of C. will depend upon the character of the operation to be undertaken, and the nature and extent of the country to be traversed. For a small army under ordinary circumstances the following staff, as prescribed by regulations, will be ample :

1 D.A.G., 2 A.A.G., 2 D.A.A.G., 1 A.C.G., with as many commist. offrs. under him as may be required ; 1 O.C.R.A. ; 1 Adjt. of R.A. ;

1 O.C.R.E.; 1 Adjt. of R.E.; 1 D.C.G.; 1 D.C.G. of O.; 1 P.M.O.; 1 I.V.S.; 1 offr. of A.P.D. In all about 18 or 20 offrs. In many instances it would be possible to reduce this number, but there is no economy worse than reducing the number of S.Os. along the L. of C. As transport has not to be found for them, no addition to their number adds to the difficulties of supply for the troops in the field.

The duties of the G. of C. are thus described in our regulations:

(*a.*) The maintenance, defence, and police of the roads used as Ls. of C.

(*b.*) The railway service.

(*c.*) The C. and T. Dept. on the L. of C.

(*d.*) The O.S. Dept. on the L. of C.

(*e.*) The Medical Department on the L. of C.

(*f.*) The semi-permanent line of telegraph.

(*g.*) The field post.

(*h.*) The Veterinary Department and Remount Depots.

The authority of the G. of C. is paramount over all troops halted on or moving over the L. of C., and over all offrs. of every department of the army employed on that line. He will direct to the Advd. depot all reinforcements of men and horses, and all supplies and stores required at the front, and will cause to be sent to the rear all men, horses, and stores not required, either temporarily or permanently, with the army in the field, as, for instance, the sick and wounded, escorts, and prisoners, unserviceable or surplus arms and equipments, trophies of war, arms, and other captured articles. He will authorise requisitions on the country, and enforce them if needful. The G. of C. holds to the heads of departments at Army Hd. Qrs. the same position that a G.O C. a Divn. or an Army Corps does, according as the army is composed of one or more Army Corps. He will keep the C.G. of the Army in front continually aware of the amount of supplies in the Advd. depot, in the intermediate depots, and at the B. of O., and in furnishing this information he will invariably state the time it will take to bring the supplies from the rear to the advd. depot. The G. of C. is held responsible for the harmonious working of all departments on the L. of C. Under instructions from the G.O.C. the Army, he communicates direct with the home amthorities as to the requirements of the army, and receives from them information of all men, minerals, stores, &c., sent to the army.

These regulations omit all reference to the most important duty of the G. of C. in the German and French armies, namely the responsibility for feeding, clothing, and supplying the army in the field with everything it may require. With us there is an attempt to divide that responsibility between the G. of C. and the C.G., an arrangement that can only lead to failure and disaster. I would rather describe the duties of the G. of C. as follows, believing it to be the true description of his functions; (it was on the following lines we worked in the Soudan in 1884–85:)

1st. To supply the army in the field with food, ammunition, clothing, money, and in fact everything it requires.

2nd. The protection of the L. of C. from the enemy. The command, organisation, and administration of all military posts, stations, and towns between the army and the base, including the police duties along the line.

3rd. The movement, feeding, and accommodation of all troops, prisoners, sick and wounded passing over the line.

4th. The organisation, administration, and working of the railways or boat service or ordinary horse or other transport constituting the means of conveyance, whether for men or stores, between the base and the army and the maintenance of the railways, roads, canals, and bridges along the line.

5th. The administration, maintenance, and, when necessary, the construction of a telegraph system in the theatre of war.

6th. The postal service between the base and the army.

7th. The hospital service between the base and the army.

All the ports where troops or stores are landed or collected along the B. of O. should be under the command of the G. of C. In an enemy's country, he must arrange for the civil administration of the districts through which our communications run: if the civil authorities have remained at their posts, they will carry on their duties under his orders. Much will depend upon his management of them as to the assistance to be obtained from the inhabitants in the shape of labour, transport, and supplies. These are duties requiring great tact and knowledge of human nature in general, and of the country, its resources, and the character, disposition, manners, and habits of its people. It will be for him to place such restrictions as he may deem necessary upon local postal arrangements, the publication of newspapers, and the movements even of private individuals from place to place. A special corps of police, under intelligent offrs. conversant with the language of the place, should be sent from England for duty at the B. of O. and along the Ls. of C. His police by means of spies should keep him well informed of all that passes amongst the inhabitants, and his command over the P.Os., which should be strictly enforced, should supply him with much useful information.

The G. of C. will keep open the communications required for the road service, and he is bound to repress immediately, and with a firm hand, all irregularities or disorders, whether committed by soldiers or civilians. He has the entire disposal of the troops, departmental offrs., and officials employed on the road. If he thinks fit he can place several S. Cs., or a portion of his L. of C. under one offr. But the offr. appointed to such a charge must act as an inspecting offr., and whilst either himself or his senior S. O. should always be present at his Hd. Qrs. station, the other should frequently be on the move, so as to ensure that all the offrs. under his control are working harmoniously together. The G. of C. will always, by early application to superior authority, have a sufficient number o

offrs. for present requirements. He will make such inspections as he may think fit of the communications, and will employ those S.Os. specially appointed for inspection duties in constantly moving up and down the roads and railways. He will also, when necessary, proceed to the Hd. Qrs. of the army in the field, to confer personally with the G.O.C., taking care that himself and his senior S.O. are never absent at the same time from his Hd. Qr. station. He will also detach any of his offrs., when he thinks fit, to places where special difficulties may require their intelligent direction. The situation of the advd. depot will at once be notified to G.Os.C. Corps and Divns., who will keep the Comdt. of the advd. depot continually aware of the position of their Hd. Qrs. The position of all hospls. on the L. of C., and also of Rmt. depots must be at once notified to the Hd. Qrs. of the army in the field by the G. of C., with the available accommodation for men and horses at each. If troops are halted for any time on the L. of C., or any delay takes place, information must be at once sent by S.Cs. to the G. of C., and to the C. of B., by telgh. or special messenger. The G. of C. will take such steps as he considers best for providing for the security of the L. of C., by intrenching important points, by sending small flying columns up and down the line or to the flanks, and he is responsible that proper arrangements for the supply of ammn., water, and provisions, to the various intrenchments are made.

Magazines of Provisions.—He will under the orders of the C. in C. fix upon the position where large magazines of provisions will be collected. It is well to have them along the line at distances of 3 or 4 marches, so that if obliged to fall back, the army should find provisions every third or fourth day sufficient to carry it on to the next magazine in rear.

Purchase of Food, Stores, &c. must all be made under the orders of the G. of C. who will take care that departments do not bid against one another in the open market. All purchases of every kind must be made by the Commissariat Departmt. or by its agents.

The Base of Operations must be for us some port or ports on the sea-coast. Our chief magazines will be most probably on or near the sea coast. A good commodious harbour with ample wharfage is of the first consequence. The means of inland conveyance from thence is the next consideration. A port at the mouth of a navigable river whose course is parallel to the L. of C. should if possible be selected: a railway or canal, in same direction, is next in advantage to such a river, and good paved or macadamized roads come next. Whatever the position selected, it should be safe from attack. The management of the B. of O. is of the utmost consequence to an army, as all who can remember Balaklava in 1854 will understand. To such a place an able administrative offr. should be appointed as commandant. He should take his orders direct, from the G. of C., and no other General, no matter what may be his rank, if even living there for several days, should

have the power to give him orders or assume any authority whatever over him. The extent of the place and the size of the army must determine the staff required. The Staff laid down in Regulations : 1 A.A.G. ; 2 D.A.A.Gs., of whom one is to be detailed as a Landing Offr. ; 1 Railway Offr. when required ; 1 O.C.R.A. ; 1 C.R.E. ; 1 A.C.G. ; A.C.G. of O. ; M.Os. as required ; 1 I.V.S. and an Offr. of the A.P. Dept. The duties of the Commt. of the B. of O. will be roughly :—

(*a.*) The arrangements for the defence of the place ; the command of all the troops that may be there. The maintenance of order amongst the inhabitants, and the direct control over the police.

(*b.*) The embarkation and debarkation of all men, animals, and stores of all kinds.

(*c.*) The maintenance of all wharves, piers, landing-places, and store-houses, &c.

(*d.*) Arrangements for receiving and, if necessary, for taking care previous to embarkation, of all sick, wounded, and prisoners.

(*e.*) The forwarding of all men, stores, &c., to the front.

(*f.*) Communicating with the R. N. on all matters in connection with embarkation and debarkation.

(*g.*) The conservancy of the town and of its surroundings.

Quarters and an office for the Naval Transport Offr. must be found as near as possible to those of the Military Landing Offr. These two offrs. should work well together ; if they do not, all will go wrong. The general division of duties according to existing Regulations between the army and R. N. at the base is as follows :—The R. N. unload and disembark all men, horses, and stores, provide the requisite boats, tugs, barges or lighters, and deliver the loads at high-water mark or at the wharves or piers constructed and maintained by the army. The unloading of the boats or barges will be performed by the army. The army load all boats or barges at high-water mark, or at the piers, under the supervision of a N. O., who is responsible that the boats, &c., are properly stowed and will give such instruction as he may think fit on the subject. When the boats, barges, &c., are loaded, the R. N. become responsible for their removal and transhipment to the transports or other vessels. On the arrival of a ship at the base, the N.T.O. will give immediate notice to the M. L. O. sending him a return in general terms of everything on board, and stating how soon he will be prepared to discharge. The M. L. O. will then make arrangements for receiving the contents of the ship, and will inform the N.T.O. when and where he will be prepared to receive them. No men, horses, mules, cattle, stores, or anything conveyed in any ship for the use of the army will be landed until the M. L. O. has made a requisition upon the N.T.O. Although the foregoing are the general rules as regards the division of responsibility, it is to be distinctly understood that the O.C. at the

base will render assistance of every kind to the N.T.O., such as sending working parties on board ship, manning or helping to man boats, if he asks for such assistance; similarly instructions have been issued by the Admiralty that the R. N. should aid the army in every way on an application to that effect being made. The very difficult and complicated duties of embarking and disembarking troops and stores can only be carried out successfully so long as perfect harmony is maintained between the R. N. and military authorities at the B. of O.

In my opinion this division of responsibility between the R. N. and the army at the B. of O. is a very great mistake, pregnant with difficulties, if not with failure. I think the Commdt. at the B. of O. should be supreme there as regards every operation connected with the comfort, welfare, and safety of the army. To supply him with naval technical knowledge, a naval transport offr. of experience should be attached as an offr. to his staff, over whom the R.N. authorities should have no power. It is a good thing to have a ship of war there, as the men can render invaluable services when there is any particular haste required, and they are clever at constructing wharfs. They are useful in enforcing the orders of the Naval Transport Offr. as regards the police regulations afloat, established by him; but it should be clearly understood, in my opinion, that no R. N. Offr. no matter what may be his rank, should issue orders to the Naval Transport Officer or interfere in any way with the harbour regulations, as approved of by order of the Commandant.

In order to ensure the efficient supervision of those who may be temporarily detained at the base and detached from their corps, the cadres of a depot battn., depot battery, and depot company of R.E. will be sent out from England to the base as soon as possible after active operations have been decided on. These cadres will in the first instance comprise the commissioned and N.C. staff of a battn. together with the offrs. and N.C.Os. of 2 companies of Infy.; one offr. and the necessary N.C.Os. for the battery of R.A. and the same for the company of R.E. The strength of these cadres may be subsequently increased if necessary. The C.Os. will take charge of all regtl. documents and baggage which may not be required in the field, and they will be responsible that men ordered for embarkation take with them their documents complete, and a proper kit. Cavly. soldiers will be attached to the Infy. companies. As stated in the article on police, the police duties in such a place are most important. Even supposing that there are no inhabitants, a large number of sutlers are sure to congregate there, and amongst them a host of spies. It is very desirable that telephone communication should be established between the S. C.'s office and the landing piers and all the other important offices in the place.

The Conservancy of the harbour, town, camp, &c., should be a distinct part of the police duties, and special men should be allotted for this work,

I think, as stated on p. 110, a Board of Health should be established, to direct and supervise this conservancy work under the orders of the Commandant. The first grand point to establish is a positive prohibition of the sale of intoxicating liquor stronger than light wines and beer. Circumstances must decide the strength of the garrison, but the fewer the soldiers the better. A special corps of police should be sent from England for duty there. The ordinary police duties being attended to, a corps of scavengers should be handed over to the Chief of Police, who will act upon the advice of the Board of Health. The Commandant's quarters and office should be under the same roof, and whenever he leaves them, even for an hour, one of his staff should remain there to represent him. He must establish a hospl., to be in the suburbs if possible, where, if necessary, sick men coming from the front can be temporarily lodged until sent home. Ample store accommodation should be provided at the B. of O. for regtl. baggage under the care of a good N.C.O. from every Regt., Battn., &c., in the manœuvring army these N.C.Os. will be attached to the Regtl. Depots for Cavly., Infy., &c. to be sent from home for work at the Base.

Wharfage and Store Accommodation.—The wharfage and store accommodation furnished by the town must be divided amongst the several Depts. The available storage to be distributed in the following order as to importance: 1st, for provisions of all sorts; 2nd, for what are generally known as military stores; 3rd, for the Medl, dept.; 4th, for hospl. stores and equipment; and 5th, for Vety. purposes; the relative proportion of storage under those heads to be 50, 33, 5, 10, and 2. There should be a capacious shed at the Medl. wharf for the protection of the sick whilst temporarily waiting for the boats which are to take them to the ships. A corps of labourers, either natives of the country or civilians enlisted in that capacity in England, should be sent to work at landing stores, &c. They should be exclusively under army offrs., at the rate of about 1 offr. to every 200 men. A Chinese Cooley Corps would be far the best for this work, and it could easily be raised at the time at Hong Kong. Amongst other police arrangements, precautions against fire should not be neglected. It is advisable to keep plenty of clear space round the wharfs, as the difficulty of landing stores is rendered most serious when they are confined, as at Balaklava and Peytan. If storehouses are to be built, they should be placed about 80 yds. from the water's edge. In fine, upon the manner in which the duties at the Base are carried out, the success of all operations in the field must greatly depend, and those duties can only be efficiently carried out under the immediate orders of one man, who should be an offr. of rank and experience.

Station Commandants.—The duties of these offrs. must vary at each station, according to its position and importance. The police arrangements of the district, and the charge of all transport and troops so long as they

passing through it, either to the front or rear, are duties common to all Stations where magazines of stores are to be collected, or where there are large hospls., vety. establishments, a field arsenal, the terminus of a railway, or a break of gauge, will usually be considered as 1st class stations, and will have a Commdt. of rank. Stations at the end of stages where animals for transport are kept, where no troops entrain or detrain, and where there are no general stores, will be considered 2nd class stations, and their S.Cs. will be of inferior rank. The S.C. will be responsible that the Commissariat and O.S.D. are supplied with proper working parties for loading and unloading stores. The staff at each station will have to be fixed according to its position and the duties devolving upon the Commdt. The normal establishments are thus described in our regulations. For a 1st class station, 1 B.M. ; 1 railway offr., when required ; 1 offr. of R. E., when required ; 1 D. A. C. G. and 1 of the O. S. D. ; 1 M. O., when required ; and 1 V. S., when required. For a 2nd class station, 1 Adjt. and 1 Q. M. of the C. and T. dept.

These Station Commdts. will be appointed by and will take their orders direct from the G. of C. or from his staff, with whom he will be in constant telegraphic communication. It is manifest that as an army advances each successive halting-place on the L. of C. must have means for accommodating the horses and men passing through. Some of these stations will be of greater importance than others ; but all will require to have an offr. as Commdt. Stations will be numbered consecutively from the rear, that at the base being always No. 1. At stations where hospls., remount depots, and depots of supplies or stores are formed, doctors, &c., will be added as required, and if necessary a paymaster. At stations where there is a railway terminus, a break of gauge, or a general halting-place where troops entrain or detrain, there will be a railway S. O. As military operations vary, the importance of stations will vary also, and the staff required will vary accordingly. Except in case of actual attack, the S. C. is not to be superseded by, or interfered with in the discharge of his duties by any offr. passing through the station who may happen to be his senior. In case of attack the senior offr. present will take command. The S. C. will facilitate the transmission of everything going to, or coming from the army, and will be held responsible for the security of the roads and telghs. within his district. He will also make such arrangements for defence as he may deem necessary.

The Commdt. cannot carry out his duties properly unless due and early notice of the movements of troops and convoys be sent to him. These notices will be sent by the Staff of the G. of C. and the S. Cs. on each side of him. Thus, should a convoy of stores or a body of troops be moving along the L. of C. he will receive notice from the staff of the G. of C. of the day they are expected to arrive in his district, and he will receive notice from the S. C.

next to him of their safe arrival and the hour at which he may expect them on the following day; similarly, he will send notice on their arrival to the next S. C. He will further notify to the G. of C. the arrival or departure of all bodies of troops exceeding 20 in number, and will also send weekly reports showing all troops and details arriving at and leaving his station. He will keep himself acquainted with the state of supplies at his station, and will notify to the C. G. attached to the G. of C. should his supplies fall below the quantity he is ordered to keep in hand. The S. C., except in urgent and unforeseen cases, when he may act on his own responsibility, reporting immediately what he has done, must not detain offrs., soldiers, or supplies passing through for service at his station. He will distinctly understand that by doing so he will interfere with the whole of the arrangements along the L. of C. He should take means to prevent all disorders and excesses occurring in his district; complaints made by inhabitants should be inquired into without delay, and strict justice at once administered. Offences committed by troops on the line of march are to be reported by the S. C. to the O. C. the troops, who will deal with them: if the party is not commanded by an offr., the S. C. will himself deal with them. To prevent stragglers, all soldiers falling out of the ranks will be furnished with a pass by the captain of their company. Soldiers not having passes will be arrested. The S. C. will exercise a supervision over the military police employed in his district. All strangers unprovided with duly authorized passports or passes will be arrested until the orders of the G. of C. or of his Chief of Police have been obtained. In a hostile or semi-hostile country he should seek to gain the confidence of the population, induce them to bring in supplies, and form markets in his station. He should take great care that they are in no way molested, and that all payments, whether for things purchased by individuals or for the public use, are made at once according to a fair and equitable tariff.

Contributions.—Although our system is to pay for everything we draw from the theatre of war, it may be sometimes necessary to levy contributions upon the inhabitants. They will be levied by the S. C. under orders from the G. of C., such contributions may be of four kinds.

(*a.*) Contributions in money. These may be in the nature of fines on villages for bad conduct, for some attack on the troops or for otherwise interfering with the operations. The money so received should be paid into the nearest military chest. Money contributious may also be in lieu of contributions in kind. Whenever there is no emergent necessity for obtaining supplies from the people, it is far better to levy contributions in money than in kind. Money is more easily and can be more equitably levied.

(*b.*) Contributions of cattle, provisions, or stores of any kind. The proceeds to be handed over to the Commissariat or O. S. officers.

(*c.*) Enforcing the supply of provisions or other articles on payment of fixed sums. Such supplies to be dealt with as pointed out in (*b*).

(*d.*) Pressing waggons, horses, and transport generally for the army, such transport to be paid for at fixed rates, and to be administered by the offrs. in charge of the general transport. In most cases it will be sufficient to get transport so pressed to work one stage on the line. The S. C. will be very careful to check any ill-treatment by conductors of convoys of the drivers or horses so pressed, and to ensure an early settlement of their claims. The success of the operations of an army in the field may depend much on the hired transport, and S. Cs. must not only check at once with a firm hand irregularities that may occur, but should report the steps they have taken to the G. of C. Contributions in money can be best collected by the established tax collectors acting under the local authorities; the collector to be paid a percentage on amount collected. In requisitioning provisions, the common rule is to obtain 1 ration per diem from every 3 inhabitants in a rich, well cultivated district, and half that amount in a poor, or mountainous country. The Germans fixed the ration to be furnished by the French inhabitants at 1·65 lbs. bread; 1·1 lb. meat; 1·21 lbs. lard; 1·058 ozs. coffee; 2·116 ozs. tobacco or 5 cigars; 0·88 pint of wine or 1·75 pints of beer or 0·176 pint brandy. The daily ration for horses at 13·2288 lbs. oats; 4·4096 lbs. hay and 3·3072 lbs. straw. When the inhabitants preferred it, they paid 2 francs. a day in lieu of the soldier's rations; round Metz. it was only 1½ francs. There the ration in kind was smaller than described above. All offrs. responsible for supplies should make themselves acquainted with the resources of the country in cattle, grain, forage, fuel, &c., and with the means of transport by land and water. An intimate knowledge of the L. of C. by land and water is indispensable for the offr. in charge of transport and supplies. According to German experience each Army Corps of about 30,000 men requires about 150 sqr. miles in order to find billets for the men, and the most necessary provisions for man and beast. It is not conducive to health to be restricted to a smaller space.

Every S. C. will establish his office in a convenient, central, and prominent house, and will, if possible, live in that house: if he cannot do so, one of his staff must. His office will be indicated by a red flag by day and by a red lamp by night. Finger-posts will be erected indicating the way to his office, and the roads to the next station. A guard will be always on duty, and should be posted as near to his office as possible. He will keep a journal, in which will be entered for each day all letters received or issued, all arrivals or departures of troops, the state of the supplies every 7 days, a statement of all large contracts or purchases that have been made, all contributions that may have been levied, and all unusual occurrences. This journal will be inspected by the G. of C. or any of his staff

appointed for the purpose. A report, being an extract from the Station Journal, will be furnished to the G. of C. every 7 days. This report will state whether additional supplies may be obtained in the district, or horses or other transport procured, either to hire or by purchase. All bodies of troops or individuals entitled to draw rations, when marching, will be furnished with routes signed by the proper authority. These routes will be produced on their arrival at the Route Station, and the S. C. may, if he thinks fit, verify the number of horses and men for whom rations are demanded with the actual number present, and will note any discrepancy in his journal and on the face of the route. Escorts with stores or supplies will, if possible, be made to do double marches, they may be halted for a certain number of hours to rest and refresh and again push on. Escorts marching at night will be furnished with guides, of whom there will be some retained ready for use at each station. No person connected with the army can deviate from the route laid down. All persons belonging to the army found off the road by which they are ordered to march will be arrested. The arrival of all parties, no matter of what size or by whom commanded, will be at once reported by the offr. in charge to the S. C. When special or extra transport is required, the fact of such being required must be noted on the face of the route. The S. C. has the power of granting or withholding such special facilities. A billeting return of each town or village in the neighbourhood will be kept, and a copy furnished to the G. of C. A place should be selected as a parade ground for troops, and another place to park waggons in. In case of large detachments passing through, the S. C. will use his discretion as to billeting a portion or the whole in out-lying places. All parties billeted will be furnished with a billeting paper, signed by the S. C., which will be the order to supply accommodation. This paper, signed on leaving by the senior offr. of the party billeted, will be the voucher on which payment will be made for the accommodation.

In small stations where there is no M. O. the S. C. will use his utmost vigilance to preserve a good sanitary state, and prevent the pollution of the water supply. When a M. O. is present it will be his duty to bring to the notice of the S. C. any violation of sanitary regulations, and suggest remedies. At all large stations a Board of Health should be created.

Storehouses will be of two classes—those for local and those for general service. The former are required at every station, the latter will be formed at places selected for the purpose by the G. of C. No convoys should be allowed to pass through towns, if by making a short detour this can be avoided. If they must pass through, it should be done carefully in detachments. Convoys should be parked outside the town; office and baggage waggons alone should be allowed to enter and halt in towns.

Veterinary arrangements for Line of Communication.—Attached to the G. of C. there will be an inspecting V. S. who will have charge of all the

vety. arrangements from the B. of O. to the Advd. depot, and including both. He will advise as to the most suitable locality for establishing the Rmt. depot, with regard to facility of access, water, forage, shelter, isolation of suspicious cases, &c. He will make frequent inspections of these depots and regulate the duties of the V. Ss. attached. He will be responsible that horses fit for duty are not detained in these depots except under special instructions from the G. of C. He will see that the depots are properly supplied with the requisite medicines, instruments, &c., from the reserve store at the base. He will be in constant communication with the Princl. V. S. and furnish him with full information as to the health of all animals belonging to the Army on the L. of C. He will take instant means to prevent or eradicate all contagious diseases that may break out, and he will especially be on the watch for epizootic disease amongst the animals of the surrounding country, and guard against its extending itself to the cattle, of the army. The V. S. attached to the O. C. the B. of O. will be especially charged with the reserve store of vety. medicines, instruments, and surgical means. He will, through the G. of C., keep the P. V. S. aware of what is in store, and will forward requisitions for such supplies as may be requisite to England. He is responsible that all requisitions from the front are promptly met. He will take professional charge of the Rmt. depot at the B. of O. He, or an offr. of the department under his orders, will superintend the embarkation and disembarkation of horses and cattle, and will inspect them, in order to detect infectious or contagious diseases. He will convene Boards of V. Ss. to recommend the destruction of animals that it may be advisable for sanitary or other reasons to destroy. He will receive all surplus vety. field chests from the troops in front, or from transports, and will see that all transports embarking horses are supplied with the same.

Remount Depots on Line of Communication.—It may be safely assumed that 40 per cent. of all horses sent into the field will require to be replaced before the war has lasted one year. A Rmt. depot for the number of horses and other animals that may be determined on, will be formed at the B. of O. As the army advances, other Rmt. depots will be formed as required at convenient places, and there should always be one at the Advd. depot, which will advance or not with the army as the G. of C. may deem most advisable. These depots will be commanded by offrs. specially selected by the G. of C., and will be under the professional charge of the I.V.S. attached to the G. of C. Our regulations direct that the Rmt. depot at the B. of O. should consist of 4 troops, at the Advd. depot of 2, and at intermediate stations of 1 troop each. The strength of these depots must, however, depend upon circumstances. Each Rmt. depot is formed so as to divide, that at the base into 4, that at the Advd. depot into 2 portions.

Establishmt. of Remount Troop.		Staff of Remount Depots of 2 or more Troops.		
			Base.	Advanced Depot.
1	Captain.			
1	Veterinary Surgeon.			
1	Farrier-Serjeant.	Commg. Offr.*	1	1
2	Serjeants.	2nd in Command	1	..
2	Corporals.	Adjutant	1	1
5	Shoeing Smiths.	Qr. Mastr.	1	
1	Trumpeter.	Inspg. V.S.	1	1
60	Privates.	Sergt. Majr.	1	1
4	Bâtmen.	Q. M. Sergt.	1	1
—		Farrier Majr.	1	1
77		Total . .	8	6

The men will be furnished from the Cavly. at home, by convalescents of mounted corps, or by such natives of the country as may be hired for the purpose. A Rmt. committee will be appointed by the G. of C. for the purchase (locally) of horses, mules, &c. This committee should be formed of an offr. from the Cavly., R.A., and the C. and T. Corps. Whenever purchases of animals take place without the authority of this Rmt. committee, an immediate report must be made to the president, stating all particulars, accompanied by receipts for the horses, &c., purchased. All remounts and all horses the property of the public, or of offrs. that are foraged at the public expense, that may be pronounced unfit for work by the V.S. in charge, shall be received in these depots on the application of the O.C. the regt. or detachment. All suspected cases must be carefully isolated, and if possible, a few sheds or detached stables should be constructed for sick animals. To prevent the advd. depot being too full of sick horses, those that are suffering from extensive wounds, severe sore backs, &c., or requiring serious operations and time for recovery, should, if able to march, be sent to the Rmt. depot at the base, or that at some intermediate station. Every horse sent to a Rmt. depot from the front or elsewhere will be accompanied by a sheet containing a full statement of the case signed by the V.S. in charge ; every horse will bring his line equipment and grooming implements, a list of which will be written on the back of the order for his admission to the depot, a receipt for which will be given by the Adjt. or Q.M. of the depot to the person who brought the horse to the depot. All horses discharged from a Rmt. depot will be accompanied by a Discharge Sheet which will be handed over to the person authorized to receive the

* This offr. to be a Lt.-Colnl. at Base, and a Major at Advanced Depot.

horse, on the back of which will be noted a list of the articles received with him and of those sent back with him. All men bringing sick horses, &c., will, if necessary, be rationed at the depot for the time they stay there. It may be desirable to use such men to take back cured or Rmt. horses to the Divn. to which they belong.

A pair of light field vety. medicine chests, suitable for packsaddle carriage, will be supplied to each V.S. with the troops in front for temporary or emergent cases of sickness or lameness. A regular journal will be kept by the C.O. at each Rmt. depot in which all admissions and discharges of horses, giving full details regarding each, will be entered. These journals must be periodically inspected by the I.V.S. attached to the G. of C. The Cavly. and R.A. obtain remounts from these depots as required, all applications for which to go from G.O.C. the Divn. or Army Corps, as the case may be, direct to the G. of C.: mounted offrs. of all grades and branches of the service, when actually in the field, can also obtain chargers from these depots upon payment, the price being fixed in G.O., and it should always be high, so that offrs. may be induced to provide themselves with horses.

The C. G. of O. with the G. of C. will keep the C. G. of O. with the army in front, constantly and directly informed as to the amount of stores, not only at the base, but also at the advanced and intermediate depots. He will receive orders from the G. of C. as to the position where those depots are to be located, and as to the nature and amount of stores to be maintained at each.

The O.S.O. at the Base will apply to the Commdt. for any assistance he may require, and to the Transport Dept. for transport. He will communicate direct with the S.N.O. as to the supply of ammunition and ordnance stores that may be required for H.M. ships, but in the event of a naval brigade being formed, its organization will come under the military authorities, and the O.S.O. will be governed accordingly. All general arrangements with the R.N. authorities requiring executive action will be made by the Commdt. All communications as to details arising out of the above general arrangements which the O.S.O. may have to address to the R.N. authorities will be forwarded through the Military Landing Offr.

O. S. Os. at Intermediate Stations on the L. of C. will make their wants known to, and will obey all orders they may receive from the Commdt. of the Station.

The O.S.O. at the Advanced Depot will be attached to the staff of the Commdt. of that depot. He will organize his department in the manner best convenient for meeting the requirements of the troops in the field. He will take care that the transport waggons coming to the rear for supplies of ammunition or stores are not detained, and that the requisitions are promptly met. He will take the orders of the Commdt. of the advd. depot as to

what articles are to be destroyed and what sent to the rear. The Commdt's order to destroy stores, and a certificate to the effect that they have bee destroyed, shall be deemed a sufficient discharge in the Commissary accounts. A proper understanding must be maintained between the O.S.C in the charge of the advd. depot as to how, when, and where the store are to be drawn by the troops. This can only be done by direct commun cation—the more direct the better—between the R.A. offrs. receiving th ammunition or stores, and the Commissaries who have to issue them.

The Field Post Office will be under the G. of C., who will keep the arm in front acquainted with any new post office that may be opened, and of a changes effected in the postal service generally. All transport required f postal purposes will be furnished by the Director of Transport. The off in charge of the post office will apply to the G. of C. for escorts or an military assistance he may require. The general working of the field pos the transmission of money-orders, &c., will be carried out under instructio proposed by the Postmaster Genrl. The postal staff for Army Corp Divns., &c., and for L. of C. will be as follows :—

Each Offr. is allowed a public riding Horse.	Captn.	Lieut.	N.-C.Os.	Privates.	Bâtmen.	Total.
Hd. Qrs. Army Corps	1	1	1	2	2	7
,, Cav. Brigade	..	..	1	1	..	2
,, of 3 Divisions	..	..	3	6	..	9
At Base and on Line of Comtns. . .	..	1	4	31	1	37
Total . . .	1	2	9	40	3	55

These details will be supplied by the Postmaster Genrl. from the Post Off Volunteer Corps. The postal establishment for a small Expeditionary Fo must be fixed by the G.O.C. according to the nature of the intended ope tions: the working of the postal service should, however, be carried out the G. of C. The mails should, in my opinion, be made up in England bags addressed to Divns. or Brigds., the letters for each Regt. being ma up in separate bundles, and none should be despatched from England up which any charge for postage is to be made; it should be arranged that stamps be required on letters sent from the army, the postage for which single rates, should be collected upon delivery in England. The object all arrangements of this nature should be to relieve the army in the field all but the most necessary duties, even although you may thereby gre increase the duties of the Home Depts.

The Troops to Guard the Line of Communications.—It is quite impossible to lay down any absolute rule as to the number of troops required for the L. of C., so much depends on the nature of the country, the character of the inhabitants, whether actually hostile or not, the climate, &c.

Prize Money.—All booty taken in war legally belongs to the Crown, and should not under ordinary circumstances be appropriated or distributed without the Sovereign's sanction. This view of the subject has not always been acted upon, but no G.O.C. in the field should depart from it except under most peculiar circumstances. When a capture is made or expected to be made, the G.O.C. should call upon the offrs. to elect or appoint 2 or 3 offrs. to represent them as prize agents, and immediately when the capture has been made, the C. of the S. should have prize rolls sent to him from every regt., battn., and every dept. actually present at the time of capture. It will be for the G.O.C. to express an opinion as to the troops employed who should participate in the prize, the final decision on this point resting with the S. of S. for War. The prize rolls to be sent to the A.G. at the W.O. with least possible delay. If the navy has in any way participated in the operations, it is advisable that a naval offr. should be added to the prize agents. In the appointment of prize agents, or in calling for prize rolls, it is indispensable to announce in the G.O. on the subject that no right or claim to prize on the part of any one is thereby constituted, and that the grant and distribution of any booty taken depends as it always has done upon Her Majesty's will and pleasure. It will be for the G.O.C., having obtained the views of the prize agents, to decide how, when, and where the booty is to be converted into money, or otherwise disposed of: it may be considered advisable to sell all or a part of it by auction or private sale on the spot, or to send it home to be sold there; if it be sent home it may be considered advisable to send it in charge of a prize agent in some hired transport or ordinary steamer, in order to avoid any claim for percentage by the captain of the ship if sent in one of H.Ms. vessels. All expenses legal and otherwise incurred by the prize agents in the discharge of their duties, to be charged against the prize fund. All expenses so incurred to be paid at once and the balance sent home to the Treasurer of Chelsea Hospital: prize agents are bound by law to do this within two months of the date of receiving all moneys. The remuneration to prize agents is to be $1\frac{1}{2}$ per cent. upon the net amount—after all expenses are paid—paid over to Chelsea Hospital for distribution; this percentage is to be divided, share and share alike, amongst the prize agents by the Treasurer of Chelsea Hospital two months after the distribution of the prize shall have been begun by that official. All guns and military stores captured must be handed over to the C.G. of O., who will make an accurate list thereof, giving the prize agents or captors from whom he receives them, a receipt in which their nature, the length and wt. of the guns, &c., are to be de-

scribed, but he is not to give any estimate of their value; copies of these receipts, together with the fullest possible information regarding the captured articles, will be forwarded by him to the S. of S. for War. All horses and other transport animals, and all carts, waggons, &c., will be similarly handed over to the offr. in charge of the transport, and all cattle for killing and eatables to the commt. dept., copies of the receipts given being in every case forwarded to the W.O. I have felt it necessary to give these details because no orders on the subject are to be found in our regulations.

In the event of its being necessary to divide prize on the spot, the following is the scale upon which the distribution of prize money is to be made in future. This scale is that approved of by the Treasury, although never published as an order to govern future issues; it is based on the relative daily pay of all ranks, the pay of the private soldier and of all regtl. ranks for all arms being assumed to be at infy. rates, so that all offrs.,&c., of the same rank shall receive equal shares, the pay of the private being assumed to be 1 shilling, thereby entitling him to 1 share. In calculating the amount to which an offr. is entitled, so many shares or $\frac{1}{2}$ shares are to be allowed him as there are shillings or sixpences in his daily pay; nothing less than half a share is to be calculated for, and no allowances of any kind are to be included in the calculation. All Generals, Brigadiers, and Os. C. regts. (whatever their rank may be) to receive double shares corresponding to their daily pay (exclusive of command money). The amount to be received by all other combatant S. O. to be calculated according to the amount of their daily staff pay plus half the regtl. pay of their rank, 1 share for every shilling and $\frac{1}{2}$ a share for any odd sixpence or odd pence over sixpence but under a shilling. The General or other O.C. the army in the field to receive 5 per cent. of the clear divisible fund.

The practical effect of this principle will be to divide the available fund in the proportion of about $\frac{1}{3}$ to the offrs., and $\frac{2}{3}$ to the N.C.Os. and privates after deducting the share of the G.O.C. The number of shares to be received by each rank will therefore be as follows:—General 400; Lt.-Genrl. 150; Majr.-Genrl. 76; Brigr.-Genrl. 57; Cols. or officers ranking as Colonels or Cols., on the staff, or offrs. having regimental rank of Cols. 40; Colonels except as above defined or Lt.-Col. 32; Major 16; Captn. 12; Lieut. 7; Warrant Offr. 4; all N.C.Os. and men according to their position in following classification:—Class I., 3 shares; II., $2\frac{1}{2}$; III., 2; IV., $1\frac{1}{2}$, and class V., 1. If a Genrl., Lt.-Genrl. or Majr.-Genrl. be in chief command he receives 100 extra shares, and in a similar manner, Brigdr.-Genrl. 50 extra shares. Upon some occasions lately a gratuity has been issued after a campaign to all who took part in it, and it has been given upon the above mentioned scale.

Intelligence Department.—From the moment that war is declared until peace is made, it is of the utmost importance that we should know

what the enemy is doing, indeed it is impossible to exaggerate its importance, so that no sums of money expended with that object in view should be grudged; it is always best to pay informers and spies by results. A General who has the means of always learning the enemy's movements and intentions, is certain to annihilate an adversary to whom his doings are unknown, all other things being equal. Napoleon said that a General operating in an inhabited country, who was ignorant of the enemy's doings and intentions, was ignorant of his profession; in writing on this subject to his brother in Spain, he said that the single motive of procuring intelligence would be sufficient to authorise detachments of 3000 or 4000 men being made to seize local authorities, post-offices, &c., &c. Until the troops are actually in the field, such information must be gleaned by our Intelligence Dept. in London, and by our Foreign Office people, who should also during the war keep up a system of communication with the enemy's capital, and if possible with his army. The means of starting an intelligence dept. should, if possible, be taken with you from England, or sent on before you. The purlieus of Leicester Square could supply our armies with spies for every country in Europe. When war is impending with any country, a number of offrs. should be sent to travel through it and collect information, although if our Treasury would pay for it, this could be much better done during peace, as is done by other nations.

Once in the field a knowledge of the enemy's doings must be obtained by the G.O.C. in the best way he can. It is explained further on how reconnaissances for this purpose should be conducted. The other means of obtaining information are prisoners, deserters, by questioning the inhabitants, by intercepted letters, tapping telegraph wires, and by means of spies. The G.O.C. an army appoints an offr. as the chief of his intelligence dept., working of course under the C. of the S., and the utmost care should be taken in the selection. If the army is a large one, one or two other offrs. should be employed in a similar manner at the Hd. Qrs. of Corps or Divns. that may be at some distance from Hd. Qrs.; it is advisable that the employment of these offrs. in this manner may be kept strictly secret from the army, and that they should themselves at all times disown having anything to do with spies, and profess utter ignorance of the enemy's movements. It is easy to make them A.D.C.'s and let them nominally attend to the general's private correspondence, or to notify their appointments in G.O. as posted to the staff. As in some countries proper offrs. cannot be found for this purpose who can speak the language, English civilians taken from the consular service may be given this work to do, and be attached to the army professedly as interpreters. Whoever conducts the works should be of middle age, and have a clear insight into human nature, with a logical turn of mind; nothing sanguine about him, but of a generally calm and distrustful disposition. He should be intimately acquainted with

the manners and customs of the people of the country. The organisation of the enemy's army should be engraven on his mind, and the names of all Os.C. corps, divns., &c., &c., should be in his possession. He should be in constant communication with the central office in London, to whom should be communicated at once all reliable information obtained in the field, and from which in a similar manner all information received from other sources should be transmitted to the chief in the field.

Spies.—The management of spies is difficult; out of every 10 employed, you are fortunate if 1 gives you truthful information. It is important that spies should be unknown to one another. Care should be taken to make each believe that he is the only one employed. Some serve from patriotism, others for money, some receive pay from both sides; if such a one can be depended upon he is invaluable. All should be petted and made a great deal of, being liberally paid and large rewards given them when they supply any really valuable information. A few thousand pounds is of no consequence to a nation, but if well laid out in obtaining information it may be the indirect means of adding to the victories of one's country. It is very necessary that all bonâ-fide spies should always have about their persons some means of proving themselves really to be whom they represent: a certain coin of a certain date, a Bible of a certain edition, a Testament with the 3rd or the 7th leaf torn out, &c., &c. These tokens should be changed frequently. A spy who was employed by an offr. in a neutral state making his way to the Hd. Qrs. of the army in the field, could thus at once make himself known to the Intelligence Dept. there. In some instances, a pass-sign or word is better, as it is less compromising, such as putting up the right hand to the right ear and then to the left ear, &c., &c. The more extensive the system, and the greater its ramifications both as to the numbers employed and the extent of territory from which information is obtained, the better chances you have of obtaining what you require. It is essential that one or more offrs. should, if possible, be posted in some neutral state as near the theatre of operation as can be done without exciting suspicion, with whom all the spies and secret agents employed there should be in communication: they should select towns or villages from which there was good telegraphic communication with England, so that the information obtained might be quickly transmitted to our Hd. Qrs. in the field. These offirs. should be provided with ample means to employ spies, and to pay well all those who supply them with trustworthy information. It is very necessary that specially prepared paper should be provided for the use at times of all offrs. and agents employed in the Intelligence Dept., upon which letters can be written in ink that does not become visible until it has been subjected to a certain chemical process. It is necessary that a letter in ordinary ink should invariably be written on the same paper containing the information that it is required to keep secret.

All prisoners taken at the outposts should be led direct to Hd. Qrs. without being questioned elsewhere: the chief intelligence offrs. there will examine each separately, taking care that no one is present. You should burn the clothes of any prisoner or deserter whom you suspect of having letters or papers about him which you cannot find. When besieging any place this is very important, as of course the garrison will endeavour to communicate with the outside world through your lines. Open the buttons of the clothing of all such prisoners taken and have his boots cut in pieces as it is easy to hide papers in the soles or heels. It is much better that the enemy's movements should not be known to the army generally: if they are, they will be canvassed by a host of newspaper correspondents, and in the end the enemy will learn that his doings are known, which will make him more watchful; whereas it is a great matter to lull him into the pleasing notion that we are a stupid people, without wit or energy enough to find out what he is doing or intending to do, and that we have no spies in his camp. As a nation we are bred up to feel it a disgrace even to succeed by falsehood; the word spy conveys something as repulsive as slave; we will keep hammering along with the conviction that 'honesty is the best policy,' and that truth always wins in the long run. These pretty little sentences do well for a child's copy-book, but the man who acts upon them in war had better sheathe his sword for ever. Spies are to be found in every class of society, and gold, that mighty lever with men, is powerful enough to unlock secrets that would otherwise remain unknown at the moment. An English General must make up his mind to obtain information as he can leaving no stone unturned in order to do so. Much will depend on the disposition of the inhabitants; if they are friendly, as the Spaniards were during the Peninsular war, it is easy to organise a good intelligence dept., for the great difficulty of conveying news from one army to the other is got over; with good spies in the enemy's camps, they can send their information by a trusty peasant, who of course can pass without suspicion. The letter sent should be written on a strip of very thin paper, which, if rolled up tightly, can be put into a quill $1\frac{1}{2}$ in. long, the ends being sealed up; this can easily be concealed in the hair, beard, or in a hollow made in the end of a walking-stick. It is a good plan to write secret correspondence in lemon-juice across or along the edge of a newspaper or the pages of a book, which, like a Testament, if found on the person of a peasant, would excite no suspicion. Such writing leaves no mark, but if at any subsequent time it is held to the fire, or a hot iron is passed over it, every letter becomes legible. In the article on Reconnaissances will be found lists of questions to be put to prisoners, and lists of the ordinary indications of movements on the part of an enemy; but it is only by studying his manners and customs that one can understand what he means.

In all the wars of this and future ages, the electric telegraph will be greatly

used. A telegraph operator can, with a small pocket instrument, tap the wires anywhere, and learn the messages passing along them. A few such men living concealed within the enemy's territory could obtain more news than dozens of ordinary spies. Immediately before or during an action an enemy may be deceived to any extent by means of such men: messages can be sent, ordering him to concentrate upon wrong points, or by giving him false information you may induce him to move as you wish. The telegraph was used in all these ways during the American war between North and South. Spies can be made useful in spreading false news of your movements; indeed a G.O.C. should so keep his council, that his army, and even the staff round him, should be not only in ignorance of his real intentions, but convinced that he aims at totally different objects from what are his true ones. Without saying so directly, you can lead your army to believe anything: and as a rule, in all civilised nations, what is believed by the army, will very soon be credited by the enemy, having reached him by means of spies, or through the medium of those newly-invented curses to armies—I mean newspaper correspondents.

The intelligence offr. (or offrs., if there are more than one) should every morning report in writing to his chief the information he has obtained from the offrs. employed under him, and other sources. All suspicious circumstances observed by the outposts to be reported daily through the General on duty to the C. of the S., who will at once inform the chief intelligence offr. It is a great object that a system should be established by which all information, whether gleaned from individual offrs. out amusing themselves, or from the outposts, or from any other source, should be placed at the disposal of the man to whom the G.O.C. looks for information. All offrs. should learn, accordingly, that it is their duty to report anything they may discover to the nearest S.O., who must remember that he must lose no time in informing the C. of the S. Although trifling events in themselves can tell but little, yet when they are collated in numbers, and compared with the information derived from spies and reconnaissances, each small piece of news becomes, perhaps, an important link in the chain of information. Commissariat offrs. in their dealings with the inhabitants often pick up valuable information: the rule should be clearly laid down that all such intelligence should be at once communicated to the Intelligence Dept.

Police.—No system of police is laid down in our regulations for an army in the field. We must, therefore, be guided by the regulations of foreign armies, and by the establishments that were brought into existence in our Crimean army, up to the date of its leaving for home. An offr. of at least the rank of a captain should be named Provost-marshal for a corps of 2 or 3 Divns. With a larger force, or if the army is divided, an assistant P.M. will be required,

The establishment of police for Divisions, &c., is as follows:

Distribution.	Officers.	Sergt.-Majors.	Sergeants.	Corporals.	Privates.
Hd. Qrs. of Army Corps	1	..	..	..	..
,, ,, ,, (Mounted) .	..	1	1	1	8
,, ,, ,, (Foot) . .	..	1	1	1	8
Cavalry Brig. (Mounted)	..	..	1	1	8
Hd. Qrs. 1st Division (Mounted) . .	..	..	1	1	8
,, 2nd ,, ,, . .	..	..	1	1	8
,, 3rd ,, ,, . .	..	..	1	1	8
1st Brig. Foot Police	..	..	1	1	8
2nd ,, ,, ...	..	..	1	1	8
3rd ,, ,, ...	..	..	1	1	8
4th ,, ,, ...	..	..	1	1	8
5th ,, ,, ...	..	..	1	1	8
6th ,, ,, ...	..	..	1	1	8
	1	2	12	12	96

For the Hd. Qrs. of an Army consisting of 2 or more Army Corps there should be 1 sergt. and 4 privates mounted, and 1 sergt., 1 corpl. and 6 privates dismounted.

The Provost-Marshal.—The Army Act of 1881 thus describes his duties: "For the prompt repression of all offences which may be committed abroad, P.-Ms. with assistants may from time to time be appointed by the G.O. of the G.O.C. The P.M. or his assistants may at any time arrest and detain for trial persons subject to military law committing offences, and may also carry into execution any punishments to be inflicted in pursuance of a C.M., but shall not inflict any punishment of his or their own authority."

As the power of inflicting summary punishment is no longer vested in the P. M., he must in future, on the march, or during the progress of operations when he considers it advisable to make an example by the immediate punishment of a man whom he or any of his assistants have taken in the act, or against whom some inhabitant may complain of violence, &c., apply to the nearest C.O. to assemble a *summary court-martial* to try the prisoner. The Army Act of 1881 lays down the following rules on the subject.

Summary Cts. Martial.—104. *(a.)* A summary C.M. may be convened by the C.O. of any corps or portion of a corps on active service, or by any offr. in immediate command of a portion of a body of forces on active service.

(b.) Where it appears to any such offr., on complaint or otherwise, that a person

subject to military law has committed an offence, he may convene a summary C.M. to try such person, if he is satisfied that it is not practicable* to try such person by an ordinary C.M., and—where he is below the rank of F.O. and is not a C.O.—is further satisfied that it is not practicable* to delay the trial for reference to a superior offr.

105. (*a.*) Not less than 3 offrs. must be appointed, unless the convening offr. is of opinion that 3 offrs. are not available,* in which case 2 may be appointed.

(*b.*) If the convening offr. is of opinion that 3 other offrs. are not available* to form the ct. he may appoint himself president of the court; but if he is of opinion either that 3 other offrs. are available,* or that although 3 other offrs. are not available* he himself is by reason of his position as convening offr. or otherwise not available,* he should appoint another offr. to be president who may be of any rank, but should not be below the rank of captain, unless in the opinion of the convening offr., an offr. of that or some higher rank is not available.*

(*c.*) The offrs. should have held commissions for not less than 1 year, and if in the opinion of the convening offr. any offrs. are available* who have held commissions for not less than 3 years, he should appoint those offrs. in preference to offrs. of less service.

(*d.*) The P.M., an assistant P.M., and an offr. who is prosecutor or a witness for the prosecution, must not be appointed a member of the ct., but save as aforesaid any available offr. may be appointed to sit.

106. The ct. may be convened and the proceedings of the ct. recorded in accordance with the form in the 2nd Appendix to these rules; but where it appears to the convening offr. that military exigencies or other circumstances prevent the use of such form, the C.M. may be convened and the proceedings carried on without any writing, except that such written record, as seems practicable* must be kept by the P.M. or assistant P.M., if present, or if not, by the president and the offr. charged with the promulgation, stating, as near as may be, the particulars set forth in the form, and stating at least the name (or, if the name is not known, the description) of the offender. the offence charged, the finding, the sentence, and the confirmation.

107. The statement of an offence may be made briefly in any language sufficient to describe or disclose an offence under the Army Act, 1881.

108. The ct. may be sworn at the same time to try any number of prisoners then present before it, but except so far as prisoners are tried together for an offence committed collectively, the trial of each prisoner will be separate.

109. (*a.*) The names of the president and members of the ct. will be read over in the hearing of the prisoners, who will be asked if any of them object to be tried by any of those offrs.

(*b.*) If any prisoner objects to an offr., and any member of the ct. thinks the objection reasonable, steps will be taken to try the prisoner before a ct. composed of offrs. against whom he has no reasonable objection.

110. The president will administer to the other members of the ct., and a member of the ct. when sworn will administer to the president, the following oath:—

You, do swear, that you will well and

* *See rule* 121.

truly try the prisoner [*or* prisoners] before the ct. according to the evidence, and that you will duly administer justice according to the Army Act now in force, without partiality, favour, or affection, and you do further swear that you will not divulge the sentence of the ct. until it is duly confirmed, and you do further swear that you will not on any account at any time whatsoever disclose or discover the vote or opinion of any particular member of this C.M., unless thereunto required in due course of law. So help you God.

111. When the ct. are sworn, the president will state to the prisoner then to be tried the offence with which he is charged, with, if necessary, an explanation giving him full information of the act or omission with which he is charged, and will ask the prisoner whether he is guilty or not of the offence.

112. If a special plea to the general jurisdiction is offered by the prisoner, and is considered by the ct. to be proved, the ct. shall report the same to the convening officer.

113. (*a.*) The witnesses for the prosecution will be called, and the prisoner will be allowed to cross-examine them and to call any available witnesses for his defence.

(*b.*) The following oath shall be administered by a member of the ct. to every witness:

The evidence which you shall give before this ct. shall be the truth, the whole truth, and nothing but the truth

So help you God.

114. (*a.*) A member of the ct. or a witness may take an oath with such ceremonies and in such manner as makes the same binding on his conscience, and the words "you" and "So help you God" may be varied or omitted for the purpose.

(*b.*) A member of the ct. or a witness who objects to take an oath, or is objected to as incompetent to take an oath, may be allowed by the ct. in lieu of an oath to make a solemn declaration, which will be in the same form as the oath, with the substitution of "I" for "you," and with the omission of "You do swear that," and "So help you God," and with the substitution or addition, where necessary, of "I do solemnly declare that.'

115. The prisoner will be asked what he has to say in his defence, and shall be allowed to make his defence.

116. (*a.*) In the case of an equality of votes on the finding the prisoner will be acquitted.

(*b.*) The finding of acquittal requires no confirmation, and if it relates to all the offences charged against a prisoner will be declared at the time of the finding, and the prisoner will thereupon be discharged from custody.

117. (*a.*) The ct., if consisting of 3 or more offrs., may award any sentence which a general C.M. can award; but if the ct. pass sentence of death the whole ct. must concur.

(*b.*) The ct., if consisting of 2 offrs., may award any sentence authorised for the offence, not exceeding summary punishment or 2 years' imprisonment with hard labour

(*c.*) The proceedings shall be held in open ct., in the presence of the prisoner, except on any deliberation among the members, when the ct. may be closed.

(*d.*) The ct. may adjourn from time to time, and may, if necessary, view any place.

119. (*a.*) Except in the case of acquittal the finding and sentence of the ct. shall be valid only in so far as the same are confirmed by proper military authority.

(*b.*) The P.M. or an assistant P.M. cannot confirm the finding or sentence of the ct.

(*c.*) A prosecutor of a prisoner or a member of the ct. trying a prisoner cannot confirm the finding or sentence of the ct. as regards that prisoner, except that if a member of the court trying a prisoner would otherwise under these rules have power to confirm the sentence, and is of opinion that it is not practicable* to delay the case for the purpose of referring it to any other offr., he may confirm the finding and sentence.

(*d.*) Where a sentence of death or penal servitude has been passed, the sentence shall not be carried into effect until confirmed by a general or F.O. commanding the force with which the prisoner is present at the date of his sentence;

Providing that in case of a sentence of death it shall be the duty of any such offr. who is not in chief command of the forces in the field comprising the said force with which the prisoner is present, to reserve the sentence for confirmation by a superior offr., except where he is of opinion that by reason of the nature of the country, the great distance, or the operations of the enemy, it is not practicable* to delay the case for confirmation by the said offr. in chief command or by any offr. superior to himself in command of the said force with which the prisoner is present, and in that case he may confirm the same.

(*e.*) Subject to the exception in (*b*), (*c*), and (*d*), the finding and sentence of a summary C.M. as regards any prisoner may be confirmed by any General or F.O. or by the C.O. of a corps or portion of a corps, or by any offr. not qualified as aforesaid but being in immediate command of a detachment or portion of the body of the force with which the prisoner is present; Provided that—

(1.) it shall be the duty of any such offr. in immediate command as aforesaid, if not otherwise qualified to confirm, to reserve for confirmation by superior authority the finding and sentence, except where he is of opinion that it is not practicable* to delay the case for that purpose; and

(2.) it shall be the duty of an offr. who has not power to confirm the finding and sentence of a general or district C.M. to reserve (save as provided by (*f*) for confirmation by an offr. having that power a sentence awarding a punishment in excess of that which a regtl. C.M. can award.

(*f.*) Where the punishment awarded by a sentence is such that an offr. is required to reserve the same for confirmation, that offr. may nevertheless, if he thinks fit, confirm the sentence, if in confirming it he mitigates, remits, or commutes the punishment, so as to make it a punishment a sentence for which he has power to confirm.

(*g.*) Any offr. may, if he thinks it desirable, reserve any finding or sentence for confirmation by superior authority.

(*h.*) An offr. not having power to confirm the finding and sentence of a district C.M. shall not have power to commute summary punishment into imprisonment for any period exceeding 42 days.

* *See rule* 131.

(*i.*) A confirming authority shall not send back a finding and sentence for revision more than once, and on any revision the ct. shall not take further evidence nor increase the sentence.

120. The rules, 53 (Mitigation of sentence on partial confirmation), 55 (Confirmation notwithstanding informality in or excess of punishment), 95 (Transmission of proceedings after finding), 96 (Preservation of Proceedings), 97 (Rate of payment for copies of proceedings), and 98 (Loss of proceedings), shall, so far as practicable, apply as if a summary C.M. were a district C.M.

121. (A.) In the rules with respect to summary C.M., unless the context otherwise requires, the expressions "practicable" and "available" mean respectively practicable and available, having due regard to the public service.

(B.) The expression "C.O. of a corps or portion of a corps" means the offr. whose duty it is under the provisions of H.M's Regulations, or, in the absence of any such provisions, under the custom of the service to deal with a charge against any of the persons belonging to such corps or portion of a corps who are present under his command, of having committed an offence, that is, to dispose of the charge on his own authority, or to refer it to superior authority.

122. Any statement in an order convening a summary C.M. as to the opinion of the convening offr., and any statement in the minute confirming the finding or sentence of a summary C.M. as to the opinion of the confirming offr., shall be conclusive evidence of such opinion, but this rule shall not prejudice the proof at any time of any such opinion when not so stated.

In the Examination of Ct. Martl. proceedings prior to confirmation, S. Os. and G.Os.C. will remember that the validity of a G.C.M. sentence, tested by the A.D.A., depends on the observance of the following conditions:—

(1.) The liability of prisoner to Military Law, (*a*) as to status (Secs. 163, 4): (*b*) as to offence (Secs. 4, and seqr.).

(2.) The convention by a qualified offr. appointed by H.M. of offrs. qualified to form the ct. (Secs. 48, 51, 119–20).

(3.) The ct. (so constituted), being duly sworn according to the A. D. A. (Sec. 56.)

(4.) The procedure of the ct. according to the act and to the rules issued under the act (Sec. 54).

(5.) The finding of the ct. of Guilty or Not guilty (Sec. 54).

(6.) The sentence by the ct. of a punishment that may be awarded under the act. These several points are to be observed by the Presidents of cts. before they transmit the proceedings to one or other of the Military authorities who are responsible for confirmation. (Sec. 55); (*a*) Her Majesty (*b*): Any offr. deputed by H.M. (Sec. 119).

Too much care cannot be taken in selecting offrs. to act as P. Ms.: they should have a good knowledge of soldiers, be of determined character, and of pleasing manners; severe, but just. It is advisable that they should speak the language of the country: if they do not, interpreters should always accompany them on the line of march, and be permanently attached to them. *Interpreters*, especially in the east, are often villains. In how many instances have I seen the greatest injustice done through their

machinations, and the greatest injury done to the public service by their ill-treatment of the inhabitants. The army that employs them has to bear all the odium their falsehood, dishonesty, and often their stupidity, give rise to. As a general rule, the P.M. should encamp with Hd.Qrs. ; it is advisable that he should be intimately associated with the offr. in charge of the intelligence department, as both should work hand in hand. As regards a police establishment, we have the very best material in the Irish constabulary to draw upon. It was made use of when the army was first organised in the Crimea, but it was mismanaged, and had no useful result.

Passports.—The first duty of the P.M. is to make out a list of all those (not soldiers) attached to the army in any capacity, either as servants (public or private), or as sutlers, or as belonging to societies for the relief of the sick or wounded, or as newspaper correspondents. In his book each man should have a page, upon which should be noted all particulars regarding him. Men having wives with them, to have their description also entered. To each must be issued a ticket of residence, which, like the passports formerly in general use abroad, should have an exact personal description of the holder to prevent its being transferred. Photographs of every one to whom a passport is issued should be kept in the book, and a duplicate attached to the passport itself ; every one applying for a passport to hand in two photos. of himself for that purpose ; the copy attached to the passport to be stamped and signed by the P.M. and by the holder of it. Every one to be obliged to carry his passport about on his person at all times. Each passport to be numbered and the number to correspond with the page in the general registry, to which there should be an alphabetical index. The following information should be contained in the passport and registry to be made out thus :—

TICKET OF RESIDENCE. No.—

Name . . . . . .
Country . . . . . .
Occupation . . . . . .
If a foreigner, has he a passport . . . . . .
Intended residence in camp, &c. . . . . .
" business . . . . . .
Name of any one in camp who will vouch for his respectability . . .
Height . . . . . .
Colour of eyes . . . . . .
Do. hair . . . . . .
Age . . . . . .
Any marks about him . . . . . .
His signature . . . . . .

named above, has permission to remain until further orders.

By command.

(Signed)

Camp (date) of 188 .

The police offr. of each divn. will keep a similar register of all such people following, or belonging to his divn. the number of each entry to correspond with that in the general register kept by the P.M. It will be his duty to see that no stranger lives with his divn. without such a register, and he will arrest any one not possessing one, and take him before a S.O. of his division. It would be a good plan to institute a fine for any remissness in these regulations, or for the loss, by accident or carelessness, of such registry. Of course, if there were grounds for supposing that there was anything criminal in the matter, the offender should be expelled from the theatre of war or otherwise summarily punished.

Punishments with an Army in the field must be summary.—The laws which in peace suffice to keep the population of cities in order, will not answer the same purpose in armies during war. The former is an aggregate of men, women, and children, of all ages and all classes, both as regards position and education ; the soldiers of an army are, as a general rule, of one class in all respects, are in the prime of youthful manhood, full of fire, passion, and recklessness, and not brought into contact with the softening influences of old men and respectable women ; they are men in growth, with the failings and high spirit of the schoolboy. Without strict discipline such an assemblage would be a mischievous mob and not an army. All camp followers, or individuals of any sort accompanying an army, either for business or pleasure, are to be made amenable to such punishments. On the march the P.M. and his assistants must hover about along the outskirts of the line of march, visiting every village and all large farm-houses, &c., &c., to see that stragglers are not there, as it is by such men that crimes are committed. He should make prisoners of all stragglers, and send back soldiers under escort to their respective corps. When on the march, all G.Os.C., or others in detached commands at some distance from the main body, will aid the P.M. by giving him guards, taking charge of prisoners, giving him patrols (they should, if possible, be cavly.), &c., when he applies for them, unless in their opinion there are sufficiently good military reasons for refusing to do so. If under such circumstances the P.M. considers he has not been properly supported, he must bring the matter to the notice of the C. of the S. or A.G., who will inquire into it. When in camp, the P.M. and his assistants must be always on the move, visiting the neighbouring villages, and places at which they think breaches of order or discipline are likely to be committed. He must render every protection in his power to the inhabitants of the country, and be always prepared to inquire into their complaints. This will go far towards encouraging them to bring in provisions for sale. He will take charge of the markets (the positions of which will be, in the first instance, pointed out by the Divisional A. A. G.). He is responsible for their good order and cleanliness. His police look to the former, and he must obtain fatigue-parties or use defaulters

to insure the latter. He will bring to the notice of the staff of Divns. any want of cleanliness in the vicinity of their camps, all irregularities at watering-places, &c. All guards, whether commanded by offrs. or N.C.Os., must take charge of any prisoners handed over to them by the P.M., or any of the police acting under his orders. Those in command of the guards to take down in writing the crime and the name of the police-offr. handing the prisoner over. If such prisoners have not been reclaimed previous to the guard being relieved, they must be sent to their regtl. guards with a report of the circumstances.

Taking it for granted that the base of our army is a seaport, the town should be under the closest police surveillance. It must have a P.M., with a sufficient police staff to keep order. He should take his orders from the offr. in immediate command as to the individuals to whom passports should be granted to enable them to visit the army in the field. All foreigners must come with regular passports from their own ministers. Travelling gentlemen, newspaper correspondents, and all that race of drones, are an encumbrance to an army; they eat the rations of fighting men, and do no work at all. Their numbers should be restricted as much as possible. Strangers of all sorts upon arriving at any military post *en route* to join the army, must be at once visited by the P.M., or other offr. in police charge, their registers examined, compared with their appearance, and signed by such offr. It must be remembered that the enemy will do all he can to have paid spies in your camp. No stone should be left unturned to discover them, large rewards being offered to any one who will inform on them.

Newspaper Correspondents.

Soldiers of course object to their presence in camp upon military ground, but as long as the British public's craze for sensational news remains as it is now, the English General must accept the position. Only newspapers of importance and those that are well known should be allowed to have a correspondent with the army, and only one correspondent to be allowed for each paper. It is most desirable they should be carefully selected men. Those who are best known for the honesty with which they report news are very anxious to exclude from their ranks all those who have transgressed or are likely to transgress the rules laid down for their guidance. The following rules were laid down on the subject for use in Egypt.

Rules for Newspaper Correspondents at the Seat of War.

1. All newspaper correspondents accompanying the army in the field must be furnished with a licence granted under the authority of the C.-in-C. at home. In this licence the paper or papers for which the correspondent is agent will be stated. The form of this licence is given further on.

2. A correspondent may not write for papers other than those mentioned

in his licence. If he desire to do so, he must get leave, and the permission must be duly registered on his licence.

3. Licences will not be granted to those whom it is considered undesirable to have as correspondents in the field. Retired Officers will be preferred.

4. All correspondents in the field will be under the Mutiny Act during their stay with the army.

5. Correspondents will not be allowed to go to the outposts without special permission, to be granted in writing each time a correspondent may wish to visit them.

6. The use of any cipher is forbidden to correspondents. French and German are the only foreign languages permitted.

7. A Staff Officer will be named to act as Press Censor. He will register licences granted under the authority of the C.-in-C. at home, and will grant licences to local correspondents *not accompanying* the army in the field. These licences will be issued under similar conditions to those granted to correspondents accompanying the army. He will also grant passes when necessary to all correspondents at the seat of war. He will be the channel of communication between the G.O.C. in the field and the correspondents. Each newspaper having a correspondent in the field or at the seat of war will send him a copy of every issue of their papers, so that he may, by examining their contents, be assured that the press rules in the field are strictly adhered to.*

8. This Press Censor will have the power of insisting that all communications from correspondents to their newspapers must be sent through him; and he may detain or alter the communication should he deem it injurious to the interests of the army.

9. The G. O. C. will through this S.O. give as much information as he may consider advisable and consistent with his duty, to correspondents. The Press Censor will fix an hour when correspondents may call upon him daily for information, and he will be authorised to tell them everything that can be published with safety to the Army.

10. The military Authorities will facilitate, so far as they can, the despatch of the messages of correspondents.

11. Should the means of communication at the disposal of the G. O. C. in the field not be sufficient to convey the messages of correspondents, the latter may, under his sanction, arrange for a special means of transmitting their messages. It is, however, to be clearly understood that such arrangements are to be entirely under the control of the Press Censor.

12. The G. O. C. in the Field has power to revoke, at any time, any

* *As this regulation may be evaded, it is essential that all such newspapers should be carefully perused daily in our Intelligence Department at home, so that the attention of the G.O.C. in the field may be at once called by telegraph to any contravention of these rules.*

licence granted under the authority of the C.-in-C. at home, or under his own authorty, should he consider it advisable, in the interests of the Army to do so.

13. Editors of newspapers desirous of sending agents to the theatre of war and the correspondents whom they propose for that purpose, will be required to sign the following declaration.

"———— have read the rules for the guidance of editors of newspapers, and of correspondents with an army in the field, and ———— hereby agree to abide by the same.

"Signed ———— Editor of the ————.

"Signed ————, Proposed correspondent to the ———— to accompany the army."

NOTE.—In the case of a correspondent who is already at the Seat of War before the arrival of the Army, the signature of the Editor or Manager of the newspaper for which he acts will be accepted "for the correspondent," and if a licence be granted a provisional one will be issued. This will hold good so long only as is necessary to allow of the correspondent's signature to the Declaration being obtained and received at the W.O.; a permanent licence will then be forwarded to the Editor or Manager for transmission to the correspondent. Managers of newspapers wishing to appoint local correspondents are recommended to sign a copy of the Declaration and forward it to the correspondent if already in the field, in order that he may counter-sign and present it to the Press Censor authorised to grant local licences under the authority of the G.O.C. in the field.

The P.M. and all his officers should have a list of every licence granted, to whom given, its No. &c., &c.

All important news is nowadays sent home by telegraph. The wires in the field are of course under the exclusive management of the army, and no telegram will be received at any telegraph station that does not bear the signature of the Press Censor on every page of it. All corrections made in a telegram meant for transmission must be similarly signed. The Military Secretary to the G.O.C. in the field is as a rule the best officer to make Press Censor at Hd. Qrs.; others may be required at the base or along the L. of C.

FORM OF LICENCE FOR NEWSPAPER CORRESPONDENTS.

(To be printed on a card about $5\frac{1}{2}'' \times 3\frac{1}{2}''$, with a counterfoil, $5\frac{1}{2}'' \times 1\frac{3}{4}''$.

No. of Licence.

To whom issued

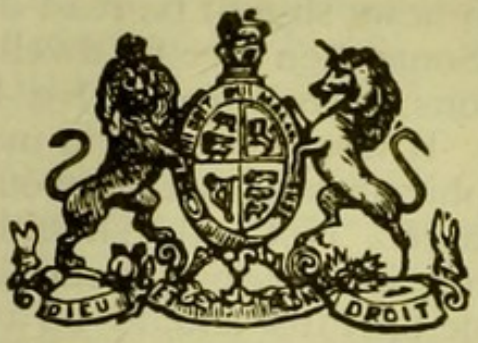
Date of issue

Issued by

By Authority of

To act with the army in

No. of Licence.



_____ having signed the Declaration attached to the Rules for Newspaper Correspondents with an Army in the field, is hereby licensed to act as Correspondent for the _____ with the Army in _____ dated at _____ the ____ day of _____ 188____

By authority of the F.M. Comdg. in Chief.

(Signed) _____

1. He is authorised to draw Rations for himself and servant.
2. He is authorised to draw Forage for one horse.

By authority of the General Comdg. in Chief.

in _____

place _____ date _____

(Signed) _____

NOTE.—The Staff Officer signing the latter certificate should see that the paragraphs which are not applicable are struck out.

Use of Electric Telegraph.—It is essential that all wires in the theatre of war should be in military possession, and that every telegraph office should be worked by military operators, no message being allowed over

the wires from correspondents, offrs., or others, until it had been read and signed by the press censor. All important news from a seat of war is nowadays sent home by telegraph, and my experience tells me how necessary, for the sake of accuracy, if for no other reason, it is that all telegrams with news should be read over, and all sensational matter erased from them. Some men love to dwell on horrors which in many instances are the creations of an imaginative brain that may be perhaps somewhat overwrought. It would be easy in many phases of every campaign to send home telegraphic messages that would create a panic without doing any good whatsoever. Not only should every telegram, but every page of it and every correction made in it should be signed by the press censor before any telegraphic operator should be authorised to send it forward. In the Soudan in 1885, the following rules were laid down:—

1. The opening of the Military Telegraphs for the transmission of unofficial messages will be only permitted by the Commander-in-Chief, under such restrictions as may be enacted from time to time and published in General Orders.

2. As a general rule, press messages exceeding 200 words will not be accepted for transmission.

3. If messages of more than 200 words are allowed, they must be divided into sections of not more than 100 words each; each section being numbered consecutively.

4. Press Correspondents are requested to make use of the Military Telegraphs 'A' 'Forwarded' form (color white). No Press forms are provided.

5. No message will be accepted in Cipher.

6. The tariff is the same as that of the Egyptian Telegraph Administration.

7. Messages are paid for with Stamps as in the United Kingdom.

8. Stamps are kept at every Military Telegraph Office, for which cash must be paid.

9. To avoid the use of cash, warrants are provided at the Military Telegraph Offices for the exclusive use of authorized persons. Press Correspondents will be allowed to use them if they have lodged sufficient guarantee for the recovery of the charges, which guarantee will be vouched for by the Director of Army Telegraphs.

PART II.

COMPOSITION AND DISTRIBUTION OF AN ARMY.—The army is to be divided into army corps, consisting each of 20,370 (21 battns.) infy., 3780 cavly. (6 regts.), 90 guns, with a proportion of R. E., &c., &c., &c. (these numbers do not include offrs.), the detail being as follows * :—

A BRIGADE OF CAVALRY (Tents carried).

	Offrs., Warrt. offrs. & Rank & File.				Horses & Mules.					Carriages.						
° Horses & Drivers for these wagons, &c. are provided by the ½ Compy. of C. T. C. † The S.C.O. and Vet. Surgn. included in these numbers are both attached to the Compy. of C.T.C. for rations, &c.	Officers.	Warrt. offrs. & Rank & File.	Batmen & Servants.	Total of all Ranks	Offrs.' Chargers.	Troop.	Draught.	Mules.	Total animals.	Gun & limber & Gun Ammutn.	Genrl. Service.	Forge & Store.	S.A.A. or Tool or Water Carts.	Ambulce. Wagns.	Commisst. Carts.	Total Carriages.
Staff	†6	1	11	18	13	2	..	..	15	..	..	..	..	..	..	..
3 Regts. of Cavly.	96	1698	192	1986	264	1440	168	3	1875	..	33	3	6	..	..	42
1 Batty. R.H.A.	7	169	14	190	14	62	110	..	186	12	1	5	..	..	..	18
Medical Departmt. 1 Fd. Hospital ..	5	30	10	45	7	1	..	..	8	..	7	..	2	..	2	11°
Medical Departmt. 1 Bearer Compy. ..	4	57	5	66	5	2	..	..	7	..	4	..	1	10	1	16°
Medical Departmt. 1 Compy. C. T. C.	1	69	2	72	1	8	102	..	111	..	15	.	3	10	3	31
1 C.T. Company	5	153	10	168	5	18	170	..	193	..	36	1	2	..	1	40
Postal Corps	..	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..
Mounted Police	..	10	..	10	..	10	..	..	10	..	..	..	..	..	..	..
Total	124	2189	244	2557	309	1543	550	3	2405	12	96	9	14	20	7	158

A BRIGADE OF INFANTRY (Tents carried).

Staff	†6	1	11	18	13	2	..	..	15	..	..	..	..	..	..	..
3 Battns. of Infy.	90	3078	120	3288	33	6	162	9	210	..	30	..	15	..	..	45
1 Fd. Hospital	5	30	10	45	7	1	..	..	8	..	7	..	2	..	2	11
1 Bearer Company	4	57	5	66	5	2	..	..	7	..	4	..	1	10	1	16
1 Company C.T. Corps	3	175	6	184	3	20	194	..	217	..	21	1	2	..	1	25
Military Police (Foot)	..	10	..	10	..	..	..	..	..	..	..	..	..	..	..	..
Total	108	3351	152	3611	61	31	356	9	457	..	62	1	20	10	4	97

This table gives the strength which the Infy. Brigd. will embark with,

* Allowing for the men to be used for regtl. transport purposes, each battn. of infy. should be counted as 900 bayonets, and each cavalry Regt. at 470 sabres. If these numbers are taken, the total strength of our Army Corps would be 18,900 bayonets and 2,800 sabres.

but as Regtl. Transport is only provided for 1000 of all ranks per Battn., upon landing, all officers, &c. in excess of that number will be left at the base.

Indian Establishments.—In India the Brigade of Cavlry. consists of 1 British and 2 Native Regts. and 1 Battery H. A. : the brigd. of infy. of 1 British and 2 Native battns. ; and the Brigade of all arms of 1 Infy. brigd. (as above), 1 Regt. Native Cavalry, 2 Field Batteries, and 1 Co. of Sappers. In India the Divn. of all arms consists of 2 infy. brigds., 1 pioneer regt., 2 native cavly. regts., 1 battery H. A. and 3 field batteries, and 2 companies of sappers. The army corps. in India will generally consist of 2 divns. (each as described above, except that each will only have 1 Regt. of cavly., and 1 company of sappers), 1 cavly. brigd., 3 batteries R.A., and

A Division of Infantry (with tents).

* Inclusive of the gun-carriages carrying the guns.
† This is the strength for the field, the supernumeraries having been left at base.
‡ The details of this Compy. have no yet been fixed.

The details are arranged for a Divn. forming part of an Army Corps.	Officers and Men.					Horses.				Guns.	Carriages.			
	Officers.	N.-C. Os. and Men.	Drivers	Bâtmen and Servants.	All Ranks.	Officers.	Troop.	Mules & Draught Horses.	Total.		6-Horsed.*	4-Horsed.	2-Horsed.	Total.
Divisional Staff . . .	19	9	..	40	68	47	..	..	47	..	..	..	..	..
2 Infantry Brigades .	200	5972	186	288	6646†	122	62	730	914	..	..	136	58	194
1 Battalion of Rifles .	28	905	31	36	1000	11	2	57	70	..	..	10	5	15
1 Regiment of Cavalry.	31	538	30	62	661	87	480	57	624	..	..	14	..	14
3 Batteries of Field Artillery	21	279	207	42	549	27	69	318	414	18	39	15	..	54
1 Company of R. E. .	6	159	26	12	203	11	4	31	46	..	..	6	..	6
1 Divnl. Reserve Amtn. Column	6	67	104	12	189	8	17	182	207	..	17	5	22	44
Vety. Department . .	1	6	..	2	9	2	..	..	2	..	..	..	..	..
Mounted Police . .	..	10	..	..	10	..	10	..	10	..	..	..	..	..
1 Compy. C. T. C. for conveyance of baggage of Divnl. Hd. Qrs., of Supply Column, and of 2 Fd. Hospitals ‡ . .	4	73	97	8	182	4	19	267	290	..	..	38	14	52
2 Fd. Hospitals . .	10	60	..	20	90	14	2	..	16	..	..	16	8	24
Total	326	8078	681	522	9607	333	665	1642	2640	18	56	240	107	403

An Army Corps (with tents).

° This is the 1st Reserve for the Corps R.A., Cavly. Brigd., &c.

† Including gun-carriages.

The Ordnance Corps Department has been omitted, its numbers not having as yet been definitively fixed: its strength in all will be about 30 offrs., 400 of other ranks, 200 horses, and about 50 carriages. There will also most probably be one Railway company to each Army Corps, its strength being 5 offrs. and 183 of all other ranks.

	Officers, Wt. Offrs. & Men.					Horses and Mules.					Carriages.			
	Officers.	Wt. Offrs., N.-C. Os.., and Men.	Drivers.	Batmen & Servants.	Total, All Ranks.	Officers.	Troop.	Draught.	Total.	Guns.	6 horses. †	4 horses.	2 horses.	Total.
General Staff of Army Corps	35	36	..	73	144	99	..	..	99	..	..	..	..	..
3 Divisions	978	24234	2043	1566	28821	978	1992	4926	7896	54	168	420	321	909
1 Cavly. Brigade	124	2171	90	244	2629	309	1552	651	2512	6	13	123	25	161
Corps R.A. — Regtl. Staff	6	3	..	12	21	16	..	..	16	..	..	..	..	..
Corps R.A. — 3 Batts. R. H. A.	21	276	231	42	570	42	186	330	558	..	39	15	..	54
Corps R.A. — 2 Fd. Batts.	14	186	138	28	366	18	46	212	276	18	26	10	..	36
Corps R.A. — Reserve Ammn. Col.°	6	63	117	12	198	8	17	214	239	12	27	7	4	38
Corps R.E. — Regtl. Staff	2	1	..	4	7	5	..	..	5	..	..	..	..	..
Corps R.E. — 1 Compy. & Fd. Park	7	165	50	14	236	13	9	73	95	..	..	15	..	15
Corps R.E. — 1 Pontoon Troop	9	164	148	18	339	17	20	200	243	..	30	1	..	31
Corps R.E. — ½ Telegraph Battn.	6	123	85	12	226	12	29	104	145	..	16	..	..	16
Military Police	1	22	..	2	25	2	11	..	13	..	..	..	..	..
Vety. Dept.	1	10	..	2	13	2	..	..	2	..	..	..	..	..
1 Compy. C. T. C. for conveyance of baggage of Hd.-Qr. Staff, Corps Details, &c.	4	73	97	8	182	4	19	267	290	..	..	38	14	52
1 Field Hospital	5	30	..	10	45	7	1	..	8	..	..	7	4	11
1 Bearer Compy.	4	54	..	8	66	5	2	..	7	..	..	14	2	16
½ Compy. C. T. C. for conveyance of the Fd. Hospl., Bearer Compy., &c. &c.	2	40	64	4	110	2	14	126	142	..	..	27	7	34
1 Compy. C. T. C. as Bakery column for Army Corps Hd. Qrs., &c., for 1 Divn., 1 Cavly. Brigd. (50 ovens in 4 Sections, 4 of 10 & 1 of 20 ovens)	3	125	106	6	240	3	19	154	176	..	..	36	..	36
1 Compy. C. T. C. as Bakery column for remaining 2 Divns. of Army Corps (60 ovens in 4 Sections, 2 of 20 & 2 of 10 ovens each)	4	143	126	8	281	4	22	184	210	..	..	43	..	43
Postal Department	2	3	..	2	7	2	..	..	2	..	..	..	..	..
Totals	1234	27922	3295	2075	34526	1548	3939	7447	12934	90	319	756	377	1452

4 comps. of sappers. When the army corps. in India has 3 infy. divns., it will then have a divn. of cavly., 4 batteries R. A., and 5 comps. of sappers.

In distributing regts. into brigds. and divns., they should be grouped as much as possible according to nationality and to regtl. distinctions, the Fusiliers being together, the Light Infy. the same, and so on.

It is advisable that the divns. should be numbered 1, 2, 3, 4, &c., right through the army: thus in an army consisting of 3 army corps, the 2nd army corps would consist of the 4th, 5th, and 6th divns. of infy. The brigds. of cavly. should be similarly numbered. The brigds. of infy. should be called right and left brigds. of such and such a divn.

"*The order of battle*" with all foreign armies, is a form giving the distribution of the force into divns., brigds., &c., with the names of all the generals and brigadiers and their principal S.Os. as it would stand on parade for inspection. The names of the Os.C.R.A, and R.E. are also given. This "order of battle" has nothing to do with the formation in which the force would be engaged.

Waste in men and horses.—Before entering on a campaign every preparation should be made for the supply of men and horses to make good losses. The statistics of the German army show that at the end of first year 45 pr. cent. of the Infy., 20 pr. cent. of the Cavlry., Artilly., and Engineers and 12 pr. cent. of the Mily. train are lost to the army and must be renewed. As a rule, 4 weeks after the Army has marched, the first supply of men should be forwarded from the Depôts to the operating army at the rate of $\frac{1}{8}$th of the yearly loss given above. On the 1st of each month afterwards, a fresh supply should be forwarded. If a serious battle is anticipated, special supplies should be in readiness to start at an hour's notice. It may be assumed that 40 per cent. of the horses sent into the field must be replaced before the war has lasted one year.

CAVALRY.—*The proportion of cavalry* in an army corps is $\frac{1}{6}$th of the infy. If the units are counted as stated in note, page 183, the proportion would be $\frac{1}{7}$th of cavalry (in foreign armies it is about the same). The nature of the service upon which an army is sent, and the character of the country to be operated, must always greatly influence this proportion. In the establishment of the French and German armies the total amount of cavly. is about 1 to 11 of the total infy.; in the Austrian army, this proportion is 1 to 9: and in the Russian army about 1 to 15: in our army it is nearly 1 to 8. In open countries where forage is plentiful, one cannot have too many cavly. (provided they can fight on foot as well as mounted); and even in the closest countries, if forage is to be had, the more mounted men (whether you call them cavalry or mounted infantry it matters little) you have, the more formidable will be your army. A cavly. brigd. armed with breech-loaders that have a range of 1000 yds. and provided with a few machine guns, might go anywhere, even in the closest country, by dismounting $\frac{2}{3}$rds

of their numbers ; with a strong force of cavly. one might do wonders during a campaign or an action, by cutting in upon an enemy's flanks, rear, communications, &c. For a pursuit they would be invaluable ; but then they must make up their minds to fight on foot whenever required to do so. In peace the proportion between men and horses is, England, 1 to 0·75 ; Austria, 1 to 0·879 ; France, 1 to 0·897 ; and in Germany, 1 to 0·96875.

ARTILLERY.—*The proportion of guns* to sabres and bayonets in an army corps is as nearly as possible 3 guns to the 1000 men. If the calculation is made according to the numbers given in note, the proportion would be 3·75 guns to the 1000 men. This proportion must always depend upon the nature of the service which the army is to be employed upon, the topography of the theatre of war, and the quality of the troops ; the better they are the smaller the number of the guns required. An army that is intended more for the occupation of strong positions and to act generally on the defensive, should have a larger proportion of guns than an army intended for offensive operations in the field. Too many guns are a heavy burden, they hamper all rapid movements, and withdraw a large number of fighting men from the force for their protection. Armies like that of the U.S. during the Confederate war, which have an immense artillery to make up for the inferiority of their infy., lose whole batteries at every period of a campaign. The question of siege trains is not considered here ; the nature of the service upon which the army is to be employed, and the number of fortified places in the theatre of war, must determine their necessity, and also their composition, &c. Modern inventions have so improved the precision of fire, the range and the mobility of artillery, that there is an outcry at present to increase the number of guns per 1000 sabres and bayonets. This cry is made chiefly by men whose only knowledge of guns is from seeing them fired at a target, or with blank cartridge at a review, where the precision of aim in the first instance and the terrific noise in the latter have sent those gentlemen home with the notion, that "one cannot have too many guns." For the real damage done by artillery, see article on that head farther on. An inordinate number of guns with any force is most embarrassing, for any guns that cannot be brought into action are an encumbrance, they block up the roads, and hamper every movement ; at present, under ordinary circumstances, I believe 3·75 guns per 1000 fighting men to be about the maximum proportion that can be taken in the field with advantage at the beginning of a campaign, when the regts. of cavly. and infy. are up to their full establishments.

ENGINEERS.—One company is attached to each divn., of which it is to form an integral part whilst the army is in the field. When a siege is determined upon, it may be deemed necessary to collect all or several of the companies together. The proportion of R.E. to sabres and bayonets has usually been counted as 1 to 30. This proportion was laid down before

the duties in connection with the maintenance of railways and working of telegraphs were included in R.E. duties. In the Franco-German war the engineers were nearly 1 to 28 sabres and bayonets in the 2nd army. The proportion of pontoon equipment with an army must depend upon the number and size of the rivers in the theatre of war. The quantity of telegraph wire required with an army in the field will depend upon the extent to which lines of telegraph exist in the country to be operated in.

THE ORGANIZATION OF ARMIES FOR SMALL WARS.

Great political changes must take place before England will ever again send a large army into the field. When such a necessity overtakes us, the army employed will be organised in Army Corps constituted as described in this book. The scattered nature of our distant provinces will, however, from time to time force small wars and difficult military expeditions upon us. For the organisation of large armies to operate in Europe against armies similarly armed and trained, fixed regulations exist in all countries; but any such regulations are impossible for small armies intended for use against barbarous people or nations who are differently armed and organized from the armies of Europe, and who inhabit distant lands, unprovided not only with railways but even ordinary roads, and whose climate is oftentimes trying if not dangerous to Englishmen. Each of our little wars requires special arrangements for its conduct, and a specially organized force to bring it to a successful termination. All our disasters from time immemorial have, in the first instance, had their origin in the fact that those good people who planned the operation and who organized the little army intended to carry it out, belonged to what may be called the barrack-yard type of General. Now I would above all things wish to impress on the rising race of General and Staff-Officers, in the fewest possible words, the absolute necessity, in all small wars, of suiting not only our tactics, but, in the first instance, the organization of the force to be employed to the nature of the work to be done and of the enemy to be encountered. With us, it is always accepted as an axiom for these small wars that the total number on our side is to be from say one-tenth to one-third of the strength of the enemy's troops. This proportion must of course vary with the fighting value of the enemy man for man. The nature of his arms, his skill in using them, and his courage as a soldier must be all duly and seriously considered; what constitutes his strength? is it his warlike character, the nature of his country, his great numbers, &c. &c. Having, after a mature deliberation on this point, arrived at the conclusion that when you meet him face to face with all his available forces you must have say 3,000 or 6,000 fighting men, your next consideration is, what number of soldiers will you require to guard your base, your depôts of stores and food, and to protect and keep open your L. of C. Of course there may be cases, such as in that of the Red River expedition, where you resolve

upon cutting yourself adrift from your base, carrying with you from the start everything you require. Instances of this sort will be rare. As a rule, you will require troops to protect your L. of C., and their amount must be duly calculated beforehand, the length of the line, the character of the country it passes through, the disposition of the inhabitants, and the enemy's usual strategy and mode of fighting will be the chief factors in this calculation. There remains to be considered the number and organization of your administrative services, including transport, that most difficult of subjects. If the climate is unhealthy, your medical arrangements and organization will be most important. It will be for the General to whom the nation entrusts the duty of planning the operations to be undertaken, to lay down the number of sick and wounded to be provided for. In doing so he will naturally avail himself of the best medical opinions to be had regarding the climate and the prevailing diseases, but he must be on his guard against allowing an over cautious P. M. O. to convert the operating force into a train of stretcher carriers, and the amount of transport which can be obtained, or fed or made use of, into an ambulance establishment. Every practicable precaution must be taken and every probable contingency provided for, but, in doing so, the "practicable" must never be lost sight of, nor must the object of the expedition be made subsidiary to departmental fancies. Iced champagne in the middle of the desert would be without doubt an admirable medicine, and I have known M. O's. propose impossibilities of that kind, but if you attempted to provide for your sick and wounded during a desert campaign as you would do for a war in Europe, you would render your proposed expedition an impossibility. All these are points that have had to be calculated very carefully upon many occasions during the last 25 years. My own experience leads me to advise thus: listen most attentively to all the experts have to tell you, and then use your own military experience and the knowledge you have obtained from the history of other, and as far as possible, similar undertakings, and come to a compromise between what is desirable and what is practicable. Beware of theorists and of the ordinary unintelligent traveller who is entirely devoid of military ideas. I can safely say that had I listened to the "Gentleman who knows the country well," no military enterprise that I have had in my time, either to plan or to carry out myself, could ever have succeeded. The most dangerous man to listen to is the theorist who writes books on war, but who has had no practical experience, and who in fact is a soldier only over a paper country. Having fixed upon the manner in which your little army is to be fed, the nature and amount of the ration to be given to man and beast, the extent to which you mean to provide carriage for sick and wounded, the supply and quantity of ammunition per man and gun; in fact having decided all points bearing upon administration, you then come to the most important one, namely the composition and organization of your 3,000 or 6,000 men. One axiom is

unvarying and undeniable, don't attempt to make use of second-rate soldiers in small wars: you will have to fight against large odds, and generally to undergo far more privations in small military enterprises than in great wars: you require therefore the bravest and strongest men in your nation. Man for man, the Afridee, the Beduin Arab, the Zulu, and the Maori is braver than many of the men in every Regt. in every Army. To pit the ordinary Tommy Atkins, reared in Whitechapel, against the hillside savage warrior who has wielded arms since childhood and looked upon war as a natural condition of man, is not only the worst of folly, but it is cruel to the man concerned and it is criminal to the nation.

The smaller your number, the greater the necessity to pick and choose. Indeed, with a very small expedition, I do not see why you should not have as its back bone a small corps exclusively composed of young officers. Our officers cost us nothing. There is always a crowd of gentlemen trying to enter the army, so the nation could afford to lose them, and I wonder what on earth it is in the way of a military enterprise that a battn. of Infy. or mounted Infy. composed of English gentlemen could not accomplish! If old-fashioned prejudice and respect for precedents and the love of working in old grooves prevented any such reasonable proposal from being listened to, I would still impress most seriously upon my readers the utter folly of detailing whole units of cavly. regts. or of Infy. battn. for small wars. In the first place the fighting line of our home army, as is the case with all the great European armies, is in the Reserve, which is not intended to be called out for small operations of the nature now discussed; consequently our home Battalions cannot be looked upon as thoroughly efficent for active service uutil their Army Reserve men have joined them; until then, the Guards excepted, they must necessarily be largely composed of recruits and immature youths. Then again as the Os. C. our Regts. obtain their positions by living long enough and not by selection, the chances are that many of those in command of the Regts. 1st on the rolster for foreign service would be at best only fairly indifferent leaders. But in small wars we *must* have the best men as leaders. One does not employ the oldest London surgeon to perform some difficult operation, nor do we look for men to sit on the bench as judges amongst those whose names have been longest enrolled as barristers in the Temple. My advice is, select all ranks most carefully for these little wars; call for 50, 80, or 100 volunteers from sufficient number of Regts. until you have your required number, selecting as Troop or Company Offrs. the best men from each of these Regts., and as C. Os. the very best men of the required rank in the army. With a battn. of 1,000 men so selected you can afford to say "Come on," to your most warlike or most savage enemy. This course will save the nation great sums of money, for it will enable the war to be pushed through rapidly and with far smaller means and smaller numbers. You will neither have anything like the same propor-

tion of sick, nor will you have as many killed or wounded for the numbers engaged will be fewer. To send a weakly man on active service is cruel to the individual, retards operations, renders them more difficult, requires larger hospital and medical establishments, and the result is, if not actual failure, at least decreased efficiency and greatly increased cost. The regimental spirit with which a battn. composed of ten companies each drawn from a different Regt. will be imbued will render it irresistible ; it will be the highest development of a feeling so extensively written about, but so little understood by civilians. To wind up this part of the subject, let me say, do not be contented with any but the best offrs. and the best soldiers for these little wars, and if some old Adjutant General Pipeclay refuses to let you have them, be assured the English people will support you, their sound common sense will be too powerful even for the opposition of poor Lt. General Sir Regulation Routine.

Circumstances must dictate the composition of your force ; for example in a desert where water is very scarce, and no food of any kind to be had for horses, you can have few if any cavalry or men mounted on horses. The country may be of a nature where the use of R.A. would be next to impossible ; the theatre of operations may be such that no possible advantage could be secured by taking Engineers with you, and so on. In other instances it may be the very reverse, and infantry may be the least useful arm. You must be ruthless in settling this point, for besides the old pedants who will denounce as monstrous the idea that any fighting expedition should not have the regulated proportions of all arms, you will have letters in the newspapers from indignant artillerymen saying you are a fool because you have not appointed a C.R.A. or employed any artillery, aye, and more, if you only employ field batteries, the gallant H.A. will denounce you as a stuck up fellow who knows nothing of their trade, and who is especially prejudiced against his own particular branch. In the same way the other arms of the service if omitted or not employed in their usual proportions will all bring pressure to bear upon you which silly outsiders will always be found to support.

I need scarcely warn you to give no heed to the pessimists or prophets, or to those whose balloons or patent pontoons or homœopathic rations you have rejected. They will pronounce your plan of operations as opposed to all military experience, and will warn the public in the most influential newspapers that you are either a madman or a self-opinionated fool leading or sending men to certain disaster.

Boat expeditions.—Transport is always a most difficult question in all military operations. Unless a railway exists, you have to maintain the roads along your L. of C. in good order and to feed thousands of animals constantly employed in carrying forward to the fighting army the provisions and various stores it requires. A navigable river relieves you of most of

your worst difficulties. I may say with confidence that the Red River Rebellion of 1870 could not have been put down except by a boat expedition and that no army could have penetrated as far as we did in 1884–1885 into a hostile Soudan except by the Nile route. The gentlemen and ladies who talked of moving an army from Suakim to Khartoum, with Berber and the whole intervening deserts in the enemy's hands, were wild visionaries and theorists in the military art with little practical knowledge of war. Jomini never had an independent command in war. All English offrs. should closely study the details connected with the Nile expedition of 1884–1885. Those details were based upon the experience we had gained in our advance upon Fort Glearry in 1870.

The boats for the Nile were built expressly, but in a great hurry. They measured as follows: L. 30′ and 32′: B. 6′, 6″: and D. 32″ interior measurement: their average wt. was 1,000 lbs. Their equipment and the 150 days' supplies that each carried for its crew of 12 men is described below.

Stern Wheel Steamers.—As a guide for the construction of steamers to carry cargo and to tow on any shallow rivers used as a L. of C., I give the dimensions of the Stern Wheelers we had made at home and put together at Cairo. L. over all 92′: L. of hull 80′: Beam 20′: D., amidships, 51″: Light Draft, 15″: Load Draft, 22″: Horse Pr. 50: Carrying Tonnage, 25 to 40 tons: Towing Power 20 tons: Speed 8 and 9 Knots: Coal consumed per hour, 4 cwt. They were sent out in 4 pontoons and pieces not exceeding 4·5 tons each. Skin of steel $\frac{1}{10}$th in. thick: built in 20 watertight compartments: compound engines, surface condensing. Bottom flat: 3 rudders: spoon bow: each cost £7,500.

List of Boat Equipment, Nile Expedition.

Every boat carries—

2 Masts.
2 Sails and Yards.
12 Oars.
2 Boat-hooks.
6 Pushing Poles.
2 Grapnels, 6 fathoms rope.
12 Rowlocks.
3 Hardwood Rollers.
5 Spare Planks, besides usual Foot-boards.
2 Spare Knees.
1 Awning.
2 Awning-poles.
1 Rudder and Yoke-lines.
1 Towing Rope, 120 fathoms.
1 Coil of Cordage, 50 fathoms.
1 Snatch Block.
1 Leading Block.
1 Bell Tent.
3 Bags, Waterproof, Blankets.
1 Bag, Waterproof, Accoutrements.
6 Boxes Ammunition.
2 Axes, Felling.
1 Axe, Pick.
1 Balance, Spring, with Pan.
3 Buckets, Leather.
3 Canisters, Tin.
12 Cups, Tin.
12 Plates, Tin.
1 Dish, Baking.

1 Dredger, Pepper.
1 Fork, Flesh.
12 Forks.
12 Knives.
12 Spoons.
2 Knives, Butchers'.
2 Tin Openers.
2 Kettles, Camp.
1 Ladle, Soup.
1 Lamp, in box.
2 Gallons Colza Oil
2 Mops.
1 Pail, Iron.
1 Pan, Frying.
1 Portable Stove.
2 Spades.
2 Shovels.
6 Sacks (with Strings).

One boat in Six carries—

1 Coil of Cord.
10 lb. Pitch.

One boat in Eight carries—

1 Tool chest.
1 Adze.
1 Auger.
1 Axe.
4 Bradawls.
4 Chisels.
2 Screwdrivers.
2 Files.
3 Gimlets.
2 Hammers, Claw.
1 Hatchet.
3 Knives.
1 Mallet.
8 Needles.
7 Palms, Sailmakers'.
2 Pincers.
1 Jack Plane.
1 Punch.
1 Rule, 2 feet.
1 Saw.
1 Scissors.

1 Sponge.
6 Slings, Webbing.
2 Canvas, Slings.
1 Sheet, Lead, 2 ft. by 2 ft.
4 lb. Pitch.
32 lb. Paint, in tins.
1 Paint Brush.
4½ yds. thick Canvas.
3½ yds. Sail Canvas.
1 coil Spunyarn.
1 Filter.
1 tin reserve Charcoal for do.
1 lb. Tow.
1 Hammer.
1 bag Nails.
Corks.
Sandpaper.
Hooks and Lines, Fishing.

6 Axe Handles.

1 Saw Set.
2 Stones, Sharpening.
1 Tape, Measuring.
2 Brushes, Paint.
1 Axe, Felling.
5 Shoes, Pushing-poles.
6 lb. Copper Nails.
4 lb. Iron Nails.
4 gross Brass Screws.
10 Sheets Tin.
2 lb. Marline.
1 Marline Spike.
5 lb. Twine and Sail Thread.
1½ gallons Oil.
25 lb. Lead, White.
2 lb. Paint, White.
½ lb. Beeswax.
6 Axe Handles
10 lb. Tow.
4 bottles Oil (tin)

One boat in Twenty carries—

1 Grindstone, complete.
1 Luff Tackle.
30 lb. Iron Nails

Fifteen Boatmen divide between them—

2 Cans, Soup.
1 Dredger, tin.
15 Forks.
1 Fork, Flesh.
3 Kettles, Camp.
2 Kettles, tin.
2 Knives, Butchers'.
15 Knives.
1 Ladle, Soup.
15 Plates.
15 Tin Pots.
15 Spoons.
Spare Lines, Hooks, and Fishing Nets.

Nile Boats.—The native boats are the *Nugger* and the *Diahbiyeh.* The nugger is the great cargo boat used chiefly above the 2nd cataract in the management of which the Dongolese are very expert. The largest size is about L. 53′ : B. 23′ : H. (between decks) 5′, 8″ : The commonest size of the large class is L. 50′ : B. 16′ : and H. (between decks) 4′, 6″ : it is steered by a very large rudder. The mast is generally about 40′ to 45′ above deck and is almost in centre of boat, carrying one large lateen sail having a yard above and a boom below. The sail is lashed to the boom and is taken in as required by the simple process of rolling up the sail by turning the boom round. The ordinary nugger carries about 20 tons stowed mostly forward. She is roughly decked forward and aft, a small undecked well being left round the mast. The *Diahbiyeh* is a 2-master boat with a high cabin astern built on deck for the convenience of passengers. It is chiefly used below the 1st cataract, but never above the 2nd. Its average length is about 100′ with a beam of 15′ and a depth of hold of 4′, and a drought of water of 30″. We used them largely for carrying rail and grain below the 2nd cataract.

Sea Transport.—Under existing regulations, the transport of troops by sea is entirely subject to Admiralty control, a system which most soldiers who have had experience in war think a very bad one. When conveyance by ship is required for men or stores, application is made for it by the S.O. of the District or Divn., &c., to the S.N.O. on the spot, specifying the exact numbers, with their several ranks, and the quantity of baggage to be conveyed. It rests with him to decide whether he can provide conveyance in any of H.M.'s ships at his disposal, or whether he must hire merchant vessels. If the latter course is decided on, tenders of vessels are advertised for. All ships that are offered should be invariably inspected, previous to being taken up, by a S.O. and a naval offr., for the purpose of ascertaining if their general character fits them for the conveyance of men and horses. It is the especial duty of the former to see that they are generally calculated to accommodate troops with comfort ; that they are well ventilated or capable of being made

CALCULATED FOR 12 MEN IN A BOAT, AND TO LAST 100 DAYS.

Net total for each boat.	Article.	Packed in: No. of cases.	Packed in: Contents of each.	Proposed daily issue.*
799 lb.	Preserved corned meat ..	1	60 lb. ..	1 lb. 4 days out of 6.
		10	54 ,, ..	
192 ,, ...	Preserved fresh meat ..	4	49 11/16 lb. ..	
		4	48 lb. .. average	1 lb. 1 day out of 6.
168 ,, ...	Bacon †	4	42 lb. ..	,, ,,
48 ,, ...	Boiled mutton †	1	48 ,, ..	
66 ,, ...	Cheese	4	2 cheeses, 16½ lb. ..	¾ oz.
770 ,, ...	Biscuit, Navy	22	35 lb. ..	1 lb. days out of 6.
240 ,, ...	,, Cabin	8	30 ,, ..	
200 ,, ...	Flour	2	60 ,, ..	1 lb. 1 day out of 6.
		2	40 ,, ..	
52 half-pt. bott.	Pickles	2	26 bottles	½ oz. 4 days out of 6.
17 tins	Jam	1	17 tins ..	1⅓ oz. 2 days out of 6.
17 ,, ...	Marmalade		17 ,, ..	
80 lb.	Tea	2	40 lb. ..	1 oz.
240 ,, ...	Sugar	4 bags	60 ,, ..	3 ,,
19 ,, ...	Salt	1 bag	19 ,, ..	¼ ,,
80 ,, ...	Preserved vegetables	1	48 ,, ..	1 oz.
		1	32 ,, ..	
7½ gallons ..	Lime juice	3	5 bottles	1/320 gallon.
		1	4 ,,	
432 rations ..	Erbswurst	2	216 rations	1 ration every 3rd day.
40 lb.	Cocoa and milk	1	40 lb. ..	Extra for occas. use.
1⅞ gallons ..	Vinegar	1	5 bottles	1/1280 gallon.
40 lb.	Rice	2	20 lb. ..	½ oz.
40 ,, ...	Oatmeal		20 ,, ..	½ ,,
10 ,, ...	Baking powder		5 ,, ..	,,
2 ,, ...	Pepper		1 ,, ..	1/36 oz.
40 ,, ...	Tobacco	1	40 ,, ..	On paymt. 1s. 4d. lb.
27 ,, ...	Soap (common)	1	27 ,, ..	On paymt. ½d. a piece.
9 ,, ...	,, (carbolic)	1	9 ,, ..	On paymt. 1d. a piece.
192 boxes ..	Matches	1	192 boxes	..
	Field hospital supply case‡	1	Sundry ..	..
		88		

* The column for the daily issues shows the data upon which the supplies of each article have been calculated, but, provided the total ration is not exceeded, the various articles may be issued in such proportion as may be considered advisable by the Officer Commanding.

† If the supply of bacon is sufficient, 5 cases containing about 200 lb. will be sent in each boat. In that event the supply of boiled mutton will be omitted.

‡ Containing—
- 3 bottles brandy.
- bottles port wine.
- 12 4-oz. tins Liebig's extractum carnias.
- b. mustart (in tin).
- 1 lb. yellow soap (in tin).
- 1 lb. candles (in tin).
- 1 tin alum.
- 2 lb. arrowroot.
- ¼ lb. salt (in turned box).
- 4 tins condensed milk.
- 6 tins cocoa and milk.
- 2 boxes safety matches.
- ½ lb. compressed tea.
- 1 corkscrew.
- 1 opening knife.
- 1 bottle permanganate.

so (troops must not as a rule be berthed on a deck unprovided with side scuttles); that they are not infected with vermin; that no bad smells exist which cannot be easily remedied; and that the height between decks from deck to beam is at least 6′ for men. The greater the height the better but when it exceeds 7′ it becomes necessary, in order to sling the hammocks so that the men can get in and out of them conveniently, to "*block down*," the height to be 78″. For horses, the ships with the greatest height between decks should be selected, and as a rule that height should not be less than 7′. When, however, an army corps or other large body has to be embarked, it may not be possible to obtain a sufficient number of ships so high between decks. The "Himalaya," which has been a most successful horse-ship for the last 27 years, has only a height of 8′ between decks. If horses are to be carried in the hold, the height from ceiling to beam must not be less than 12′. Vessels with less than 30′ beam are not suited for the conveyance of horses. For the conveyance of elephants the beam should be at least 2′ or 3′ more. The hatchways for horses must be at least 10′ × 10′; 12′ × 10′ is better. There should be the least possible amount of deck hamper, so that the troops may have ample deck room. Steamers are always preferable to sailing vessels, as they make much shorter voyages, which is a consideration of the first moment in the conveyance of horses, mules, &c. The larger the steamer, the better she is adapted for transport purposes. It may be assumed that in future, troops intended for active operations will only be embarked in large 1st-class steamers for long voyages; they are more economical, comfortable and healthy, and enable complete units to be embarked more satisfactorily than small ships (many small vessels have no side scuttles); they have a higher speed than small vessels, thus shortening the voyage, and reducing the chances of being captured by an enemy. The space occupied by the flotilla, whether at sea or at anchor, is smaller, rendering its protection and direction a more easy naval matter; they have a *pro tanto* greater capacity for the accommodation of troops and animals, and for the stowage of military material, stores and coal, and the strain upon the floating factories (which must invariably accompany a large fleet of steam transports) for the repair of machinery, &c. is much less. Small ships should never be used for horses, but in calm seasons, and especially for short voyages, they can be conveniently carried in large sailing ships towed by powerful steamers.

Embarkation of stores and provisions.—The absolute rule should be that those articles which will be required first on disembarkation, should be embarked last. It is because this self-evident rule is so frequently violated that there is often so much discomfort to the troops and so much general confusion when troops are landed in any large numbers for active operations in distant countries.

Hospital Ships must have 2 regular decks below the upper deck, e

provided with ports or scuttles. The main deck must not be less than 7′, and the lower deck not less than 6′ from deck to beam. The main deck should be quite clear fore and aft, and have a large entry port each side abreast mainmast: also stern ports and a large bowport on each side. The ship should be painted white outside.

Tonnage required.—In the movement by sea of large organised units, such as a Divn. or an Army Corps, the amount of net T. required may be roughly calculated thus:—

1st. For very short voyages, such as crossing the English or the Irish Channels, 1½ tons net per man and 2½ tons net per horse.

2nd. For voyages not exceeding a week, 2 tons net per man and 6 tons net per horse.

3rd. For long voyages to any part of the world 2½ tons net per man, and 7 tons net per horse. These estimates include space for 1 month's forage and provisions for voyages under a week, and for 3 months for long voyages over a week in duration, and in both cases for the 1st line of transport complete. In calculating for a number of vessels for long voyages, it may in some instances be advisable to add 10 p.-c. extra for loss of space which the unsuitableness in construction of some steamers will entail. When a large amount of transport vehicles and animals are embarked, it may be necessary to add a small percentage, but the estimates given above will provide ample accommodation for all the guns, waggons, horses, stores, &c., constituting the Army Corps or Divn. when at war strength, together with the above specified proportion of forage and provisions for all embarked. When very large bodies of troops have to be embarked for long voyages, the gross T. required may be roughly calculated at 10 tons per horse and 4 tons per man, this result to include all stores, guns, provisions, 1st line of regtl. transport, &c., as in the previous calculation.

Net and Gross Tonnage.—To reduce gross to net, for H.M.'s troopships multiply gross by ·6, and for merchant steamers multiply it by ·65; to raise net to gross for H.M.'s troopships add 66 p.-c. to net, and for merchant steamers add 53 p.-c to it; the results will be roughly accurate.

The force sent from India to Cyprus in 1878 consisted of 471 Europeans of all ranks, 5631 native offrs. and sepoys, 2539 followers, 1336 horses, 96 ponies, 43 bullocks, and 12 guns. It was conveyed in 28 hired ships (having a net T. of 37,946 tons), of which 12 were steamers and 16 were sailing vessels (the latter were towed by steamers); the net tonnage of the steamers was 17,581, and of the sailing ships, 20,365 tons. Calculating for the conveyance of this force at the rate of 2½ tons per fighting man, 2 tons per follower and 7 tons per horse, pony and bullock, the total net T. required would be 33,520 tons. A large quantity of stores and of special provisions for natives were taken in these ships. In 1879 the force sent to South Africa was 8136 of all ranks with 1851 horses and 238 waggons; it was

conveyed in 18 steamers, the gross and net T. of which was 55,131 and 35,404 tons. The amount of T. required upon the scale of 2½ tons per man and 7 tons per horse for such a force would be 33,297 tons (net), no allowance being made for the 238 waggons. The average size of the 36 steamers employed was 1979 tons net each, that of the 44 steamers carrying troops to Egypt in 1882 was 3199 tons gross and 2168 tons net each ship. When troops were despatched to the Transvaal in 1880–81, 7374 men of all ranks, 2297 horses, 145 mules, 12 guns and 80 waggons were embarked in 19 hired steamers with a total net T. of 38,175 tons. Without making any allowance for the guns or waggons, at 2½ tons per man and 7 tons per horse, the amount of T. required would be 35,459 tons for those number of men and horses. At the same time 5165 of all ranks, and 22 horses were em-

Military Units.	1st Supposition.		2nd Supposition.		3rd Supposition.	
	Net tonnage required.	Probable number of ships.	Net tonnage required.	Probable number of ships.	Net tonnage required.	Probable number of ships.
Battn. of Infy. 1097 of all ranks, 55 horses, 4 carts and 8 waggons . .	1800	1	2500	2	3000	2
Regt. of Cavly., 653 of all ranks, 615 horses, 1 cart, and 9 waggons . .	2500	2	5000	4	6000	5
Battery of R.H.A. 182 of all ranks, 185 horses, 6 guns and limbers, and 10 waggons.	720	1	1500	2	1800	2
1 Fd. Compy. R.E. and Fd. Park, 236 of all ranks, 95 horses, & 15 wagns.	650	1	1050	1	1300	1
1 Pontoon troop, R.E., 339 all ranks, 244 horses, and 31 waggons. . .	1300	1	2450	2	3000	2
1 Telegraph troop, R.E., 315 all ranks, 202 horses, and 24 waggons	1100	1	2000	2	2400	2
1 Transport Compy. A.S.C., 146 all ranks, 97 horses	500	1	850	1	1100	1
A divn. 10,155 of all ranks, 2450 horses, 18 guns, 65 carts, and 224 waggons	21,000	17	35,000	26	42,000	30
An Army Corps. 36,035 of all ranks, 12,939, horses, 90 guns. 280 carts, and 1153 waggons.	87,000	74	150,000	110	180,000	135

barked in 5 of H.M. troopships, with an aggregate net T. of 12,156 tons; calculated for as above those numbers would require 13,066 tons; or if those mbarked in both classes of vessels be added together (12,539 of all ranks and 464 horses and mules), they would at the same rate require 48,595 tons (net), whilst the 24 ships in which they were actually embarked had an aggregate et T. of 50,331 tons. In all these instances, however, it must be remembered hat the troops did not take their regtl. transport with them, although a ertain amount of G. S. waggons, &c., were embarked.

For the Egyptian war of 1882, 44 steamships were hired for the conveyance of troops, besides a great number of others for stores, hospital urposes, &c., &c. The tonnage of those 44 ships was 140,747 gross, and 5,382 net. They carried men, guns, horses and mules, and transport arts and waggons (not regimental).

The foregoing table gives a fair estimate of the freight required for our everal military units under each of the 3 suppositions given (see opposite age). These figures give roughly the actual T. required for the several units, omplete with their stores, arms, ammunition and regtl. transport (1st line), ut make no provision for ships fitted specially as hospitals, factories, &c., c., nor for ships required for extra milty. stores, nor for food beyond rovisions and forage for 1 month for voyages not exceeding a week, and r 3 months for long voyages. They include ordinary hospital accom. odation on board of each transport, except in the calculations given under e 1st supposition. The Divnl. Staff are placed together in a suitable eamer carrying part of the Divn. In the T. given for an Army Corps, lowance is made for a suitable steamer for the exclusive conveyance of e G.O.C. and his staff, horses, and the carts and animals required for the nveyance of their baggage, &c.

H.M.'s troopships would carry the following numbers of men and orses :—

Names of Troopships.	1st Supposition.		2nd Supposition.		3rd Supposition.	
	Men.	Horses.	Men.	Horses.	Men.	Horses.
erapis, Orontes, Crocodile, Malabar, Himalaya, Euphrates, and Jumna	2194	20	1097	58	1097	58
amar	1097	10	1097	10	1097	10
imoon	800	10	600	10	600	10
ssistance	800 or 160	8 or 138	800 or 160	8 or 138	800 or 160	8 or 138

Under the 1st supposition, permanent fittings, such as mess-tables, stools and hammock fittings are not necessary, as the men can use their own canteens, camp kettles, knives, &c., but sufficient cooking space and meat dishes are indispensable. The fittings required for horses need not be so elaborate under the 1st supposition as those required for long voyages.

For calculating the amount of space required for provisions, see page 96.

In converting the regulated weight of baggage into cub. ft., 100 are allowed for each ton, but the common marine ton is only 40 cub. ft.

Boats.—If the troops embarked are to be landed in an enemy's country it is most necessary that each transport should carry a sufficient number of boats so that there may be thrown on shore at one time all the infy. (without their regimental transport) all the divnl. Artillery, with 2 waggons per battery, one charger for all mounted offrs. of Infy., and 2 chargers for all general and combatant S.Os., together with at least the divnl. Cavly., if not the whole of the cavly., but without its transport.

If the disembarkation has to be effected on an open beach with a dangerous surf, special surf boats must be provided, such as those used in 1873-74 on the Gold Coast. The adoption into our transport service of collapsible boats enables the boat accommodation possessed by each ship to be very largely increased—for calm weather—without adding inconveniently to the stores to be carried on deck.

In all hired transports there must be the following boats, all being hung at davits and fitted with approved lowering and disengaging gear:—

Ships, tons.	Boats.			Aggregate Cubic Contents.
	Life.	Ordinary.	Total.	
				Cubic feet.
Over 3000	4	6	10	3800
3000 to 2000	4	4	8	3200
2000 to 1000	2	5	7	2000
1000 and under	2	4	6	1500

The life boats for the 3 first classes of ships must be 28′ × 8½′ with a depth of 3½′; for the last class they may be 2′ shorter. Each boat to be complete with masts, sails, oars (2 spare oars in each), 3 boat-hooks, rudder, tiller, 1½ sets of crutches or thole pins, 2 two-gallon barricoes, bucket and bailer, and a good painter at least 18 ft. long. Each lifeboat is to carry in addition a good sharp axe or tomahawk in case, and a life jacket or belt for each of the crew. The watertight compartments must contain at least 1½ cub. ft. for each 10 cub. ft. of the boat's capacity.

In the class of steamers usually hired as transports, there are generally in all ships over 2500 tons measurement, 10 boats capable of carrying 350 fully equipped infy., and in vessels between that size and 1200 tons, 8 boats that could carry from 150 to 200. In the Indian troopships, the boats can carry over 500, and all others of H.M.'s troopships named on previous page can carry 400.

The regulation capacity of a boat is determined by multiplying together the extreme L., B., & D. (if fitted with rowlocks the depth to be measured from the bottom of the rowlocks), multiplying the product by ·6, which gives the capacity in cub. ft. The capacity in cub. ft. divided by 10 gives the number of men each boat will hold.

Horse boats.—Those made in 1878 for use on the open beach at Cyprus, answered well; each carried 10 horses, or 2 fd. guns with their limbers; they were fitted with fall-down sterns, which served as broughs. They measured, L., 35½′, and, B., 10½′. Each transport carrying troops to be disembarked in open boats should carry 1, 2 or 3, according to its capacity; but there should be at least 40 in all, with the ships carrying each Infy. Divn., and 20 with those carrying the Cavly. Brigd.; with the ships carrying an army corps complete, there should be at least 100.

Steam launches.—One should be carried by each transport, its size to depend upon the size of the transport, but as a rule it should be able to tow ashore all the other boats of the ship when they are laden with troops. The 1st class steamers of the great passenger lines now carry steam launches. In the embarkation or disembarkation of large bodies of troops it is essential that the C. of the S. or other S.O. entrusted with direction of the operation, should have at his exclusive disposal a steam launch or despatch vessel, and it is most desirable that the G.O.C. each divn. should also have a similar boat at his exclusive disposal.

Numbering of transports.—Each ship should have a number, which should be painted in black figures 3 ft. long on a white ground on each bow and quarter, and should have similarly painted on each broadside, the Regt. or the department, &c., she carries. It is a good plan to have the numbers of all ships carrying mounted corps painted in red to distinguish them, ships carrying only provisions and stores to have their numbers in white figures, and the ships carrying each of the 3 Divns. of an army corps to be distinguished by carrying a flag at the fore, main or mizen.

Provisions, bedding (*for the men only*), *medical comforts and forage* are almost invariably supplied from our own stores, but all fittings, mess utensils and other articles for troop use, together with all cabin fixtures (including bedding of all sorts) and equipment required for the offrs.' mess, are supplied by the owners.

THE CARRYING CAPACITY OF SHIPS can be estimated as follows:—*The number of offrs. a ship can carry* generally corresponds with the number of 1st class passengers she is fitted for. It may occasionally be necessary to add to this if there is not accommodation for the proper proportion of offrs. required for the number of men to be embarked.

Officers' cabins and messing.—The cabins must be in every way fitted, supplied and equipped as is usual in passenger steamers of the 1st class, except that offrs. must provide their own towels and napkins. The O.C., whatever his rank, will have a cabin to himself of not less size than 42 superficial ft. (exclusive of berth place), and provided with a table, chair, lock-up drawer or cupboard for papers, and a swinging lamp; a separate w.c. is also allowed him. Cabins for other offrs. must not be less than 30 superfl. ft. for 1 offr., or 42′. for 2 offrs; when more than 2 are put into a cabin, 10 additional ft. are to be allowed for each, these measurements to be exclusive of bed place, which is never to be less than 6′. by 2′. There must always be a w.c. on deck for the exclusive use of the offrs. The supply of bed linen to be sufficient to allow a change weekly. There should be a cook-house for the offrs' mess separate from that for the men. *The mess* is to consist of the usual meals, the table to be well kept, and at least equal to those provided in the best passenger ships. The number of cooks, stewards and servants to be fixed by the surveyor at not less than is usually provided in first-rate ships for a similar number of 1st class passengers.

The number of N. C. Os., Rk. and File that a ship can carry usually corresponds with the number of hammocks that can be conveniently slung between decks plus the number of staff sergts., &c., who can be accommodated in any standing berths or other existing 2nd class passenger accommodation. In emergencies, however, or for very short passages of 1 or 2 days' duration, in addition to the number that can be accommodated below, $\frac{1}{4}$ more may be embarked. The space occupied by a hammock when slung is 9′. by 16″. (sergeants are allowed a width of 18″.); but in slinging a number they overlap lengthways, so that in reality each only occupies a space of 6′×16″. To calculate the number you can sling upon any given deck, leaving out of the calculation all spaces occupied by hatches or any obstruction, the following formula can be used:—

$\frac{L-3}{6} \times \frac{B}{16} = n.$ L being the length in ft. and B the breadth in inches of the space where hammocks can be hung; if $\frac{B}{16}$ does not leave a remainder greater than 8, then 1 must be struck from the result: fractional remainders

must be struck out. The cub. space required for a man and horse on board ship may be fairly calculated at 52 and 126 cub. ft. respectively. In making all these estimates, the space required for hospital purposes must be struck out.

Hammock hooks should be $5\frac{1}{2}$" long of $\frac{5}{8}$" iron, well screwed into the beams, and with numbers painted beside them to correspond with number on tally of hammock when practicable.

To ascertain the number of horse stalls that can be constructed on any deck, you have only to divide the running length of space available by 27"., but before you determine upon the extent of that available space, you should mark off a space of 3' all round the ship's side for a passage to be kept clear behind the stalls, and of a similar width alongside all hatchways or other obstructions. When the clear width of beam between the inner sides of any deck is 36' or upwards, 3 rows of stalls can be constructed, the passage between the rows where the horses are to stand head to head being at least 6' in the clear between stanchions, and where they stand head to tail being at least 54". No horses or other animals should, as a rule, be placed near the boilers or stoke-hole ; in some vessels, owing to the thickness of the bulkheads, the wings on the main deck on each side of engine room and boilers are often the coolest parts ; heat is likely to bring on inflammation. For every 110 stalls fitted in any ship, only 100 horses, mules, &c., are to be embarked.

THE FITTINGS REQUIRED FOR TROOPS ARE:—*Mess table*, fitted with cross legs, to be 6' long by 27" wide, and fitted wlth a 9" shelf underneath ; these tables to be numbered in large figures, odd numbers on one side, even on the other side of the ship, beginning forward on main troop deck. *Benches*, fixed to tables, to be 6' by 9", and made of $1\frac{1}{4}$" wrought deal *Valise battens* to be $4\frac{1}{2}$" wide, nailed to under-side of beams. *Accoutrement hooks* to be $7\frac{1}{2}$" long, 3 for each soldier, as near his mess table as possible. *Racks for sea kit bags* to be constructed where most convenient of light fir. *Arm racks*, to hold all the rifles embarked, to be in most convenient places, where freedom from rust is best secured. *Latrines* to be built on deck at the rate of 3 p.-c. of men embarked. *Urinals*, lined with lead, to be provided on deck as required. *Seats of ease* will always be fitted in the head when practicable. *House on deck for waterproof coats and capes*, fitted with sufficient hooks to hang the coats supplied for use of troops on board. *Hammock platforms* to be built on upper deck, with stanchions and side battens of deal, and bottoms fitted with gratings to be provided with well painted canvas covers, fitted with stout stops all round 18". apart: *a slop shoot* to be fitted on each side of upper deck through a convenient port.

LAZARETTE DECK, of not less than 2". thick, to be laid on beams thrown across for that purpose, so as to be strong enough to carry the weights to be stowed on it. The following fixtures, &c., are to be con-

structed upon it: an *Issuing room*, to be of such size as may be required, never less than 6′. square, to be fitted with shelves, dresser, hooks, door, &c., as thought desirable. *Bread Room* to be constructed against the issuing room as may be required, and filled with shelves. *Magazine*, size as required, made of 2 thicknesses of ¾″. deal, crossed and nailed with copper nails, door hung on metal hinges, with brass padlock, hasp and staple. To be large enough to carry 100 rds. per rifle in ships carrying infantry going on active service, 30 rds. of which will be landed in the ammunition boxes in the S.A.A. cart, or with the regulation pack-saddle equipment if the Regtl. Reserve is to be carried on mules. *Baggage room* to be large enough to contain all the regulation baggage of those embarked. *Helmet room* of sufficient size to hold all the helmets or busbies of those embarked.

A cooking galley for the exclusive use of the troops should be provided, to be complete with fire-hearth, funnel, and double boiler, poker, shovel, rake, &c., and a hot plate; it is to be of sufficient size to cook at one time for all the troops embarked; it must be 6′. 6″. high in the clear, and when it includes the bakehouse also it should have a superficial area of 30′. for the first 100 men, with 15 superficial ft. extra for each additional 100 men. It is to be lined throughout with tin, the boilers to hold 3 pts. for every man embarked, and each boiler to have a large brass cock; it should be paved with tiles.

A bakehouse to be provided sufficient to bake enough fresh bread for issue on 4 days each week to all troops embarked. A baker is provided by the ship to bake, but one or more soldiers will be required to assist him.

Iron tanks, sufficient to hold 14 days' water for all troops on board, and, for the crew at the rate of 1¼ galls. daily per head. In mule or horse ships, the Govt. will supply all tanks required to hold the water for the animals. *Lift pumps* to be fitted at convenient spots to pump the water from the tanks to each compartment on which troops are carried; special hoses will be required for this purpose.

Distilling apparatus.—One or more to be in every ship used for long voyages, and to be carefully tested and warranted to make, in 24 hours, 1½ galls. of pure cold water for each person on board, and 10 galls. for each horse or mule. The stores required to be as directed by the Surveyor.

Prison accommodation to be provided for 2 p.-c. of troops embarked. A prison for 4 men to be 6½′ × 12½′. in the clear, to be divided by 3 moveable bulkheads into 4 cells.

Ventilation.—In addition to any special system of ventilation provided, the decks may be cut, and air-tubes and air-funnels, with large cowls, fixed as may be deemed advisable. This matter is of the first importance, and every practicable arrangement should be made beforehand to provide for it sufficiently. Good portholes or scuttles are indispensable. Windsails, of from 4′ to 6′. in circumference, according to size of ship, must be supplied

for each hatchway or scuttle, each deck carrying men or animals, having its own windsail down each hatchway leading to it. At least half must be square-headed, and fitted with yards from 4′ to 6′. long. Dr. Edmond's system of ventilation is now commonly used in all large transports.

Life buoys, from 12 to 24, according to numbers embarked, must be distributed about bridge and upper deck, and hung so as to be readily thrown overboard. Each buoy to be capable of floating 24 hours with 40 lbs. of iron attached to it.

Lightning conductors, one to each mast.

Lime and whitewash brushes to be provided as considered advisable by the Surveyor.

Accommodation ladders.—Two are all that are ordered in the Regulations, but ships for infy. ought, I think, to have 2 on each side, or even 3 when the length of the ship admits, or when a rapid disembarkation is required. Each ladder to be long enough for use when the ship is light; to be strong enough for the use of infy. crowded on it in heavy marching order, and to have a good landing platform at the bottom, fitted with 3″ man-ropes, fastened to the side stanchions. These ladders to be entirely independent of the gangway ports, where the horses and waggons (if any) are to be hoisted in and out. It is a good plan to have a Jacob's ladder on each side of poop for the sailors' exclusive use.

Step ladders, with hand rails, to be fitted to each hatchway, and secured at foot with strong cleats, steps to be hard wood, and from 20 to 36″ wide.

Awnings to be provided fore and aft, with curtains for one side.

Fire engines.—The donkey to be always fitted as a fire engine, and provided with sufficient 2½″. hose to reach the furthest end of the vessel down below. Good portable fire engines to be supplied at following rates: vessels over 3000 tons, 4; and from 3000 to 2000 tons, 3, with 18 fire buckets in both instances. From 2000 to 1000 tons, 2; and under that size, 1, with 12 fire buckets in both instances. *Fire buckets* to be either of wood or leather, and fitted with lanyards long enough to draw water from the poop when the ship is light: these buckets never to be used for washing decks.

Hatchways to troop decks to have booby hatches, also awnings that will keep out rain, and all to be fitted with gratings.

Hospital.—For long voyages a sufficient space in most suitable part of ship is to be screened off, with canvas screens made to roll up, to accommodate 5 p.-c. of men embarked, of whom 3 out of every 5 should be accommodated in standing bed places made in 2 tiers, the remainder being in swinging cots; these bed places to be well clear of the deck and sides of the ship, and to be 6′ × 27″ in the clear.

A dispensary to be built aft of the hospital bulkhead, 4′ × 8′.

ARTICLES FOR TROOP USE:—*On troop deck*, police lamps, with lock and key to be supplied as demanded by Surveyor. The number required

varies not only with the number of men, but also with number and size of decks and compartments on which they are berthed. Each compartment. requires at least 4 ; each harness room, 2 ; each latrine, 1 ; or, if over 20' long, 2 ; washing place, 1 ; or, if over 20' long, 2. Long decks, without compartments, require about 2 for every 100 men on them. Half of these lamps to be supplied with candles to burn day and night, the others with enough to burn daily for 12 hours. Hexagonal safety candle lamps, with brass padlocks for use of N.C.O., &c., 4 for each 100 men, besides one for the hospital, issuing room, troop galley, the w.c. of S. Sergts., and 2 for use on deck for the men to light their pipes at. All these to be supplied with candles to burn 12 hours daily. For each mess the following articles with 5 per cent. spare :—1 tin mess kettle of 2½ galls., with lid to form dish ; 1 pair of carving knives and forks ; 1 mustard pot to hold half a pint ; 1 pepper dredge ; 1 pickle jar to hold 4 pints ; 1 salt jar (1 pint) ; 1 oval tin dish ; 1 potatoe net to hold 12 lbs. ; 1 pudding bag ; 2 zinc tallies, stamped with number of mess and fitted with pliable wire lanyard ; 2 bass scrubbing brushes ; 1 set of 3 washing tubs of 22, 20 and 18 in. diameter respectively. For every 2 messes, 1 galvanized iron pail to hold 2 galls., with same percentage spare as before. For each soldier, with same proportion of spare, 1 tin plate, 1 tin pint pot, 1 iron spoon, and 1 wooden hammock tally, 6"×3". marked on each side in large letters with the number of the mess, and also a capital letter from A on, according to number of men in each mess, and fitted with a strong grommet of white line about 12". long ; 2 hanging airing stoves p.-c. of the numbers embarked, but not more than 12, with 6 bushels of coke for each stove ; 3 sets of *Leg iron* p.-c. of the numbers embarked, 1 iron drinking tank, with brass cock, in each compartment, sufficient to hold 2 qrts. for each person in it. Four p.-c. on the numbers embarked of the following :—bass brooms, with fixed handles ; hair brooms, with fixed handles ; combined brushes and squeegees, and white wool mops with fixed handles. For every 100 men, 2 No. 2 size shovels.

For use in wash place, three 12" iron enamelled wash-basins p.-c. on numbers embarked.

For use on deck, 4 round wooden spittoons for every 100 men.

For use in issue room, 1 set of pewter imperial measures, quart, pint, ½ pint, gill, and ½ gill ; 1 set of tin ditto, ½ gall., quart, and pint, or 2 sets if there are over 500 men embarked : 1 set of strong spring balances, to weigh 40 lbs. ; 1 pair of counter-balance scales, with weights, 4 lbs. to ¼ oz. ; 1 set of flour counter-balance scales, with weights, 4 oz. to 14 lbs. ; 6 tin scoops, with various sizes ; 2 copper pumps for porter ; 1 porter tub, to hold 20 galls. or 2, if number of men exceed 500 ; 1 cooper's hammer and driver ; 4 strong lever knives for opening preserved meat-tins, or 6 if number of men exceed 500 ; 1 claw hammer, with iron handle ; 1 meat saw (16"), or 2 if number exceed 500 men ; 1 meat cleaver, 7 lbs. with iron handle ; 2

large hand choppers, or 4 if number exceed 500 men ; and 1 hexagonal lantern.

For use in Hospital, 1 zinc bath, 5 ft. long, or 2 if numbers on board exceed 100 men ; 1 Fyffe's chair, or 2 if number exceed 250 ; 1 spitting cup, 1 urinal, and 1 bed pan, all of pewter, to every 100 men on board ; 2 toilet cans (2 galls.) per 100 men or less number, but never more than 4 ; 1 galvanized iron pail p.-c. of men, but not more than 2 ; 1 hair broom, with fixed handle ; 2 hand bass scrubbing brushes p.-c. of men, but not more than 4 ; 30 lbs. of soft soap for cleaning hospital and dispensaries for each 100 men, but not more than 120 lbs. ; 2 hexagonal safety candle lamps per 100 men, but never more than 6 ; candles for ditto, to burn 12 hours daily for all the voyage ; and 2 japanned 10″ thermometers.

For use in Dispensary, 14″ enamelled wash-basin, enamelled soap dish, japanned toilet can (8 qrts.), japanned receiver and swinging candle lamp, 1 of each. Sufficient candles to burn 12 hours daily during voyage ; 1 good filter of size ordered, 1 hair bannister brush, and 1 dust pan.

For use in galley, 1 poker, 1 shovel, 1 rake, 1 hook, 2 tormentors, 2 flesh knives, and 3 galvanized ladles to hold 1 pint, 1 qrt., and 3 pints ; 4 cook knives of assorted sizes, 2 wooden tubs to hold 40 galls. each ; 2 galvanized iron pails, 2 candle lanterns and candles, and saucepans and kettles, &c., for hospital purposes as directed by Surveyor.

For use of Baker.—15 tins for baking bread (to hold 4 lbs.) for each 100 men, and in proportion for smaller numbers ; 1 each of the following, liquor tub, wood pail, 10″ knife, hair sieve, wire sieve, dough scraper, tin strainer and bowl.

BEDDING FOR N. C. OS. AND RK. AND FILE.—It is all provided by Government. For each sergeant, 1 hammock, slung ; 1 hair bed (of not less than 7 lbs. of hair) ; 1 hair pillow (of not less than 1½ lbs. of hair), and 2 blankets ; for each soldier, 1 hammock, slung and numbered, with 2 p.-c. slung as spare, but unnumbered ; and 2 blankets, with 5 per cent. spare. These blankets are not to weigh less than 4 lbs., or to measure less than 6′ by 45″.

For hospital use, beds containing 21 lbs., and bolsters 3½ lbs. of hair for 5 p c. of men embarked ; cots, 2 p-c. ; blankets, 10 p-c., and sheets 20 p.-c. of same numbers.

FITTING A SHIP FOR HORSES.—An offr. fitting up a ship for the conveyance of a mounted corps should be most particular that the men have a compartment to themselves distinct from the horses : this is indispensable on the score of health ; doors are frequently opened out between where the men and where the horses are—this is objectionable, as the effluvia of the horses should be kept from the men in every possible way. Every horse transport should have as many stalls on deck as possible, so that horses suffering below could be moved up there for a few days to recover, which

they do quickly in the fresh air. There should be ample stowage-room for saddles and harness in a place specially enclosed for that purpose; harness should be carefully packed in vats, all the iron having been previously varnished or coated with mercurial ointment to keep it from rusting. The saddle and bridle to be put in the corn sack and placed in the room allotted specially for the purpose. There should be no water tanks on the horse decks, they are in the way, and the slightest movement near them frets the horses; they should be in the hold with one or more pumps communicating with them from each horse deck.

Loose Boxes.—When it is possible, it is advisable to have a loose box (the size of 3 talls) near a hatchway to admit of a sick horse lying down in smooth weather: if more than 150 horses are on board there should be 2 of these loose boxes. There should be a *dispensary* with fittings for the V.S., and a forage issuing room large enough to hold one day's allowance for the horses embarked, fitted with bins lined with tin for oats and bran.

Stalls for horses purchased in England should be 6′ long, from inside of padding on breast-piece, to the inside of haunch-piece, and 2′ × 2″ clear width between the padding on side bales; 10 p.-c. should, I think, be 2″ narrower; 5 p.-c. 6″ longer, and 2″ wider is allowed by regulation; spare stalls at the rate of 5 p.-c. of the horses embarked are allowed. All hatchways and their coamings through which horses are to be slung, must be provided with canvas linings, and padded, and straw must be provided for laying on the decks to receive the horses as they are slung on board. Stalls between decks of the usual size can be conveniently constructed as shown in diagram.* Fig. 1 is a longitudinal section through stall; Fig. 2 is the plan of a stall; Fig. 3 is a cross section through flooring of stall, with an enlarged section showing the interval between the planks and the manner in which their edges are bevelled off; Fig. 4 is a section showing the manner in which the side bales are tenoned into the haunch-piece; Fig. 5 is a side elevation of stanchion showing the lock-bolt, &c.; Fig. 6, an inside elevation of the same; Fig. 7 is a plan and elevation of iron plate, with rings for securing halters to; Fig. 8, a plan showing movable portion of longitudinal batten; Fig. 9, a section of the same; Fig. 10, interior elevation of breast-piece; Fig. 11, a plan of same; Fig. 12, plan of manger; Fig. 13, section through side of same showing iron work for fixing it to side or stanchion. In these figures the measurements are given in inches: the scale of 12, and 3, is 5′ to the inch; that for 4, 5, 6, 8, 9, 10, and 11 is attached

* *These details are not exactly those laid down by the Admiralty, but the dimensions of the stalls are the same. The fittings herein described are those which were fitted up by the author for the conveyance of the offr's. chargers of the 13th Hussars from Canada to England. The one great point upon which they differ from ordinary stall fittings is, that the breast-boards and haunch-pieces are within the stanchions.*

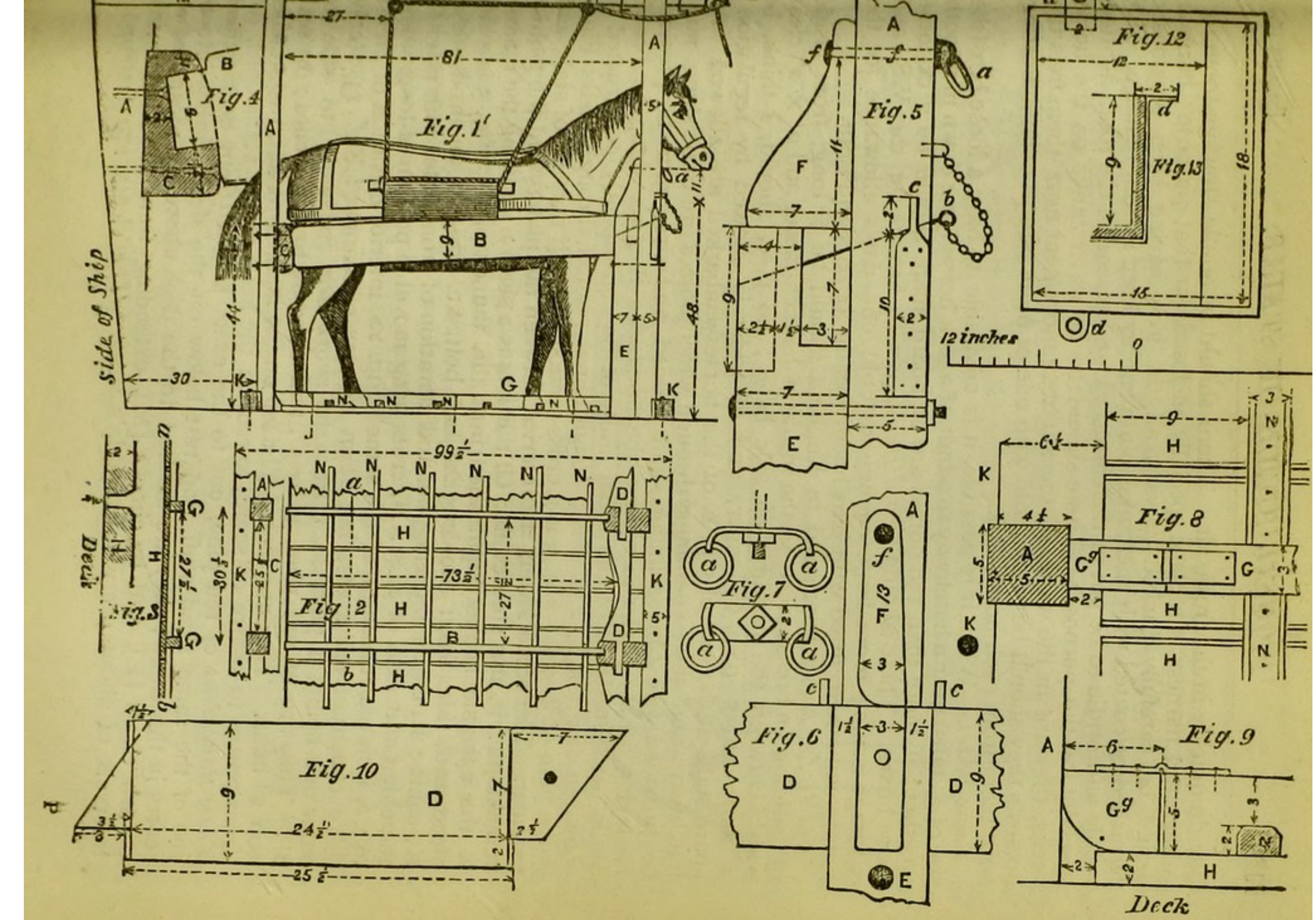


Fig. 1
Side of Ship
Fig. 2
Deck
Fig. 3
Fig. 4
Fig. 5
Fig. 6
Fig. 7
Fig. 8
Fig. 9
Fig. 10
Fig. 12
Fig. 13
12 inches
Deck

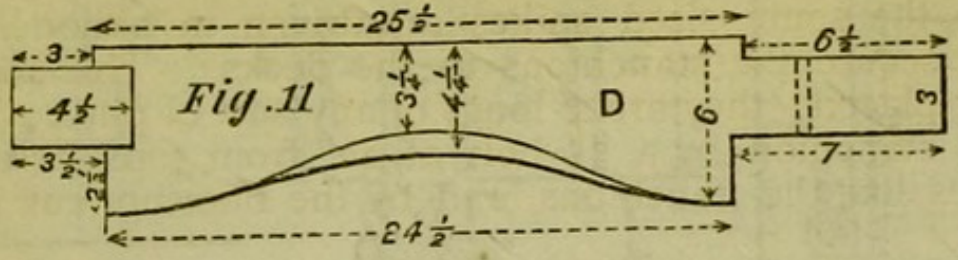


Fig. 11

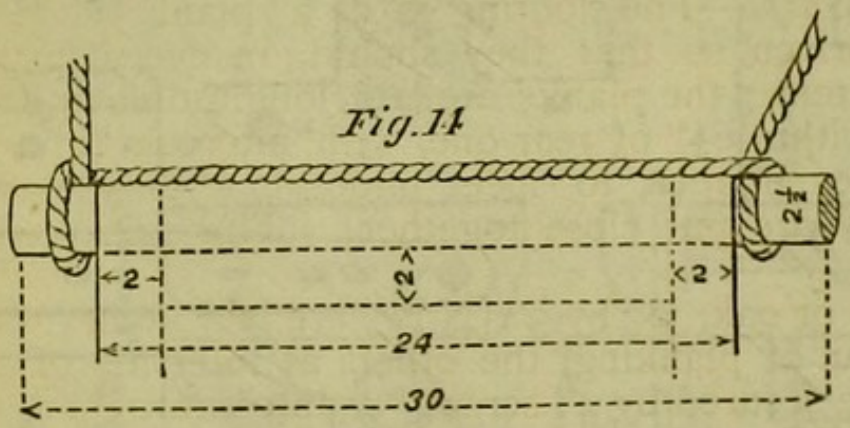


Fig. 14

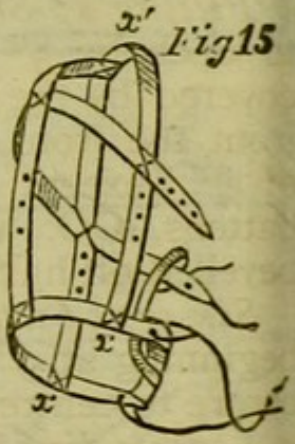


Fig 15

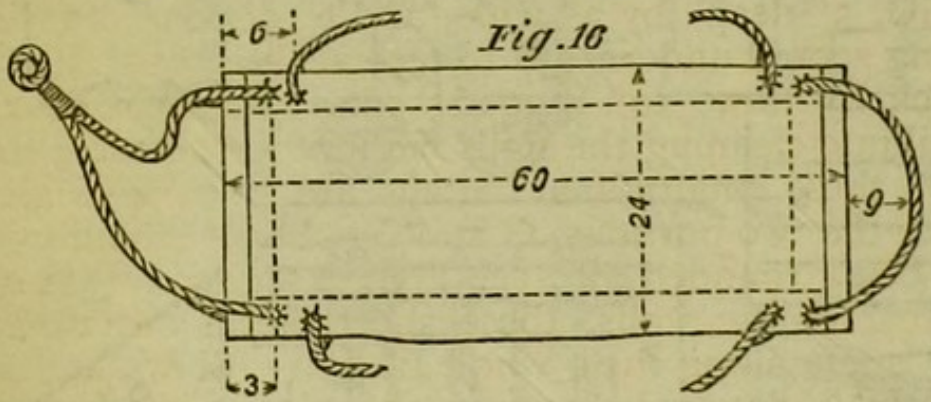


Fig. 16

to them. The same letters are carried through all the figures, A being the stanchions: B, the side bales; C, the haunch-piece; D, the breast-piece; E, the uprights supporting breast-piece; F, the lock-bolt securing breast-piece and side bale: G, longitudinal batten: H, planks of flooring; K, cants; L, cleats securing head of stanchion; M, chocks between hind stanchion and side of ship: N, cross battens; *a*, rings for securing halters to; *b*, iron pin running through stanchion into side bale.

To construct the stalls, lay down *the cants*, K, at 7′ 5½″ apart, the outer one being, if possible, 3′ from the ship's side [certainly not less than 2′]. They are of red pine, 5″ by 5″, and secured to the deck by wrought iron 1″ bolts. They are scored ¾″ deep on the insides, at intervals of 2′ 6½″ [from centre to centre of score] to receive the heels of the stanchions, AA. *These stanchions* of red pine, cut to the exact height [from deck to deck] are of the same sized stuff, and rest below on the deck, fitting into the scores in the cants; they are secured to the deck above by means of elm or ash cleats [L], and by chocks [M], extending from the hind ones at intervals of about every 10′ to ship's sides. The cleats are fastened to

deck by 5″ spikes; the same sized spikes are driven in obliquely both above and below to secure the stanchions to the decks. The short uprights, E E, are next placed: they are 4′ long, of any sort of pine, 7″ by 6″, and secured to front stanchion by a ¾″ bolt at 12″ from top: below they are secured by spikes like the stanchions, and by the flooring, cut away to receive them.

Fitting up Stalls in a Ship.—The flooring is of 2″ plank [H H], spiked to deck by 5″ spikes, driven so that they should, in every instance, be covered by the cross battens; the planks are laid longitudinally, extending from the front cant to within 6¼″ of rear one, with intervals between them of ¾″ [except where they happen to meet under one of the two, side battens, GG., when they are put close together]. The upper edges are bevelled off half-an-inch.

Six cross battens of elm or oak, 2″ by 3″ [N N], are laid across the planks beginning at 9″ from rear of planking, the others at intervals of 12″ from centre to centre; they are secured by 4″ screws, countersunk ¾″.

Longitudinal battens, GG. 5″ deep, by 3″ wide, and 6′ 9″ long, are laid along each side of stall, being scored underneath to receive the cross battens; each is secured to the deck by three 10″ ragged spikes, the heads being punched down ¾″. To facilitate cleaning the stalls without at the same time weakening the construction, these longitudinal battens are sawn through at 6″ from the hind stanchions, the two portions, G and G*g*, being united by an iron hinge, the end of G*g* being rounded off; see Figs. 8 and 9. When it is necessary to sweep in rear of the stalls, these short pieces are thrown back, so that a clear space is left along their whole range. All water from the stalls is carried along the ¾″ intervals between the planks of flooring, into this space in rear, so that a regular system of drainage is provided for.

The haunch-piece, C, is of red pine, 9″ deep, 4″ wide at top, and 5½″ at bottom, cut on the bevel, so as to afford a resting place for the horses' hams. It is secured to the inside of each stanchion by two ¾″ bolts [Fig. 4], so that its top may be 3′ 8″ above the deck; it should be planed all over the top and inside, being well rounded off so as not to scratch the horses.

The breast-piece, D, of ash, 6″ thick by 9″ deep, is cut as shown in Figs. 10, 11. The breast-piece of each stall is thus removable; its ends rest in the short uprights, E E [cut away to receive them, Fig. 5]; and as they are cut diagonally, each keeps the piece on its right in its place. Fastened to the inside of each front stanchion is a lock-bolt of any hard wood, F [Figs. 5, 6], moving on a ½″ iron bolt, *ff*; when down it keeps the breast-pieces and side bales in their places. The upper side of breast-piece is 3′ 11″ above the deck.

The side bales, B B, should be planed all over, the edges above and below being well rounded off. They are of red pine, 9″ by 3″, and on a level in front with the breast-piece, in rear with haunch-piece: behind they are

tenoned into the haunch-piece [Fig. 4]; in front they slide into the short uprights, being kept in their places by the lock-bolt, F, and by the pin, *b*, of $\frac{5}{8}$" iron. This pin is fastened to a staple in the stanchion by a small chain 14" long, and passes in a sloping direction through both the stanchion and breast-piece into the side bale (Fig. 5); 15 p.-c. of spare side bales should be embarked.

The padding should be of sheepskin long in the wool, put on double; it is only required in front and at the sides, if the haunch-piece has been properly smoothed over. It should be put on 24" lengthways along middle of side bales, and it should cover the inside and upper side of the breast-pieces. When sheepskin cannot be obtained, padding may be dispensed with on the side bales, and circular bags (shaped like a cavalry valise) of stout canvas stuffed with straw, 2' long and 7" in diameter, may be used for the breast-piece. These bags should be secured by 4 strings at each end to the stanchions.

The mangers to be made of 1" planking, 18" long, 15" wide at top, and 12" at bottom, and 9" deep [all inside measurements], lined with tin, which should also cover over the upper edges; Figs. 12, 13. A $\frac{3}{8}$" iron band, 2" wide, passes underneath, the ends turning out [*d d*] being pierced with $\frac{5}{8}$" holes, by means of which the manger is suspended to the iron pins, *c c*. This iron band is nailed to the bottom and sides of manger. Zinc, tin, or iron hooping, should be nailed along the stanchions wherever horses can get to gnaw them. The horses' heads are secured by the halters of the head collars to the rings *a a* which are fastened thus to the pin *f* [already described]. A piece of $\frac{1}{2}$" iron, 5" long, and 2" wide, has a $\frac{5}{8}$" hole pierced through the centre to admit the bolt *f*, and a hole of same size, at $\frac{1}{4}$" from each end. The ends are then bent forwards, and the rings, *a a*, of $\frac{1}{2}$" iron, and 2" in diameter inside, are inserted in the outer holes. A nut screwed upon end of the bolt, *f*, fastens the whole to the stanchion; Figs. 5, 7. All the iron bolts, spikes, &c., to be of the best wrought iron. Each stall to be numbered, the side bales, breast-pieces, and mangers, being marked with the number of the stall they belong to.

Movable shores, 4" by 4", should be provided, by means of which the stanchions can be shored up against the combing of hatchways, the masts, &c.; they should also be fitted between every 8th rear stanchion and the ship's side; these shores to abut upon the stanchions on a level with the breast-piece. They are only to be fixed in very bad weather. In narrow ships, a few shores might with advantage be placed so as to extend from the front stanchions on one side of the vessel to those on the other side.

Kicking boards should be provided at the rate of 10 p.-c. of the number of horses embarked. They should be of $1\frac{1}{2}$' deal, 8' 3" long, and 1' 6" broad. They should be fastened to the stanchions by 4" screws as required.

The horse-hammocks should be of stout web or of double No. 1 canvas,

5′ long by 2′ wide; each end passes round an ash stick, 2″ in diameter and 30″ long, to which it is securely stitched. It is bound along the sides by a piece of webbing or doubled canvas, so that its edges are of 4 thicknesses of canvas 2″ wide. A 2″ rope 30′ long is passed round each stick, in a single clove hitch, as shown in Fig. 14 [being lashed together where it crosses], so that the rope from the rear side of hammock shall be 3½′ longer than it is from the front side. The hammock is kept in position on the horse by a breast-band, 40″ long, and a breeching, 56″ long, both 4″ wide. To keep them again in their places, a wither strap, 38″ long, and a croup strap, 52″ long, both 2″ wide, are required: both should be united along the horse's back by a band, 32″ long, and 2″ wide; the wither strap to be attached to breast-band at 12″ from the centre of it. The croup strap to be fastened to the breeching at 17″ from the centre of it, all to be of stout web or double canvas. The breast-band and the breeching to fasten with stout straps and buckles to the hammock. See Fig. 1*a*. Four blocks for the ropes of the horse hammocks should be placed over the side bales, two at 1′ from the front stanchion, and two, 2′ 3″ from the hind one. The front ones to be double, the hind ones single blocks. An iron belaying cleat is fastened to the deck above, opposite each front stanchion, to which the ends of these ropes are secured. It is advisable to have as many stalls on the upper deck as possible, unless extremely bad weather is to be anticipated. They are constructed like those already described, except that they are covered in above by a sloping roof laid upon rafters connecting the stanchions.

The slings hitherto issued for embarking horses are too short and too wide: they should be 5′ long and 2′ wide, made of stout web or of double canvas, secured at each end by sticks 2″ in diameter. The sides are frequently bound by a rope which hurts the horse, and are likely to make him restive; the same strength can be obtained by a 2 in. binding at the edges on both sides, made of stout canvas doubled. Breast and breech ropes, (2″) 9′ long, are fixed to each side, and are tied together, when the sling has been put under the horse. The loop attached to one stick is 9″ long, that attached to the other is 2′ 11″, and has an iron eye (3″ inside measurement in diameter) fixed in the end. These loops to be of 4″ rope. See Fig. 16.

A headstall is shown in Fig. 15: it is made of double canvas, the band going over the head being 2½″ wide and 35″ from x to x measured round by x': the nose band measured from x to x, round the nose is 16″ long and 2½″ wide; the forehead band, 2″ wide, is 17½″ long. There are holes in the head band and face strap, so that they can be shortened by passing a string through them and tying the ends together; the throat strap is fastened by strings.

Portable horse boxes, if considered necessary, should be provided for all

ships carrying mounted troops at the rate of 1 for each infry., and 2 in each cavr. ship with under 200 horses, and 3 in those having over that number to every 25 horses. They should be 63″ long, and 29″ wide in the clear, thickly padded all round where the horse's chest, flanks and quarters are likely to touch. They should be very strongly built, and fastened together with bands of iron running under the bottom.

Mules.—Except they are very large, they can be conveniently carried in ships in pens 10′ × 6′ to hold 5 each. These pens are made with 4 stout stanchions, with strong boarding round to keep the mules in. They should be tied by the head with collar chains, as they are apt to eat rope, and tin or zinc should be fastened round all woodwork they could reach with their teeth. In the voyage from Natal to Bombay each mule drank on the average 6 galls. per diem. (They were 13 hands, thick-set and powerful mules.) In India the stalls fitted up for mules are only 5½′ long by 20″ inside measurement: care is taken that the lower edges of the front and side pieces are only 2½′ from deck. The hay nets are of wire netting, and the rope portion of the headstalls also of wire; this is advisable, as mules are very destructive with their teeth. *Draft bullocks* embarked from India are given separate stalls, 6′ by 2′. *Pack bullocks* are placed 3 in a stall, each animal being allowed 5′ by 20″. One attendant is allowed to every pair of draft bullocks, but 1 man can well look after 6 or 8 pack bullocks on board ship.

Elephants are usually placed in the hold, where they feel the motion less. as many as possible of the planks of the main deck being removed for ventilation. When the hold is not boarded, a temporary flooring must be made of stones and shingle, 2′ or 3′ deep, with a top layer of sand. Three tons of sand for each elephant should be shipped for a 30 days' voyage, in order that the saturated portion may be replaced daily by fresh sand; the stones and shingle must be kept well covered to keep the feet dry and uninjured. Great care is required that the pumps used to clear out the bilge into which the urine is conducted through scuppers, are not allowed to choke with the sand made use of. Elephants are placed tail to tail, with their heads to the ship's sides. A ship with 32′ to 33′ beam admits of 2 rows so placed, with a gangway between the 2 rows broad enough for the attendants to pass and clean up dung, &c. One fore and both hind legs must be tethered. The stalls must be of very stout stuff, and should fit the animal, about 14′ by 6′ is a good size; there should be 2 side bales on each side of stall, 1′ deep and 8″ thick. One spare stall should be left amidships, close to the hatchway, for a sick animal. It is very desirable that all animals very ill and likely to die should be moved near the hatchway, so that if they die the carcasses may be easily slung up on deck. For if an elephant dies where he cannot be so slung, he must be cut up in order to remove him, and the smell of blood and flesh excites the other animals.

Camels.—To sling on board, place the anterior edge of the sling well in

front of breast pad : make the breast ropes very tight, as the camel is more apt to fall out forwards than backwards. If ship is alongside a good pier, and you can work 2 winches, you should embark about 20 camels with each or in all, 40 per hour ; you should have a double set of slings for each winch to save time. Five men required to sling a camel : No. 1 leads the camel over the sling which 2 and 3 have spread on the ground and on which he makes it kneel. Nos. 2 and 3 raising ends of sling as camel kneels and pass one loop through the other over camel's hump. Nos. 4 and 5 secure breast and breech ropes : 2 and 3 hook on tackle to sling and order ship to "hoist away." No. 1 holds leading rope as long as he can : there should always be a shore guide rope (3") about 120' long, it should be fastened just above the hook of hoisting tackle and manned by 15 or 20 men to keep the camel clear of ship's side when hoisting inboard. A similar guide rope from the deck is very desirable. As soon as the camel's legs are clear of the bulwarks, a man on deck seizes the head leading rope which is hanging down from the head collar and steadies the camel as it is lowered, 3 men receiving it between decks, No. 1 of whom holds the head rope whilst Nos. 2 and 3 unfasten the sling : No. 1 then leads him to the spot he is to occupy. Camels on board ship should be placed tails to ship's sides, heads inwards and 1' apart, to allow of men passing between them : camels are kept kneeling on board both fore legs securely knee-haltered to prevent them rising. They should be watered the day before embarkation as it is dangerous to sling them the day they drink. If troublesome in slinging, a rope should be passed round its hind legs under the hocks to prevent it kicking. Iron deck should be avoided for camels on account of heat to the animal kneeling on them. As a rule, camels feed badly on board ship : when the weather permits, a few at a time should be unhobbled daily and allowed to stand up : they should be disembarked with least possible delay upon reaching their destination.

Utensils for horse ships.—In addition to the stores already detailed as necessary for infy. on board ship, the following articles have to be provided by the owners in ships carrying horses, mules, &c. For every 10 stalls 1 hand safety lamp complete with oil and wick. Police lamps with locks and keys in sufficient number to thoroughly light wherever the horses, &c., stand (on no account is any mineral oil to be used for lighting). For each animal embarked, 1 curry comb and 1 brush, 1 hammock complete and 5 p.-c. spare, 1 canvas halter and 5 p.-c. spare, 1 breast-pad and 15 p.-c. spare. For every 3 animals 1 deck scraper, 1 wooden hoe, 1 iron hand-shove. (like a cinder-shovel), 1 hand rasp, 1 small basket, 1 hay net, 78" long by 4" wide. For every 5 animals, 1 coir mat, 80" by 26". For every 5 animals, 1 canvas water-bucket and 1 bass broom. For every 10, one wooden bucket. For every 50 animals or less number, 1 mash-tub (to hold 50 gals.), and 2 peck measures. For every 20 animals or less, a quart, and a 3-quart measure, and 1 canvas bag to hold 2 bushels and 1 to hold

3 pecks, with one of each spare for every 50 animals. Three horse-slings complete for every 50 animals, or 2 if less than 50. For each animal standing near a hatchway, 1 horse blanket 76″ by 74″. Shovels and rakes for arranging ballast as may be approved.

The supply of medicines for 50 horses on board ship for 3 weeks is as follows :—

	lbs.	oz.	No.		lbs.	oz.	No.
Cathartic balls . .	..		6	Digestive ointment .	0	2	..
Diuretic ,, . .	..		2	Nitre spirit of ether .	0	10	..
Fever ,, . .	..		12	Tincture of opium .	0	4	..
Colic mixtures . .	..		6	Linseed oil . . .	..		0½
Turpentine liniment .	2	0	..	Clyster pipes . . .	..		2
Tincture of myrrh compound . . .	0	6	..	Bladders	..		2
				Sponge.	..		2
Sulphate of copper, powdered . . .	0	2	..	Suture needles, wire and thread . . .	..		6
Nitre, powdered . .	0 per horse	1	..	Linen bandages . .	..		6
				Fomenting cloths .	..		4
Oil of turpentine . .	0 per week	8	..	Paper for balls . .	..		0½
Blister ointment . .	0	2	..	Scissors	..		1
Mustard	3	0	..	Foot-swabs . . .	..		2
Sulphate of zinc, powdered.	0	4	..	2 oz. graduated glass measure	..		1
Tow	1	0	..	4 oz. guaranteed glass measure	..		1

SCALE OF DAILY RATIONS FOR HORSES, &C., ON BOARD SHIP.

Daily Ration for each.	Hay.	Oats.	Oil Cake.	Bran.	Gram.	Pepper.	Vinegar.	Salt.	Nitre.	Flour or Rice.	Water.
	lbs.	lbs.	lbs.	lbs.	lbs.	oz.	Gills.	oz.	oz.	lbs.	Galls.
Horse*.	10	5	..	5	..	..	$\frac{1}{3}$	..	$\frac{1}{2}$	..	8
Horse†	10	4	1	4	..	..	1	1	1	..	6
Mule†	8	..	$\frac{1}{2}$	1	2	..	..	$\frac{1}{2}$	..	..	5
Ponies, Mules, and Asses†	10	..	..	$\frac{5}{8}$	4	..	..	..	..	..	5
Elephant†	170‡	..	..	..	..	..	..	$2\frac{1}{2}$	..	18–20	40–50
Camel†.	20	..	..	..	3	..	..	..	..	..	8
Bullock†	12	..	..	..	2	..	..	..	..	..	6

* According to Admiralty regulations this same ration is also allowed for mules. In addition to this ration, there is put on board for each animal daily 5 oz. McDougall's powder, 2 oz. of chloride of lime, and 2 oz. of powdered gypsum, to be used at the discretion of the O. C., as disinfectants.

† This scale of forage, &c., is according to Indian regulations. Our regulations lay down that each animal is to be fed 8 times daily, as follow: 4 times with 1 qrt. of oats and 3 qrts. of bran, and in the intervals 4 times with 2½ lbs. hay. As large a supply of carrots as the Transport Officers may direct is to be provided in addition. Oats and bran are to be stowed in *tight* casks. Hay is to be either "common pressed" or "highly compressed," or in such proportions of each as may be ordered. The forage, &c., supplied by owners will be specially surveyed as to quality, &c. Oats must not be less than 38 lbs. to the bushel, bran 14 lbs. to the bushel. The full daily ration should not be issued, if in the opinion of the O. C. the animals do not require it. Before each feeding time the bags provided for the purpose are to be filled with oats and bran, and a measure for each bag. After the horses are fed, the bags with the measures in them are to be returned to the issuing room.

‡ In lieu of this allowance of dry fodder, 320 lbs. of green may be substituted; the fodder should consist of hay, paddy straw, stalks of plantain leaves, and sugar cane; it should be given in small quantities at a time. Chuppatees of flour are generally considered better than rice. When the Indian troops were sent to Cyprus, *the grass cutter's ponies on board-ship* received ½ the ration of forage, &c., and ⅔ of water allowed for horses, Os, C, on board were, however, left a discretion on this point.

Scale of Rations per Man on Board Ship.

Days of the week.	Daily.														Weekly.				
	Salt beef, oz.	Flour, oz.	Suet, oz.	Raisins, oz.	Salt Pork, oz.	Split peas, pint.	Preserved Meat, oz.	Compressed mixed Vegetables, oz.	Biscuit, oz.	Fresh Bread, lb.	Rice, oz.	Porter, pint.*	Preserved Potatoes (uncooked), oz.	Sugar (unrefined), oz.	Tea, oz.	Vinegar, pint.	Mustard, oz.	Pickles (of various descriptions), oz.	Pepper ground, oz.	Salt, oz.
Sunday	12	6	1	2	..	..	..	..	12	..	..	1	2	4	¼					
Monday	..	..	..	..	..	..	12	..	..	1	4	1	..	2	¼					
Tuesday	..	..	..	..	12	⅔	..	1	12	..	..	1	..	2	¼					
Wednesday	12	6	1	2	..	..	..	..	..	1	..	1	2	4	¼	1/6	½	6	½	2
Thursday	..	..	..	..	..	..	12	..	12	..	..	1	2	2	¼					
Friday	..	..	..	..	12	⅔	..	1	..	1	..	1	..	2	¼					
Saturday	..	..	..	..	..	..	12	..	..	1	..	1	2	2	¼			¾		

* The supply of porter to be put on board is to exceed by 10 p.-c. the quantity required by the scale. All the articles are to be served out by full imperial weights or measures.

Notes.—Temperance Men not receiving porter (or spirit, as a substitute) are eac to be allowed daily 1 oz. of sugar, and ¼ oz. of tea, in addition to the quantities o these articles specified in the scale of rations;—those men who do not receive thes additional quantities will be credited in office with a penny a day. Neither porte nor spirit is to be issued to prisoners or 'Punishment Men,' except under medica advice, and with the sanction of the military C. O. Preserved meat is to consist o beef and mutton, which are to be provided in equal quantities, and to be issue alternately. Fresh meat and fresh vegetables are to be issued, *whenever practicable* 1 lb. fresh meat being considered equal to 1 lb. salt meat; the ration of fresh vegetabl is to be 8 oz. When fresh vegetables are not procurable, preserved potatoe (uncooked) 2 oz., or compressed mixed vegetables 1 oz., are to be issued in lieu Fresh vegetables are to be issued, whenever procurable, with salt or preserved meat in lieu of the flour, suet, raisins, peas, compressed vegetables, preserved potatoes o rice, specified in the scales. Fresh meat and fresh vegetables are always to be issued in port, and a supply equal to at least a day's consumption, should the weather admit of its keeping, will be laid in on leaving each port.

In cases in which it may be impossible to provide fresh bread, biscuit is to be issue as the ration, in the proportion shown in the respective scales. When fresh meat i

issued, bread or biscuit, in addition to the supplies according to the above scale, is also to be issued at the rate of 4 oz. of bread or 3 oz. of biscuit for each man. Oatmeal may be issued for thickening soup, when fresh meat is issued to such extent as may be considered necessary; all extra issues are to be separately certified to. The O. C. the troops will report to the military authorities, on his arrival in port, if he considers that biscuit has been at any time improperly or unnecessarily substituted for fresh bread. Any articles in the foregoing scales of rations may be stopped or changed, but only in individual cases, upon the special requisition of the M. O. The scales of rations are to be regarded as generally applicable to invalids, as well as to persons in health; invalids are, however, to be provided with fresh bread *every day*. In ships carrying invalids, there is also to be provided a liberal proportion of live stock (oxen, sheep, and poultry, *but not pigs*), with provender and water for their subsistence. The extent and nature of these supplies are to be, in each case, at the discretion of the naval or other Govt. authorities at the port, and they are to be replenished, as far as may be practicable, at any ports at which the ship may touch. Issues of poultry are to be made at the discretion of the M. O.

WATER. When there is a distilling apparatus on board, water is to be issued on the most liberal scale possible; but the minimum daily allowance of water (distilled or filtered) is to be for each individual embarked, including the crew of the ship, 6 pints when out of the Tropics, and 1 gall. when within the Tropics, which quantities are to suffice them for all purposes. When Government supplies the provisions they will also supply the water.

SCALE OF SUBSTITUTES. The above scales of rations being sufficiently varied for health, are to be adhered to, except as regards the substitution of fresh for salted or preserved provisions, when practicable, in the proportion shown below. In order, however, to meet cases in which it may be actually necessary to depart from the scale, a list of equivalents is appended:—

Fresh bread	1 lb.	To be esteemed equal to ¾ lb. biscuit.
Flour	¾ lb.	
Rice	¾ lb.	
Fresh meat	1 lb.	,, ,, ,, 1 lb. salt meat.
Spirits*	½ gill	,, ,, ,, 1 pint porter.
Coffee (roasted and ground)	1 oz.	,, ,, ,, ¼ oz. tea.
Chocolate	1 oz.	
Fresh vegetables	½ lb.	To be esteemed equal to 2 oz. preserved potato (uncooked), or 1 oz. compressed mixed vegetables.
Flour	½ lb.	May be issued in lieu of each other.
Split peas	⅔ pint	
Calavances	½ pint	
Dholl	½ pint	
Rice	¼ lb.	
Oatmeal	⅓ pint	,, ,, ,, ⅔ pint of split peas.

* When spirits are issued it is to be given to the men mixed with at least 3 parts of water to 1 of spirit, and issued in presence of the officer of the day.

Medical equipment, for the use of troops and crew, will be put on boar all transports as follows :—1 medicine chest complete, 1 case of surgeon instruments, 1 case of tooth intruments, 1 stomach pump, and 1 box fracture apparatus. If the M.O. in whose charge this equipment is, lands wit the troops, he will duly hand it over to the master of the ship.

SCALE OF MEDICAL COMFORTS FOR 1000 MEN FOR ONE DAY. Pr vision is made in this scale for the regulated number of days' victualling each case, *in addition* to the ordinary rations.

Brandy, bottles.	Rum, gills.*	Port wine, bottles.	White wine, do.	Preserved meat, 18s.	Preserved soup, pints.	Essence of beef, tins. ¼ pints.	Sago, lbs.	Arrowroot, lbs.	Rice, lbs.	Preserved milk, to make pints.	Lime juice and unrefined sugar, each, oz.†	Sugar, refined, lbs.	Tea, best black, lbs.	Vinegar, pints.	Soap, lbs.	Pearl barley, lbs.	Preserved potatoes, lbs.	Compressed mixed vegetables, lbs.	Pickles of various sorts, bottles.	Disinfectants.‡	Ale or porter, in pint bottles §
1	8	8	4	3	12	50	2	4	8	20	500	15	2	2	2	3	12	3	1	‡‡	

* For occasional use at the discretion of the M.O.

† *Lime juice*, with sugar, is to be issued at the discretion of the M.O.

‡ *Disinfectants.—Carbolic acid* (crystallized) in the proportion of 120 lbs. for 10 men for a year; to be in stoppered bottles, packed securely in a case, and to placed in charge of the Master, for issue to the M.O. as required: printed directio for its use will be issued with it. *Condy's patent fluid* (crimson), in the proporti of 20 pints per 1000 men for a year; to be in pint bottles, with printed directions use on each bottle. *Chloride of lime* (in stone jars) in the proportion of 14 cwt. 1000 men per annum. *McDougall's disinfecting powder* (in 50-lb. casks w dredger and instructions) in the proportion of 200 lbs. for each 1000 men on boar no ship to have less than one 50-lb. cask. *Articles for fumigation: Sulphuric a* in the proportion of 16 oz. for ships of 1000 tons and under, and 4 lbs. for those o that size; to be in ½-lb. stoppered bottles, carefully packed in boxes, clearly marke to be in special charge of M.O. *Peroxide of Manganese* (in stone jars) in the p portion of 1 lb. for ships of 1000 tons and under, and 4 lbs. for larger vessels. *Comm salt*, in the proportion of 4 lbs. for ships of 1000 tons, and 16 lbs. for larger ships.

§ This quantity is to be increased at the discretion of the authorities at the port in t event of draught porter not being procurable in sufficient quantities as an article of rati

BENGAL SCALE OF VICTUALLING INDIAN TROOPS AT SEA.

Articles daily.	For every cooking Soldier (not a Sikh).		For every Sikh Soldier.		For every non-cooking Soldier.	
	lbs.	oz.	lbs.	oz.	lbs.	oz.
Rice, or Atta in lieu	1	..	1	..	..	..
Dhall, Moony	..	4	..	4	..	..
Choora	..	..	..	..	..	12
*Tumeric	..	¼	..	¼	..	..
*Garlic	..	¼	..	..	..	..
*Chillies	..	¼	..	¼	..	..
*Blackpepper	..	⅛	..	⅛	..	..
Onions	..	½	..	½	..	..
Gram "parched"	..	..	..	..	..	10
Ghee	..	1	..	1	..	2
Salt	..	1	..	..	..	1
Sugar	..	2	..	2	..	6½
Tamarind	..	..	..	..	..	4
Chunam	..	¼	..	..	..	¼
Kuth	..	⅛	..	..	..	⅛
Coals or	1	..	1	..	..	..
Firewood	2	..	2	..	..	..
	gall.		gall.		gall.	
Water	1	..	1	..	1	..
Eating tobacco	..	⅔	..	..	..	⅔
Smoking do.	..	1⅓	..	..	..	1⅓
				dram.		
Coriander seed	..	..	..	1	..	..
Cummin seed	..	..	..	½	..	..
Cloves	..	..	..	½	..	..
Oil per week	..	4	..	4 oz.	..	4

* One-half oz. of "mixed currystuff" may conveniently be supplied in lieu of these articles.

Three-fourths of the above scale to be shipped for followers. Rations for non-cooking soldiers for ¼ of the voyage should be shipped besides for the whole detachment, for it will be found convenient to give all the men, or to such as demand them, rations for non-cookers for the first day or two, until they become accustomed to board-ship; besides, in wet or stormy weather, it may not be possible to cook, and in cases of sea-sickness, rations for non-cookers are necessary. For Sickhs or Punjabees, potatoes or some kind of vegetable should be shipped instead of dhall, for issue 3 times a week, and one dram of rum per man per diem for issue upon payment, at discretion of C. O.

EMBARKATIONS take place always under the immediate superintendence of the G. O. C. at the port. They should be conducted with all practicable speed, and as soon as the duties of the S. O. superintending the embarkation in connection with each ship are finished he will at once inform her captain, or the N. T. O., if there is one present, to prevent any undue delay in the sailing of the vessel. Under ordinary circumstances, if the voyage is to be a long one, it is advisable that the ship should not leave until the day following the embarkation. The ship being reported by the naval authorities as fit for the reception of troops, an inspection is to be made of her fittings, &c., by a Board, consisting of the following offrs. : a S. O. (who should have had considerable experience in the requirements of troops on board ship), another milty, offr. (not under the rank of a captain), and 2 R. N. offrs. The P. M. O. of the station, and always when practicable the M. O. in charge of the troops to be embarked, will accompany the Board, and will express their opinion on the sanitary arrangements. This inspection will, as a general rule, take place at the port to which the ship may first proceed for the embarkation of troops. At any subsequent port of embarkation the ship is not to be subjected to any further formal inspection before the troops embark: but only to the visit of the military O. C. at the port to ascertain whether any cause of complaint on the part of the troops exists, or whether the Transport Regulations have been departed from. Immediately after the inspection, a report, on the form given below, is to be made out in duplicate, and signed by all the inspecting officers. One copy to be forwarded to the Director of Transport services, the other copy to the O. C., the district in which the inspection may be held, for his information (and direction if necessary), and for transmission by him, together with his remarks, to the C. of the S. of the force embarking, or if in England to the Q. M. G. of the army,

REPORT OF THE INSPECTION.

Of the hired ship , fitted at , for the conveyance of troops from to , and now lying at

1. Tonnage (gross, if a steamer).
2. If a steamer, horse-power of engines.
3. If Board of Trade certificate is on board.
4. Name of master.
5. When accepted.
6. Height between decks in ft. and in., poop, main, lower and orlop.
7. No. of all ranks ship will carry and number ordered to be embarked.
8. Officers' cabins, if properly fitted, scuttles tight and bedding supplied.
9. Officers' saloon, or mess-place, if complete and, provided with all the articles prescribed in Regulations.
10. Officers' mess—if proper arrangements have been made.
11. Staff-serjts., if proper accommodation is provided, and for what No.
12. State of hammocks and bedding f

the troops, and if a proper supply is provided.

13. Number of berths for sick, if sufficient, and supplied with proper bedding.
14. Prison accommodation, if satisfactory.
15. Troop decks, cabins, &c., if in a clean and proper state for the embarkation of the troops.
16. Hammocks and bedding, if a space has been allotted for their stowage on deck, with painted covers for their protection in bad weather.
17. Mess tables and stools if they are in place.
18. Mess utensils, if all the articles required by regulations are provided, and in good order (see lists given at page).
19 Arm racks, and stowage for valises and accoutrements, if satisfactory.
20. Place for helmets, if provided.

	Tons at 40 cub. ft. per ton measurement.
21.* Space for regtl. baggage	
,, camp equipage	
,, other stores	

22. If the proper space for the baggage camp equipage and other stores is clear and ready.
23. Medicines, if on board.
24. Disinfectants, and articles for fumigation, if on board.
25. Ventilation, if satisfactory, and windsails if hoisted and trimmed.
26 The separate cooking galley for the troops, if complete and adequate, and if arrangements for the cooking are satisfactory.
27. What number can be cooked for at one time?
28. Coals for cooking, for how many days provided?
29. If all the articles required for cooking by Regtns. are provided and in good order.
30. Arrangements for the issue of provisions and water, if satisfactory.
31. For what number of men the ship is provisioned, and supplied with water, and for what period of time.
32. Is the distilling apparatus in good working order, and what number of galls. of fresh water can be distilled by it daily?
33. Are the arrangements for baking bread satisfactory, and for what number of men can it be baked 4 times per week?
34. Have provisions, medical comforts, and water, been examined, and found complete and good?†
35. Is the victualling scale open to view?
36. Ammunition, whether sufficient magazine space is provided and properly fitted and secured.
37. Tarpaulins for hatchways, if approved.
38. Awnings, if approved, and whether they have been spread.
39. Latrines, urinals, and wash-place for troops, if satisfactory.
40. Fyffe's water chairs for the use of troops, if satisfactory.
41. State of the well.
42. Number of boats, and how many persons they would carry.
43. State of the boats in case of emergency, and if provided with 2 plugs fitted with lanyards.

* 100 cub. ft., or 2½ tons naval measurement, are allowed for every ton weight of baggage sanctioned for troops by H.M.'s Regulations.

† If issued from a Govt. depot, the provisions, &c., are not to be examined.

44. How many fitted with lowering apparatus and on what principle?
45. Precautions against fire, and for extinguishing the same, if satisfactory?
46. Size of hatchway for horses, ft. in. by ft. in.
47. Height of horse deck.
48. Number of horses to be conveyed.
49. No. of stalls.
50. If there is 1 spare stall for every 10 horses.
51. Stores for horses, if all the articles (required by regulations) are in good order.
52. Places for saddles, &c., if provid and satisfactory.
53. Are forage scales hung up?
No. of days' consumption on board
Forage—Oats . . . . .
„ Hay . . . . .
„ Bran . . . . .
Water . . . . . .
Vinegar and Nitre, if sufficient qua tities are provided.
54. If arrangements for the accommo tion of the troops are satisfactory.
55. Are all the necessary documents a forms on board?

REMARKS BY THE BOARD.

Dated at this day of , 18 .

Naval Inspecting Officer.
Do. do.

Military Inspecting Officer.
Do. do.

REMARKS BY THE MILITARY MEDICAL OFFICERS.

The P. M. O. of the station.
M. O. in charge of troops to be embarked.

Final Inspection.—At the last port at which troops may embark, soon as possible after they are on board, and before the ship proce to sea, a final inspection of her is to be made by the following offr 1 military F. O.* (not belonging to the corps embarked), another milit offr., not under the rank of a captain, and two naval offrs. A milit M. O. (not in charge of the troops embarked) will express his opinion a the sanitary arrangements. Before beginning their inspection they sho inform the O. C. on board, and request him to accompany them. report to be in duplicate, and dealt with in the same manner as the report.

REPORT OF THE FINAL INSPECTION

before sailing of the hired ship now lying at ha
on board troops for

I. Has the memo. of Equipment been received by Military O. C.? or is it in possession of the Transport Officer on board?
II. Have the arrangements therein made been carried out, particularly as regards—

1st. ARMS.—Are they placed in the r provided for them?
2nd. VALISES AND ACCOUTREMENT Are they stowed in the places vided for them?
3rd. HELMETS, &c.—Are they stowe the places provided for them?

* *He should be if possible a S.O. of considerable experience.*

4th. HAMMOCKS AND BEDDING FOR THE TROOPS.—Have those for present use been issued?
Are they stowed in the places allotted?
Are those on deck provided with pointed covers for their protection?

5th. MESSES.—Have the troops been told off to the tables allotted for them?

6th. PROVISIONS AND MEDICAL COMFORTS.—Are the arrangements made for "getting them up," and issuing them, being carried out?

7th. COOKING.—Are the arrangements being carried out?

8th. FUEL FOR COOKING.—Are the arrangements for providing it and supplying it to the cooks being acted on?

9th. FIRE REGULATIONS.—Have they been read to the troops by the Military C. O., and has their attention been called to the printed copies hung up between decks?

10th. BAGGAGE.—Is it all stowed in the baggage room provided for the purpose?

Particulars of baggage not stowed according to regulation, in the baggage room.

a. If not so stowed — in what other part of the ship is it stowed?
b. Description { Officers' / Others'
c. Estimated quantity in cubic feet { Officers' / Others'
d. When, and under whose authority, was it received on board?
e. By whose directions was it stowed where now placed?

11th. REGIMENTAL STORES & QUARTER MASTERS STORES.—
If stowed in place allotted?
If not, where are they stowed?
By whose directions were they so stowed?

12th. CAMP EQUIPAGE, TENTS, &c., belonging to the troops.—
If stowed in space allotted?
If not, where are they stowed?
By whose directions where they so stowed?

III. STAFF SERGEANTS.—Are they occupying the accommodation provided for them?

IV. LATRINES.—Have proper arrangements been made for keeping them clean? viz.—
Those for officers;
Those for men.

V. TROOP DECKS.—Are they perfectly clear of baggage, stores, &c.?

VI. HORSES.—Are they in the places provided for them?
Are the proper number of spare stalls available?
Are the stores provided ready for use?

13th. FORAGE, DISINFECTANTS, &c.—Have proper arrangements been made for supplying and issuing it?

14th. SADDLES, HARNESS, &c.—Are they stowed in the places provided for them?

VIII. Is the ship in all respects ready to proceed to sea?

REMARKS BY THE BOARD.

Dated at this day of 18

Naval Inspecting Officer
Do. do.

Military Inspecting Officer
Do. do.

REMARKS OF THE MILITARY MEDICAL OFFICERS.

N.B.—The above reports are only made upon hired transports. No inspection report is made when troops are to embark in H.M.'s ships.

RETURNS REQUIRED BY CAPTAINS OF SHIPS.—Immediately on the embarkation of troops in H.M.'s ships of war or commissioned troopships, the under-mentioned returns are to be furnished by the military C. O. to the commander of the ship, in order that each person may be entered on the ship's books, and that no delay may take place in the issue of their provisions:—

I. A nominal list of offrs. embarking, according to seniority, showing also the appropriation of the cabins.

II. A numerical list of staff sergeants.

III. A numerical list of N. C. Os. and men—not including S. Sergts., specified in II.

IV. A list of temperance men embarked, distinguishing those who wish to receive tea and sugar.

V. A return of all ammunition which may accompany the troops on board.

When troops embark in a hired ship, the foregoing information is also to be furnished by C. Os. to the master of the vessel, except that numerical lists only of the offrs. need be given. The superintending S. O. will furnish the O. C. the troops on board of each ship with all the blank forms he will require during the voyage. Dinners for the day on which the troops embark to be always prepared on board unless orders are given to the contrary by the military authorities.

The transports having been told off for so many men and horses, the force to be embarked in each must be named by the C. of the S. in the most convenient manner, so as to keep corps, or units of them, such as squadrons and companies, as much together as possible; each unit to be complete in itself, having its regtl. transport, &c., in the same ship with it, so that, when disembarked, it may be at once ready to fight or to march inland some miles to camp or bivouac. Too much stress cannot be laid on this point, for nothing is more fatal to efficiency than the system frequently followed in past wars by our storekeepers and commissaries—and still advocated by many of them—of placing the men in one ship, their food in another, their camp equipment in another, their carts in another, the horses for the carts in another, and so on. If 4 ships, say, are necessary to convey a battn. with all its equipment for fd. service to the point where the landing has to be effected during war, it is in my opinion essential that each ship should contain so many companies, according to the carrying capacity of each ship, who should have with them—in accordance with the nature of the operation to be undertaken upon landing—every necessity to enable them to act efficiently the very hour they disembark. The theory that I have heard propounded by some of the ablest men we have in charge of stores, 'that in every war we undertake, it would be necessary to collect

our *materiel* at the point of disembarkation before despatching our fighting men to it,' is the theory of the storekeeper, and not of the S.O. who has had much war experience ; it is opposed to all sound military principles. The R.A. with us has hitherto been the only corps permitted to embark with each unit of its organisation complete on board the same ship, instead of having its guns on board one ship, the horses in another, and the men in another. It is to be hoped that the next time we have to undertake an operation like our landing at Old Fort in 1854, our infy. as well as the R.A. may disembark with its regtl. transport, &c., so as to be ready for immediate service. Every little detail for the embarkation must be put on paper in the form of an order by the responsible S.O., and communicated by him to all concerned. The larger the force the more this is necessary. In doing so, he must make his arrangements with the S. N. O. on the spot.

Sea-kits.—When troops are ordered for embarkation, every O. C. will at once obtain by requisitions from the Army Clothing Department an ample supply of necessaries to enable his regt. upon disembarkation to take the field at once complete in every respect. If the voyage is to be to any of our stations in Asia, it is usual to *issue free* to each man embarked, 1 drill frock, 1 pair of drill trousers, and 1 white cap cover for use on board ship. In peace every soldier is obliged to pay for the following articles when embarked for the Mauritius, Ceylon, Straits, China, or India in ships going round the Cape, 1 serge frock, 1 pair of serge trousers, 1 cotton handkerchief,* 8 pieces of marine soap, 4 pieces of yellow soap, 3 balls of pipeclay, 2 tins of blacking,* 1 scrubbing brush,* 1 clasp knife* (for corps not already in possession of), 1 clothes bag, 1 housewife, 1 blue worsted cap, 1 flannel shirt* in addition to kit, and 2 cholera belts.* For those that smoke, 3 lbs. each of *tobacco* to be provided regimentally. When troops go to these places by the Suez Canal, the handkerchief and the extra shirt is dispensed with, and only 5 pieces of each sort of soap, and 1 of pipeclay and of blacking are necessary. For troops going to South Africa, only 4 pieces of marine and 2 of yellow soap are necessary, and in addition to the articles already enumerated as unnecessary for voyages via Suez, those marked with * are dispensed with, and the free issue above described is not allowed. For regts. embarking for active service, beyond the kit described at page 29, it is not desirable, except for long voyages, that any special sea-kit should be provided.

Inspection of troops ordered to embark.—When troops are ordered on active service, they will be carefully inspected by the G. O. C. the district or station, with a view to ascertain their general efficiency and the state of their equipments ; all deficiencies in the equipment required for field service to be at once made good. They will also be inspected by a M. O., and all unfit for the work of a campaign should be forthwith sent to their regtl.

depot. The P. M. O. should also inspect them as near the date of embarkation as possible. All very old horses, those of delicate constitutions, and those deemed unfit for hard work, to be sent, either to the depot, or cast. All horse equipment, harness, and waggons, &c., to be minutely inspected by the local G. O. C., who is held responsible if upon landing any of the field equipment is found to be defective in any way whatever.

EMBARKATIONS can, I think, be most conveniently considered under two headings, remembering always that the operation is merely the preliminary to the still more serious operation of a disembarkation with a view to immediate active service against an enemy, and that consequently every arrangement made for embarkation should have this object in view :—

1. Embarking when there is no chance of being interrupted by the enemy.
2. When an attack by the enemy is possible, or the embarkation is to take place in his presence.

1. EMBARKING WITHOUT ANY CHANCE OF INTERRUPTION.—When a large force has to be embarked, the greater the number of ports made use of the easier will be the operation, and the more quickly it will be effected. If the transports can be brought alongside quays or wharfs, the work is greatly facilitated. The more numerous the wharfs or embarking places made use of the better, and it is an advantage that there should be at least 200 yards between each. They should be numbered from right to left, and the number of each should be painted in large figures on a sign-board to mark its position, and to prevent troops intended for say No. 3, going to No. wharf, &c. When embarking from an open beach, posts, or other signs should be erected, each, as in the case of wharfs, being numbered, to distinguish it. The nature of the locality will indicate which should be used for stores, cavalry, infantry, and R. A. If there is time, a few stages should be run out into sufficiently deep water for boats to come alongside ; this is all the more essential if there is a surf. If there are no quays or wharfs, the troops must be taken out to the ships in boats ; small steamers such as gunboats, are very useful for this purpose. If the embarkation is to be in a bay or harbour where the sea is calm, long piers formed with pontoons, casks, or boats, are most useful, and facilitate the embarkation immensely. We used them to great advantage at Balaklava, when the army embarked in 1856. Horses can, in this manner, be walked out to the ship's side, and slung thence on board. These piers can be shifted about with great ease from one vessel to another. In drawing up the orders for embarkation, the following points must receive attention, and instructions be issued regarding them :—

The name of the S.O. who is to attend, the hour each corps is to be drawn up, how formed, the route it is to follow in marching to the place

embarkation, care being taken that the several corps do not cross one another in doing so: the number of the wharf or quay where they are to embark, and the name and number of the transport in which each is to embark; the dress to be worn, whether rations, and what sort, are to be issued on shore, amount of ammtn. and camp equipment to be taken on board with each regt., the amount of baggage, the order in which the men embark, entering into special directions about how the men go into the boats and get out of them, if boats are to be used. The hour of the tide's ebb and flow must be considered. The nature of the service upon which the troops are to be employed, and the climate in which operations are to be carried on, must greatly influence these matters; as also, whether they are to land in a friendly country or a hostile one, and if the latter, whether the landing is likely to be opposed or not. It should be remembered that whatever it is desirable to land first, should be embarked last; and that, in fine, the result of the subsequent disembarkation, if it is to be effected in the presence of an enemy, or where an action will be fought immediately, will in a great measure depend upon the manner in which troops have been provided with the required means for landing quickly. If boats are used in embarking, the men should take off their valises on getting into them; they must be warned to remain perfectly quiet, and the strictest silence must be enforced, the offrs. and N.C. Os. being duly distributed throughout them. When a regt. or detachment proceeds on active service in the field, the embarkation of soldiers' wives is altogether forbidden. If possible, the C.O., adjutant, and Q.M. of each corps should go on board the transport about half-an-hour before the men. The exact position of each company can thus be marked in chalk on the mess-tables, so that according as the men come alongside, they can be marched down to their places at once, where they are to sit down, holding their valises and rifles, and remain there until ordered to move, the strictest silence to be maintained. The men to be told off by the O.C. the corps to be embarked into messes before leaving the shore, according to the size of the tables; 8 men to each mess is the almost universal number. The rifles should then be passed along a line of men, and put into the racks by companies, barrels inwards, and the valises placed by the men in the battens over their mess places; if the ammunition is to be left in the pouches, they must be sent below and stored in a magazine, but it is generally better to take out the ammunition and put it there, hanging the pouches over the mess place. A label should be pasted on the side of the butt of each rifle, showing the owner's name and number, and another on the heel of the butt with the number of his company. The sea-kit bags to be stowed in the racks provided for that purpose. The mess utensils will be placed on the tables before the men go on board. When a separate galley for the exclusive use of the troops is provided, the cooking must be done by

the men; otherwise it will be done by the ship's cook, assisted by the men. The cabins will be allotted to the offrs. to be embarked by the S.O. superintending the embarkation, according to seniority of army or relative rank.

Embarkation of horses.—Previous to embarkation, all horses should be carefully inspected by a V.S. to see they are healthy and free from all infectious or contagious diseases. Horses require great attention *at the time of embarkation*, and while they are on board ship; and every offr. of mounted corps has a most important duty to perform on these occasions, on which depend, in fact, the means of his being usefully employed in the field, when he reaches his destination. Horses should be kept in a cool state before embarking, and should be put on board ship rather low in flesh than in too high condition: in which latter state they are more disposed to be fractious and to kick, and are, moreover, more liable to inflammation. Long, slow, steady work is to be given to horses previously to their embarkation. They are to be kept fasting and without water for some hours before being put on board, as slinging them is more likely to prove injurious when their bellies are distended with feed; and they will sooner become reconciled to their change of quarters, and take to their feed on board, when these measures have been adopted. As a rule it is not advisable to remove the shoes, indeed if the horses are to be used immediately when landed, it would be impossible to take their shoes off.

Horses to be embarked should be drawn up by troops as near the points of embarkation as possible, their saddles or harness taken off and packed in vats or large sacks (the corn sack does very well), the ship head-collars being put on; the farrier sergeants will inspect the horses' feet and shoes. The men having stripped their horses, &c., the Right Files, leaving their horses in charge of Left Files, will go on board if the vessel is alongside, and put their arms, &c., in the places assigned for them, returning to shore in fatigue dress. The Left Files will then do the same. If there are many dismounted men, they can be used as horse holders, whilst the others go on board to stow away their things. If the horses have to walk on board by a floating wharf or brough, the planking should be strewn with straw or grass, and the quietest horses always led in first.

Slinging Horses.—Before commencing to ship the horses, the slings should be examined, to see that they are strong and in good order; 5 men are required to sling a horse quickly and well; one man holds the head-guy which is made fast to the ship's head-collar; 2 men, 1 on each side of him one of whom holds the sling, and passes the band under his belly to the other man; both men then hold up the ends over his back passing the long loop through the shorter one, and hooking on to the lifting tackle to it, both hold up the sling until the horse's legs leave the ground another man stands at the breast and fastens the breast-strap, and the 5th man stands at his rump and fastens the breaching; the offr. superintending

gives the word 'hoist away.' The 1st man slacks away at the guy-rope, just keeping it sufficiently taut to keep his head steady.

The rate of slinging varies from 20 to 40 horses the hour from each set of tackle according to the expertness of the men.

He is to be run up from the ground at a rapid rate; and, after attaining the necessary height, be carefully and steadily lowered down the hatchway. An offr. and 6 active and resolute men must be on the horse-deck to receive the animals, and if they are to be sent down to a lower deck, men must be stationed at the hatchways on each deck to see that his head, legs, and tail are not injured in descending to the deck where he is to be stabled, and where a soft bed of straw must be provided for him to alight upon. As soon as his legs feel the deck the sling is to be removed: on first feeling his legs, unless firmly handled, he is apt to plunge and kick violently. He is to be at once placed in his stall, the far ends of the ranges of stalls being filled up first, care being taken to place the horses as far as possible in the order they have been accustomed to stand in stables. Kickers should be placed in end stalls, and the kicking boards put up at once.

When the transports cannot come alongside a wharf, the horses must be embarked in boats or flat-bottomed scows made for the purpose. The dragoon should accompany his horse, his kit being in the scow also. Whilst there he should be in his shirt-sleeves if the weather permits, but under no circumstances should he be encumbered by his accoutrements. If embarked from a wharf, they should be walked on board by means of a brough or good gang-boards, the quietest being always embarked first. If the gang-boards have to be placed at a great slope, good battens should be secured at distances of 18″ along them. These broughs should have planked sides 3′ high. Stubborn horses must be blindfolded and led with their heads up to the brough, when by means of a plank placed behind their haunches, and held on each side by a man, they can be forced forward without hurting them. When the size of the hatches permits, it is desirable to provide sloping gang-boards, similarly fitted with battens, down which the horses can be led from the upper to the lower decks. In embarking R.A. or land transport, care must be taken that each unit of the organization is complete on board the same ship, and that under no circumstances shall a gun or a waggon be on board one ship, whilst the horses for it are in another. The guns and waggons should be put on board before the horses. The harness should, if possible, be packed in large vats and kept in a dry place on board. Tags specifying the No. of the waggon for each set of harness to be attached to the vats; the wheels will be taken off before embarkation, the linch-pins and washers to be carefully put away by the N.C.Os. of each division or sub-division. All small gear to be carefully collected, tied together, labelled and stowed in the store-room provided for it. As a rule, transport waggons need not be taken to pieces, and when practicable, they should be hoisted on board, loaded. In embarking

horses into boats from an open beach, every effort should be made to construct some sort of stage. If the water is shallow for 50 or 100 yds. out, these stages should be erected where the boats, when laden, will float, the horse being walked through the water to the stages and thence into the boats. The men should stand to their horses' heads whilst in boats, or if they admit of the horses being placed athwartships, heads and tails alternately, the men should sit on the gunwale, holding their horses by their head-collars.

Embarkation Returns.—As soon as all men, guns, &c., to be embarked in any ship are on board, a detailed return of them is to be made out by the O.C. on board, and given in duplicate to the S.O. superintending the embarkation, by whom it will be verified with the least possible loss of time, and sent on to the C. of the S.

THE VOYAGE.—There is no situation in which the troops more urgently require the personal superintendence and care of their offrs., or in which the strictest conformity to regulation is more necessary, than on board ship. The command of the troops on board ship is vested in the senior combatant offr. doing duty with the troops, to whatever arm of the service he may belong. He is equally bound to exercise that command, and equally responsible for any breach of discipline which may occur whether the offrs. and men embarked with him belong to the same regt. with himself or not. On board any of H.M.'s ships the senior military offr. in regard to the command and discipline of the offrs. and troops under his orders, will be guided by H.M.'s Order in Council, dated 6th February, 1882. On board of hired ships the O.C., while taking care that discipline is observed by the troops, is to remember that the master of the ship has lawful authority to maintain good order amongst all on board, and in all matters necessary to ensure the safety of his ship, for which he is entirely responsible. It is most important that the master, the C.O., and the M.O. in charge should carry out their respective duties in harmony, in order that what is necessary for the maintenance of discipline and the comfort of those on board may be arranged without undue interference with the duties of the ship. The C.O. is to pay attention to every requisition, consistent with the good of the service, made to him by the master. In case of fire or other emergency, the C.O. must specially remember the responsibility of the master, and render him every assistance, without attempting to take the command out of his hands. The C.O. is authorized to apply to the master to see the charter-party and transport regulations, whenever he may require them.

Immediately after embarkation a guard is to be appointed to furnish sentries, orderlies, special duty men and police. The number of these, and consequently the strength of the guard, will vary with the number of men embarked, but must be settled by the C.O. in consultation with the master and the embarking S.O. When a large number of troops are embarked, the following are necessary; but the number will be modified as circumstances may require:—1 offr. of the day, and 1 sentry in each of the following places: on each side of the forecastle, on the quarter-deck, over

each latrine and washhouse, on each entry port and gangway (when in port only), and over baggage room. The number of orderlies, cooks, bakers, sergts. in charge of troop deck, lamp trimmers, hammock-stowers, of swabblers to clean the troop latrines, offrs. W.C.'s and troop decks, will be fixed as found necessary. A trustworthy sergt. and a sufficient number of men, according to the numbers embarked, must be told off as "police." Their principal duties are to see that there is no smoking except on the upper deck, and that "lights" are put out at the proper time. They are also to see generally that the routine is carried out, and that there are no irregularities. In hot weather the bedding is to be aired as frequently as possible. The troop decks are to be cleared of all persons from 7.45 A.M. to 11 A.M., except those detailed for the purpose of cleaning it. The cowls and other arrangements used for the thorough ventilation of the ship are to be carefully attended to. Wind-sails, especially in hot climates, are to be kept hoisted and trimmed, and care taken that the ends of them below deck are not tied up by the men. In ships fitted with Edmonds' system of ventilation, strict attention is to be paid to the "Directions," and while the troops are embarked, the steam is to be turned on for a quarter of an hour during every hour in the first and middle watches, and at such other times as may seem desirable, according to circumstances. The sergts. of troop decks are responsible for the general good order and cleanliness of those portions of the deck and the messes under their charge.

ROUTINE FOR TROOPS, BUGLE CALLS, &C.—The regular morning parade is 10 A.M. There is to be one marching order parade per week. On Sundays the troops are to be ready for Divine Service by 10.15 A.M. Smoking is allowed on the upper deck only, and is strictly prohibited between decks. Spittoons will be provided, and spitting on the deck or over the side is forbidden. All tobacco pipes are to have wire covers to guard against risk of fire through loose particles of burning tobacco flying about. In bad weather and when practicable awnings will be sloped to shelter officers and men while smoking.

GENERAL CALLS.

Halt	Silence—Every one to remain still.
Advance	Carry on—that is, continue your business.
Retire	Every one off upper deck but the watch of troops.
G's	Sweepers.
G's and double	Swabbers.
Alert, followed by halt . . .	Man overboard.
Cease firing	Leave off smoking.
Commence firing	Permission to smoke.

FIRE CALLS.

Alarm (prepare for Cavalry) .	Fire.
Commence firing	Heave round the pumps.
Cease firing	Avast heaving the pumps.

Time.	Bugle Calls.	Meaning.
A.M. 6.0	Reveille	Turn out and stow hammocks; bedding for airing taken on deck.
6.30	Ration	Cooks draw breakfast.
7.0	Breakfast	Sit down to breakfast.
7.30	Rise	The day watch will go on deck clean. The watches below will clean their messes and troop decks, and then themselves, after which all but the mess orderlies and troop deck swabbers go on deck, and remain there till after the inspection.
8.0	Fall in, followed by one, two, or three G's.	Day watch of troops fall in. This watch will be on duty till 8 P.M.
10.0	Assembly	Parade. All the troops, except the cooks and mess orderlies, fall in on upper deck for inspection. The military officers of the day inspect troop decks and messes to see they are clean and in order.
10.30	.. .. ..	Aired bedding to be rolled up and stowed.
11.30	Ration	Cooks draw dinner. Up porter.
NOON.	Dinner	Sit down to dinner.
P.M. 0.30	Grog	Issue of porter under superintendence of officer of day.
1.0	Four G's	Sweep-out messes, and take all dirt to ash-shoot in waist. Sweepers fall in and sweep all decks.
1.30	Rise, and then fall in, followed by one, two, or three G's	Troop decks to be cleared for sweeping. Watch to fall in. When troop decks are cleared up, bugle will sound. and all but the watch on deck can go below.
4.0	Ration	Cooks draw tea.
4.30	Supper	Sit down to supper.
5.0	Rise	Clear troop decks of all but swabbers and mess orderlies, who will sweep out the messes and decks.
5.30	Quick	Take down hammocks.
8.0	Close	Clear up decks for the night.
8.0	Fall in, followed, by one, two, or three G's . .	Night watch of troops fall in. This watch will be on duty till 8 A.M.
8.15	Lie down	Lights out. Every man to be in or on his hammock.
8.30	——	Rounds by the officer of the day and police.
9.0	Retire	Every one below but the watch of troops and sentries.
11.0	——	Lights out in saloon.

Horses on board Ship.—The hammocks should always be kept round the horses, ut just clear of them; the ropes will be securely fastened, so that if the horses lose heir footing, they might be saved from falling down; but the wt. of the horses hould not be put on the hammocks with the intention of resting them except in very ne weather. For the first few days on board ship, food is to be rather sparingly iven, and bran is to form the larger portion of the horse's food; but after he be- omes reconciled to his altered circumstances, and as his appetite increases, he is to e more liberally fed. Horses should be given at least 8 galls. per diem, and be atered three times a day. One feed a day of 2½ lbs. of carrots is invaluable for ck horses. The head-collar supplied by the ship is the only safe fastening on oard, and there should be two shanks to each collar. The horse's head should be ed rather short than otherwise, and there should be several spare collars on board. hen mules are embarked, chain collar shanks instead of rope should be used. In ugh weather, if the vessel should labour very much, it will be found necessary to ave all the men who can be spared to stand to their horses' heads, as the horses will e less disposed to be frightened when the men are near them. Fine cinders should so be sprinkled under each horse to give him firm hold. Too much attention cannot e paid to the constant trimming of the wind-sails, which must be kept full to the ind. Sickness amongst the horses is invariably greatest where there is most motion, in the fore and after part of the ship; for the same reasons horses suffer most in ugh weather. A high temperature is not necessarily injurious, provided the atmo- here is pure, and the horses are not exposed to direct draughts of cold air; but they ffer most when exposed to rapid changes of temperature. Care is to be taken to row a stream of fresh air down the fore hatchway by means of the wind-sails, the wer ends of which are to be carried to within about a foot of the flooring. Nothing to be permitted to be on the decks which is likely to interfere with the thorough ssage of the air, or choke up the apertures to the ventilators. Air scoops are pro- ded for each scuttle for use in hot weather. It is impossible to pay too much atten- n to cleanliness. No dung or urine is to be allowed to remain in the stalls or decks. he dung should be at once carried in the baskets to the nearest appointed place for rowing it overboard. The urine, when it does not flow overboard, is led down into e bilge in the engine-room, and pumped out by steam. When not steaming, the nkey-engine will pump it out. When the urine is led into tanks, it is necessary to mp out the tanks every four hours. Great care must be taken to prevent the uppers being choked; if it does happen the master should be informed, and he will ve them cleared by means with which he is provided. The horses should be shifted ily from stall to stall by means of the spare stalls, and the platforms lifted up, and e deck cleaned underneath them. The horses themselves should be well groomed d rubbed. Vinegar is provided for sponging their nostrils, &c.

In many cases it is possible to bring the horses out on the decks, coir mats, pro- ded for that purpose, being first laid down. This is very beneficial to them. Loose xes are provided for sick horses, and there are portable boxes on board fitted with ngs, by means of which horses can be sent on deck for an airing, or shifted about

as required for their health. On these occasions the boxes should be place "athwart ship." Vet. slings are also provided for sick horses. The arrangemen for watering are from pumps fitted on each stable deck. A large tub is provided f each pump : this tub to be filled, and the iron buckets dipped into it and the wat carried round to the horses. These tubs are also to be used for bran mashing. Th pumps are to be kept locked, and to be only used for watering the horses. A stab guard to be told off as soon as the men are embarked. The decks are lit up a night.

STABLE DUTIES. *Morning Stables.* Rake the stalls well out to the rear, swee up the passage behind the horses, and sprinkle disinfectants, water the horses, spong nostrils, eyes, &c. Feed with hay, after watering, and then with oats or bran ordered.

Mid-day Stables. Shift horses into spare stalls, and out on to the deck when pra ticable, pick out and wash the feet, examine the shoes, any loose shoes to be fastene at once, and slight injuries attended to, thoroughly groom the body, brush, and han rub the legs, brush out the mane and tail, and sgonge nostrils and face. Each st to be thoroughly cleaned, platform raised and cleaned. Deck underneath drie and disinfectants freely used. When the horses are clean, water, and then fe with oats or bran as ordered. After dinner the horses are to be fed with hay f an hour.

Evening Stables. Rake the stalls well out, sweep up, sponge nostrils, &c., as morning stables. Water and then feed with oats or bran as ordered. Stablemen feed horses with remaining portion of hay.

IN THE SECOND CASE, WHEN THE EMBARKATION HAS TO BE EFFECTE IN THE PRESENCE OF AN ENEMY, as the English had to do at Corunna, t sick, all stores, carriages, horses, and other material, are to be placed board first. Circumstances must decide the order in which the guns a men are to be embarked. The possession of a small land fort, whi prevents an enemy from approaching the point of embarkation, is of gre value in such an operation. It is a most trying one, under any circu stances ; but the fire from the fleet (which it is taken for granted will be hand) ought to keep the enemy at a distance. For this reason a low, fl open beach is the best suited for the purpose ; one with high cliffs whi cannot be seen over would prevent the fleet from protecting the flanks sweeping the front of the embarking army.

Disembarkations.—In all disembarkations, the S. O. who has to ma the arrangements, must state, in his memorandum of instructions, t manner in which it is to be carried out, the hours the several corps are leave the ships, in what order, and by what means, &c. ; the clothing to worn, the rations cooked or uncooked, the ammunition, camp equipme stores, &c., &c., to be taken by the men, or put ashore with them for th use. The nature of the service on which they are to be employed w enable the G.O.C, to settle all these important matters. The S.N.

n the spot must be consulted, and all arrangements made with him egarding boats, &c. The general plan of the Disembarkation must be well hought out when that for the embarkation is being arranged, as the success r otherwise of the former will very much depend upon the manner in which he latter has been carried out. The latter is, however, much the easier peration of the two, if the landing has to be effected in an enemy's country, or the whole force must be thrown ashore in the same neighbourhood, whereas, generally, many ports or several localities at a distance one from he other can be made use of to embark the several divns. or even rigds. at. With any considerable force intended for the invasion of an nemy's country, especially if that country be sparsely populated and should ossess but few harbours or good landing places, ample materials should be aken for the construction of temporary wharves, piers, broughs, &c. It is bvious that the greater the number of ports or other points that can be sed the more rapidly and more easily will the operation be effected. When he landing takes place from boats, it is very desirable to have a large beach arty of seamen under the command of a naval offr. selected for his nergy and power of organization ; their assistance in clearing the boats, c., will always be found of very great value. This party should always ave a semaphore with it for the purpose of communicating with the dmiral in command of the fleet: the seamen should take 2 or 3 days' rovisions ashore with them. Troops should always breakfast before aving their ships, and if fighting or a long march is in prospect upon nding, this breakfast should be a very substantial meal.

Deficiency of Stores.—When troops are embarked in any of H.M.'s oopships, the captn. will have of course a copy of the Regulations on this ubject ; so I need not enter upon it in detail. On board hired ships the ammocks and blankets will be returned to the master before landing, ny loss in any stores issued for use of troops on board to be charged gainst them, the list of which, prepared by the master of the ship, if found orrect, will be signed by the C.O. Before disembarking from a hired ship, he military C.O. is to prepare and hand to the master the following returns nd certificates upon Admiralty Forms, which will be supplied to him by the aster for that purpose :—

Disembarkation return in duplicate.
Mess certificate.
Ration and forage certificate.
Freight certificate.
Certificate of the number of invalids (if any) conveyed under medical charge of the ship's surgeon.

The C.O. of the troops and another milty. offr. are, before quitting the ip, to sign a certificate in the following form, and to deliver it to the aptn. or master, viz. :—

Form of Certificate.

"This is to certify that I have been round the ship with
and that no baggage, arms, nor accoutrements of any description, are le
on board belonging to the troops.

Military Officer."

"I have made full inquiry respecting the baggage, &c., of the
disembarked from this ship, and find no complaints, and that there wa
always a sentry over the same during the time it was on board."

(To be signed by the O.C. the troops and to be dated.)

Disembarkations must be considered under two heads: 1st, When mad
without any chance of interruption from an enemy; 2nd, when made i
presence of an enemy, or where an attack is possible.

1st. THE DISEMBARKATION OF MEN, HORSES, AND STORES, is merely th
reverse of what is done in putting them on board.

The men, when landed, must be marched off at least 500 yds. away fro
the beach, which is to be kept clear for those to land subsequently.
possible, it is advisable to march them at once to the spot where they are t
encamp or bivouac, so that arms may be piled, cooking places, &c., mad
by a portion of the men, whilst the others return on fatigue to assist i
landing stores, &c. The arrangements to be made must depend upon th
mode in which the disembarkation is to be effected, whether by goin
alongside wharfs, or by boats, or small steamers. Every exertion should b
made to erect some rough wharfs, the shallow part with trestles, that i
deeper water being made with boats, ending with a barge and strongly
built schooner or vessel of that class. It may be sometimes advisable t
sacrifice a ship for this purpose, and by scuttling her, sink her in such
depth of water as to have her upper deck 3′ or 4′ above high water. Wit
a sandy or a muddy bottom, a ship might be sunk by loading her down wit
weights until she was resting firmly on the bottom. If the weather is cal
she will suffer no great injury, and can be floated off when no longe
required. Brigds. and divns. should be landed without being mixed up
each divn., with its guns, horses, camp equipment, &c., should be comple
on shore before another commences to leave the ships if there is only on
landing-place. The hour of the tide's ebb and flow will generally influenc
the arrangements.

2nd. WHEN AN ARMY HAS TO LAND IN A HOSTILE COUNTRY, and i
presence of a formidable enemy, as we did in Egypt in 1801, and in Chin
in 1860, or at a place where it is possible it may be attacked before th
disembarkation is completed, as at Eupatoria in 1854, the operation is
troublesome one, but not so appalling as it is generally considered to b
provided the troops have in the first instance been embarked in a creditab
manner, and the exigencies of the service upon which they are sent hav
been well provided for. If we are at war with a nation capable of hurtin

is at sea, the transport fleet must, in the first instance, rendezvous at some ome port under charge of a naval squadron sufficient for its protection, and y which it must be escorted to its final destination, and guarded whilst the isembarkation is being effected. If the landing is to be made on the shores f Europe or of the Mediterranean, the fleet will of course sail under sealed rders for its destination, which must be kept a profound secret under all ircumstances, known only to the G.O.C. and to the Admiral. If the oyage is to be a very long one—to China, for example—it is of the utmost onsequence that the expeditionary force should rendezvous at some place ot more than a few days' steaming from the shore where the landing is be effected. The force should be finally organised there, the horses and en being landed if necessary for that purpose. This is very essential both r man and beast after a long voyage, but particularly for the latter; for, ter a few weeks on board ship their joints become stiff, and they require st and gentle exercise to fit them for a campaign.

Selection of a landing place.—The first thing to be decided upon is the ace where the final landing is to be effected. Many local circumstances ll influence this consideration, independent of the character of the coast d the physical nature of the country itself. Political matters—which enter to all great questions—and the distribution and nature of the enemy's nd and sea forces, may force you to disembark an army in a locality ich, in itself, is not favourable for such an operation. These are subjects the G.O.C. The duty of the C. of the S. is to make a close recon- issance of the coast in company with a responsible naval officer: for, no atter what may be the advantages offered on shore, unless there is od anchorage and deep water near shore, no place can be deemed good one for the disembarkation of an army Of course, all objec- ns must give way to necessity; as, for instance, in China, the best ce for landing our army was on a mud bank commanded by a fort, ich we believed at the time to have been heavily armed, and to which we ew no large vessel could get nearer than 9 miles. Ironclads having average draught of 27′. can safely, in fairly moderate weather, approach shore as long as they have 6′. good of water under their keels; vessels wing only 8′. or 10.′ in a similar way require 3′. of water under their ls. [See paragraph on Coasts under the head of "RECONNAISSANCES."] The chief points to be considered are; the probability of smooth water: extent to which the fleet can assist by its fire: the access to and from point selected for laden boats, and for the men when landed to the rest defensible position: the distance from any such position and the ure of the position: what the enemy can do to prevent your landing: the nber and nature of the roads leading inland to the 1st objective point, the nature of the positions on such roads where the enemy could offer a midable resistance.

Even assuming that the enemy is your equal, or is even somewhat your superior in force, he cannot be everywhere to guard all his coasts; if he learns that a disembarkation in force is being attempted at some distance from his main body, he must march to the threatened locality, and a march of 20 or 30 miles is a fatiguing affair to him, whilst in your ships, if you find the spot you had selected for your landing held strongly by troops aided by great, prepared field works, you can without any fatigue to your men whatever, move 50 or 100 miles farther up or down the coast as you may decide, there to carry out your disembarkation unmolested. If the shores be low and open, enabling the guns of your fleet to assist, your operation will be greatly facilitated in the event of the enemy endeavouring to interrupt it. If the landing be opposed, the disembarkation should be effected upon the broadest front compatible with securing the mutual support of the brigds., &c. If the landing has to be made under fire, the broader this front the less will be your loss. In selecting the spot for your disembarkation, the necessity therefore of having a broad width of beach to land upon must not be overlooked. This point decided upon by the G.O.C. and the Admiral, should be kept secret until the last moment. It may be advisable to make a demonstration upon a totally different point from what has been determined upon, and it is always a good thing that a swift armed vessel with a small party should make descents upon the coast at all points where the telegraph wires are near the shore, for the purpose of cutting them, and carrying off a few intelligent men as prisoners to give the G.O.C. information upon local matters.

The Landing.—The use of steam launches, and generally of small tugs, gunboats, &c., has greatly reduced the difficulties even of landing in the face of an enemy, and the use of collapsible boats, which can be carried now to any extent by all ships, enables the invader, if necessary, to throw the fighting men of an entire army corps ashore at any selected point in one trip of the boats between the transports and the shore. We hear a vast deal of nonsense talked as to the great extent which steam has increased England's power to resist invasion; this cry is invented by politicians who do not wish to see proper defensive measures undertaken, because such would swell the annual budget, but all soldiers, who understand the question better than politicians, know this to be the greatest of fallacies: 24 hours of calm weather would now enable an enemy to throw ashore on our coasts an army amply large enough to destroy any military force we could oppose to him, and to secure the possession of London. Without the aid of steam this operation would have been a very serious one indeed, which, in common with all who have studied the question, I deplore it would not be at present. Circumstances may prevent you from throwing on shore an entire army corps in one trip of the boats, and the landing may have to be made by divns. successively. If the fire of the fleet cannot keep the enemy's fire under, it may be advi-

able to restrict your first trip to boats carrying infy. only, or to infy. with some field batteries unaccompanied by any horses. It is very desirable to expose horse boats to fire as little as possible, for although it is most desirable to have a few batteries of R.H.A., and a few squadrons of cavly. on shore as early as possible in the operation, yet, if in landing they are to be exposed to a heavy fire, it would be generally better to postpone landing them until the infy. had first secured a position ashore, and had been able, with the assistance of the fire of the fleet and with that of the dismounted batteries sent with it, either partially or entirely to silence the fire the enemy had at first brought to bear upon the landing places. Each Divn. should have; if possible, about 2 miles of beach allotted to it for the operation of landing from open boats. The transports carrying each divn. should anchor in lines in the order in which they are to land. The distance between these lines is a purely naval matter, as in fact the arrangements for actually carrying the men ashore. In all the boats employed there should be an ample supply of fresh water, so that there should be no want of it on the beach. A medical staff with stretchers and bearers, but without ambulances, should land with the first divn. sent ashore; the ambulances, &c., to be landed immediately after the cavly. and R.A. have all been disembarked. The lines of boats being towed in as near the shore as the depth of water will allow, the boats will have to pull in the rest of the way. Each line of boats must be led by a light boat, which should be provided with sounding poles. The spot where these boats reach the shore marks where the right of the battalion, brigade, &c., is to rest. The boats should be 50′ apart from centre to centre. If the landing is to be effected by divns., the 1st divn. being put ashore, the boats will return for the other divisions in succession. The men will get into the boats in the order in which they stand in line, so that when the boats ground the men getting quietly out from each side can form up at once on shore in line or column according to the orders. The men must sit quiet when in the boats, and the strictest silence must be enforced. Under no circumstances should the men load until they are on land. The colonel should be in the leading boat, and he should be the first man of the battalion to land as the captain should be the first man of the company to do so. The former will point out to the captain where to form up. The latter will, in the first instance, form up his company exactly where it lands, and then march it as a formed body to the position ordered by his C.O. If camp equipment is to be used by the expeditionary force, it should not be landed until the whole force is ashore, a small party under an offr. being left in each ship to take charge of it, and bring it ashore when ordered to do so after the landing had been safely effected. A steamer should go round the fleet and collect all men unable from sickness to land. Vessels having sick men on board should hoist some preconcerted flag, so that the steamer should only visit them. By this means all the sick can be collected

on one or more hospital ships ; and if there are none, then on board the best ventilated transports, arrangements to be made for them by the P.M.O. It is advisable, in case of accidents, that the men should land with 3 days cooked rations, and offrs. are clearly to understand that they are to do so also. If the force is landed by divns., the 1st divn. ashore will act as if it were an advanced gd., and cover the landing of the rest of the army. For this purpose it should take up any strong position as near the beach as possible, taking care to do so in such a manner that the fire from the fleet or gun-boats told off to protect the landing may also protect its flanks. If the landing is opposed, the primary object should be to silence any artillery bearing upon the beach. As soon as this is effected, and some cavly. have been landed, parties of it should be at once despatched to the neighbouring villages, to seize the post and cut the telegraph wires, if there are any. It would be a good plan to send a telegraphic message in the name of the mayor, telegraph operator, or other functionary, to the military or civil authorities (as the case may be) in the neighbouring cities, saying, "I have just returned from the coast. All is quiet. No enemy or ships to be seen anywhere. The fishermen (or John Smith, &c.), tell me they saw the smoke of a great fleet going north (or south) this morning at 5 A.M.," &c. &c. &c. It is possible sometimes to send false intelligence in this manner, which, if not actually believed, will shake belief in the true news, giving rise to hesitation and delay. Circumstances such as the proximity of the enemy, and the nature of the position, must determine when the cavly. are to land ; but the sooner it is landed the better, for, without it, all the transport and cattle will be driven away beyond reach of the infantry. The nature of the expedition, its objects and the character of the country invaded, will determine the order in which provisions and other stores are to be landed. It is of the utmost consequence that a harbour or a sheltered roadstead should be secured as a base of operations where the material and supplies can be landed securely and leisurely. To depend upon an open beach subject to bad weather to land the supplies required by an army in the field, is indeed a very dangerous arrangement, and may lead to disaster.

IN DISEMBARKING HORSES, the same precautions are necessary as when embarking them. For some days after a long voyage they should be led by hand at a gentle pace (not out of a walk), and no weight put on their backs. This rule, of course, has to give way to necessity. I have ridden and been carried fairly by a horse just landed from a ship, on board of which he had been for a month, and of the British cavly. regts. that landed at Ismaillia in 1882, some made trying marches, and charged the enemy the day after they landed. In all very distant expeditions a rendezvous, such as Varna in 1854, and Talienwan Bay in 1860, will be generally established where the horses can be landed and got into condition after their long voyage, they need seldom therefore be more than a few days on board immediately

previous to beginning active service. The disembarkation of horses by swimming is easily effected, as their instinct prompts them to make for the shore. The horse should be lowered in the sling over the side without fastening the breast rope or breeching. When the tackle is unhooked the sling opens and is at once slipped from under. It is of great consequence that a number of horses should be kept on the shore to which the others are to swim, as horses in the water will always swim towards others on the nearest shore. This plan of dropping horses out of slings into the water is said to injure their pluck, and make them for ever afterwards averse to fording rivers or entering water at all. It should only be resorted to in emergencies, and then care should be taken that the horses are cool before being put into the water. All corps must send in to the S.O. of their divn., as soon as possible after they have landed, a disembarkation return, showing the numbers actually landed, and accounting for every one included in the return of those actually embarked.

SELECTING A SITE FOR CAMPS OR BIVOUAC.—In deciding upon the site for any camp or bivouac, whether large or small, for occupation for a night or for a lengthened time, two great considerations enter into the question, viz. the *Military* and the *Sanitary*. When they clash—as they may frequently—the point must be settled according to their relative importance in each particular case. If a great battle is impending, everything must give way to the strategical or tactical exigencies of the moment, and troops may have to bivouac for many nights in positions that may be objectionable on a purely sanitary point of view. It may, however, be accepted as a general rule that, when beyond two days' march of the enemy, sanitary considerations are as a rule to be considered first. The selection of positions for offensive or defensive purposes is treated as a separate subject, see article on "POSITIONS."

The Military considerations in selecting the site for a passing encampment or bivouac are abundance of wood and good water, and other supplies, and that it should be provided with facilities for internal communication, and that there should be easy access to the neighbouring roads. Although extension is good for sanitary reasons, yet it is very trying to men after a tiring march to have long distances to go for their rations, water, &c. The first sanitary consideration is that the men should have rest ; so after long marches, in taking up positions for a single night, the camp or bivouac should be compressed ; if a longer halt is to be made, it can be opened out the following day when the men have rested. Villages, defiles, rivers, and all other obstacles near the site selected should be in rear, so that they should not interfere with the next day's march ; for it is important to have plenty of clear space to start on, to avoid confusion ; see article on "BIVOUACS."

Sanitary considerations in selecting Sites or Encampment. A medel.

offr. selected for that purpose, should accompany the S.O. sent to select the site. He will make a report in writing for the C. of the S.'s information, as to its fitness in point of salubrity, and will indicate the precautions required for improving its sanitary condition; he will report upon the quality of the water, and upon the precautions he considers necessary for purifying it. There are many places which at certain seasons of the year may with safety be occupied for a few days, where at other times it would be madness to encamp. There are rules which must not, under any circumstances, be neglected if the camp is to be permanent, and indeed the extent to which they can be disregarded at any time is to be measured by the exigencies of the moment. If obliged to encamp in a position where you expect to accept battle in a week, or a month, pitch on ground in advance of the position you must occupy when the enemy is in your presence; you then secure a fresh place for your men, and leave him a dirty one when he moves to attack you. Avoid encamping or bivouacking in graveyards; get as far to windward of them as possible. Avoid encamping on ground that has been encamped on before, and, if obliged to camp near it, go to windward of the old site. Avoid all rivers with marshy banks and marshes of every description. If obliged to camp with a small force for a day or two near a marsh, if possible place yourself so as to have a hill, or even some rising ground or woods, between you and it.

The water should be well tested, and the inhabitants questioned about it. A grass country with a sandy or gravelly subsoil is the best; land with a clayey subsoil is damp and to be avoided if possible; all brushwood should be avoided. Forests lately cut down are dangerous, particularly in hot or tropical countries. In temperate climates, if the country is well settled and the people have a robust appearance, it is the best guarantee of the healthiness of the place. There should be good natural drainage; ground sloping to the east or south is to be preferred. The banks of running rivers are good, provided their edges are not marshy. Sites on granite, metamorphic, clay-slate, and trap rocks are good. When, however, these rocks have become disintegrated, they are supposed to be unhealthy, and this rule has certainly proved true regarding Hong Kong and Kowloom. Limestone and magnesian limestone are also healthy when there are not marshes which are common in these formations; water there is good, but hard. Chalk is good when unmixed with clay; water is pleasant and good. When the chalk is so mixed with marl as to become impermeable, it is damp and likely to prove unhealthy. The permeable sandstones are very healthy. In reporting on proposed sites for encampments, note especially these points, viz.: supply of water, quantity and quality; supply of wood and provisions; roads leading to, and means of lateral communication; nature of cultivation, of soil and subsoil; shape of ground and strength or other

wise as a military position. Furnish your suggestions as to best form for camp, &c.

Marching into Camp.—The position for the army to encamp in should when practicable, be selected either the day before, or as many hours before the arrival of the troops as possible. It is advisable that a S.O. and the F.O. of the day from each brigd., a mounted offr. from each battn., and an offr. and the Q.M. Sergt. from each cavly. regt. and battery, should gallop on with the S.O. of each divn. when within a few miles of the ground for the purpose of having the exact position that each is to occupy pointed out to them. Each of these offrs. should know the number of paces required for his regt. when in line. When they have marked where their right and left is to rest, any N.C.Os., or orderlies that may have accompanied them being left on the ground, they should return to their brigds. or corps, noting in their minds as they do, the best roads or paths by which to conduct them to the position allotted to them. As the troops approach their camping ground, they should form column; when halted—generally in *mass of columns*—on the ground they are to occupy, they will pile arms, take off packs, and if it is safe to do so, take off their accoutrements also. B.Ms. having notified the C.Os. of the numbers required for piquet, and the places they are to go to, they will at once be marched there. The regtl. guards to be told off and mounted by the adjutant. The remaining men to be told off as detailed in article on "CAMPS." In the case of an army corps marching by only one road, it is absolutely necessary that it should encamp or bivouac in several lines, each line being, if possible, astride on the road. The depth of an army corps in column of route is so very great that, if it were attempted to encamp it in one single line, the troops in the rear of the column would not arrive at their camping ground until late in the evening. Even for a divn. moving by one road, it is desirable to encamp it in 2 or 3 lines, by brigds. or by lines formed of the advd. gd., and the main body, &c., according to whichever may be most convenient for the order of the following day's march, or most suitable to the formation of the ground and the roads and paths over it, and the facilities for obtaining water, firewood, and forage.

Staff **Duties when Divisions encamp or bivouac.**—The A.G. of the army corps, or his deputy, having pointed out to the S.O. of each divn. where his right and left are to rest, will tell them where the Hd. Qrs. are to be, detail the watering places generally for each divn., inform them of the roads that require most watching, stating where they lead to, and the distances, &c., point out the villages or localities in front where the right piquet of each divn. is to rest, and state whether it is to be of cavly. or infy., &c., &c.

The S.O. of the divn., having pointed out to each B.M. the line that is to be the front of his brigd., will at once make the necessary arrangements as to the water supply. If the same tanks, wells, &c., are to be used by several

divns., an arrangement should be made between the S.Os. of each as to the guards to be mounted, and the regulations to be enforced. Each S.O. should take care that he has good open communications with the nearest main roads. The front should be cleared, or if too close with hedges, and the halt is only for the day, wide openings should be made in them, to be increased every day that the force remains stationary. The divn. Hd. Qrs. should be as near the centre of the divn. as possible, and indicated to the B.Ms. and F.O. of the day. The Brigadiers to take up a position as near the centre of their brigds. as possible for their brigade Hd. Qrs. The position for the commissariat to be pointed out to the Commissary in charge, also that for the Fd. Hospls. to the divisional P.M.O.

Refuse Receptacles.—The A.A.G. of each divn. will point out to the B.Ms. the spot where all refuse is to be buried or burnt: these sites will be selected with due regard to the prevailing wind, as they should be to leeward of the camp. Places will also be selected where all transport animals that die should be buried. In some countries it is better to drag out dead horses and camels a mile or two to leeward of the camp, cut them open there, and trust to their being eaten by vultures, dogs, &c.

The C. of the S. after taking the General's orders will, in conjunction with the F.O. for the day, decide upon the number, description, and position of the piquets to be mounted. Having done so, he will inform the B.Ms. of those that are to be furnished by each, indicating as nearly as possible the spot that each is to occupy. If the F.O. for the day is to be trusted, he may be allowed to dispose of them himself, but as a rule it is better that a S.O. should go with him, and see them properly posted. The B.Ms. will, therefore, upon receiving orders on this point, detail the piquets and point out to the adjts., as nearly as possible, the position to be taken up by each, going out himself with that one which is the most central as regards his brigd. Assuming that the army is well protected from surprise by the outposts of the advd. gd., as a general rule, when a divn. is encamped in line with others upon its flank and rear, one piquet (a company) from each brigd. will be all that is required. The system of piquets being first paraded and inspected by the adjts. on their regtl. parade grounds, then by the B.M. on the brigd. parade ground, then marched to the divnl. parade ground, and most likely kept waiting some time at all 3 places before they are finally marched to the position they are to occupy for the night, is refined cruelty, and can lead to no good; it is a piece of stupid routine that is only suited for children. Soldiers hate being "humbugged about." The piquets should be detailed and marched off from their own parades in the direction of the place they are to occupy immediately when the divn. halts. It is easy to tell an offr. to move upon a certain village, rock, clump of trees, and wait there until the F.O. fixes upon the exact position for the piquet. Leaving his junior to look after the camp, the

senior S.O. must ride round the front, and examine the features of the country, to as great a distance as time and circumstances will admit of. The telegraph wire will generally be laid down from the divnl. or corps Hd. Qrs. to some point on the main line. Arrangements must be made for communicating by signal with the outposts, or with any detached force in the vicinity which is not in telegraph communication with the main body. At a certain hour in the afternoon, to be fixed by the A.G. of each army corps, the senior S.O. of each divn. must be at his tent for orders for next day's march, or if halting, regarding the work to be done. He will have to arrange for the transport of the sick to the nearest hospital in rear. A staff offr. from each divn. should visit the advance piquets and watering places of the several divns. every evening. If halting for a day or two, a similar visit should be made at early dawn, when the piquets are being relieved. He should daily ride round the camps of the several corps to see that they are in good order, the latrines and cooking places made, &c., bringing to the notice of C.Os. and brigadiers all irregularities.

INTERNAL ARRANGEMENT OF CAMP.—The site having been chosen carefully, it is taken for granted that the natural drainage is good. Although the camp had only been pitched with the intention of remaining there a day, circumstances may convert it into a residence for months ; therefore from the moment the tents are up, or the bivouac formed, every exertion should be made to carry out all the works that are required in standing camps. Those that should be attended to by each individual regt. are as follows, each being placed in this list according to its relative importance :—

1. Tents to be neatly pitched according to order.
2. Cooking places marked out, and a kitchen constructed for each company.
3. Latrines dug.
4. A trench of 4″ deep (the width of the spade) dug round the outside of each tent.
5. If the regt. is alone, make a watering place ; if encamped as part of a divn., this should be attended to by the staff.
6. The natural drainage so improved that all water flowing from the tents into the small drains round them should be led off by deeper drains into the nearest ravine or rivulet.
7. Make racks for arms in front of each company's tents.
8. Make paths with stones in front of each row of tents, &c.
9. Erect sentry boxes or shades.

1ST. TO LAY OUT THE CAMP.—In deciding upon the form of encampment, the following principles should be borne in mind :—

a. As a general rule, cavly. and infy. should encamp in column of squadrons or troops and of companies, the front of the camp covering exactly the space covered by the regts. when deployed into line (allow-

ance being made for intervals between corps), the lines of tents being in fact on the prolongation of the squadrons or companies as they stand when in column. R.A. always encamps in line, and if possible with full intervals.

b. The camp should be formed to the reverse flank, when the line had broken into column.

c. Clear passages for guns and troops through the camps from front to rear should be provided for. The "*Intervals*" between regts. are generally sufficient for this purpose ; the interval between battns., or regts. of cavalry is 25 yds. ; between batteries it is 28½ yds. or 34 yds., according as the guns have either 6 or 8 horses. In marking out the front of the camp for a divn., it cannot be expected that every corps should be exactly in alignment one with another, as the configuration of the ground must greatly influence it. When, therefore, it is necessary that the front of one battn. should form a salient angle with that of another, care must be taken to allow a sufficient interval between them in front, so that the regulated space shall be maintained all along the depth of both camps. When troops are encamped in 2 or 3 lines, from 200 to 500 yds. should be left clear between the rear of one line and the front of that behind it.

The space required for the encampment of a battn. of infy. on war establishments is a frontage of 320 yds. and a depth of 266 yds., when full distances between companies are allowed. This provides for a parade ground of 80 yds. in depth ; but when the ground is restricted, this may be dispensed with, as also the space in rear of the baggage, so that a battn. may, when necessary, be easily encamped upon a depth of 150 yds. The frontage may under similar circumstances be reduced to 120 yds., by having only 15 yds. between the rows of tents, instead of 40 yds. as shown in sketch.

The space required for a regt. of cavly. on war establishment is a frontage of 284 yds. and a depth of 436 yds. when encamped (as shown in sketch) in column of squadrons, and providing a parade ground of 80 yds. in depth. When space is an object the front can easily be reduced to 140 yds. and the depth to 336 yds., dispensing with the parade ground and closing up the baggage nearer to the offrs.' tents. Horses when picketed require a width of 6', so when the available depth is much less than 336 yds. a cavly. regt. on war establishment should encamp in column of troops.

The space required for a Battery of Artillery is 110 yds. and a depth of 142 yds.

A Divn. Encamping.—The B.Ms. having been pointed out by the A.A.G. the line that is to be the front of their brigds., must make the necessary arrangements for any deviation from it which the nature of the ground may render essential, and will point out to the Q.Ms. of corps the exact spots where their right and left is to rest. The regts. and battns. being formed in column, with an interval of 6 paces between the reverse

flank of the strongest company or squadron and the front of the camp as marked out by the regimental Q.Ms. the tents of each company or squadron will be pitched in line with them as they stand in column. Each company and squadron to be told off into squads of whatever may be the number of men it is intended should be in each tent. The regulation number is 15 for a bell tent, so the squad will be generally of 14 privates and 1 N.C.O. each. The 14 privates to be divided into 6 tent-men, 2 woodmen, 2 water-men, 1 cook, with 3 for duty if required. In the infy. arms will then be piled, and packs taken off (when at a distance from the enemy, accoutre-ments also), and hung upon the arms. In the cavly. as soon as the horse lines are marked out, the squadrons will file off to them, the men dismount, picket their horses, loosen girths, and remove bridles, placing them with their arms in rear of their respective horses. In the R.A., the battery being formed in column of subdivisions with the waggons in rear of the guns, and at such a distance from them as will allow plenty of room for the horses at the picket ropes, the horse ropes will be stretched between the gun limbers and waggons, the horses will be unhooked and filed off to their respective places. Kickers and vicious horses should be picketed at some distance from the others, each with a heel rope. The tents of each company or squadron, as they are taken off the waggons, will either be placed on the reverse flank of the arms by the Q.M. or distributed by him to the tent-men from one general pile. It is of consequence that the same tents should always be given to the same company and same squads. The Q.M., by pacing the front and flanks of the camp, fixes the position of each row of tents. The 6 men to pitch each tent are numbered off by the N.C.O. of the squad from 1 to 6, their respective duties being as follows: No. 1, front-rank poleman, No. 2 rear-rank poleman, Nos. 3 and 4 pegmen, Nos. 5 and 6 packers and unpackers of the tent. The N.C.O. of the party to superintend, and see that the pole is placed on the spot marked off for it, that it is upright, that the door is properly placed, that the cords are stretched in a line with the seams of the tent, that the slides are made fast at equal distances between the tent and the pegs, and also to enforce silence. The senior major will dress the polemen of the front row of tents from the right so that they shall stand exactly on the line marked out by the Q.M. as the front of the camp, and the captn. of each company will from them dress the polemen of his squads, who whilst being so dressed will stand at attention facing the piles of arms, at the number of paces one behind the other that the tents are to be, one from the other (not less than 20 paces if possible). No. 1 will at once drive in a peg to mark where the pole is to rest: rear-rank polemen, having in the meantime joined the two pieces of the pole together, hand them to their front-rank men. The peg-men at the same time distribute the pegs where they will be at hand when required. Nos. 5 and 6 have in the meantime unpacked the tent and

stretched it out flat on the ground, with the tent door hooked across and uppermost, when it will form a triangle, the base of which should be one

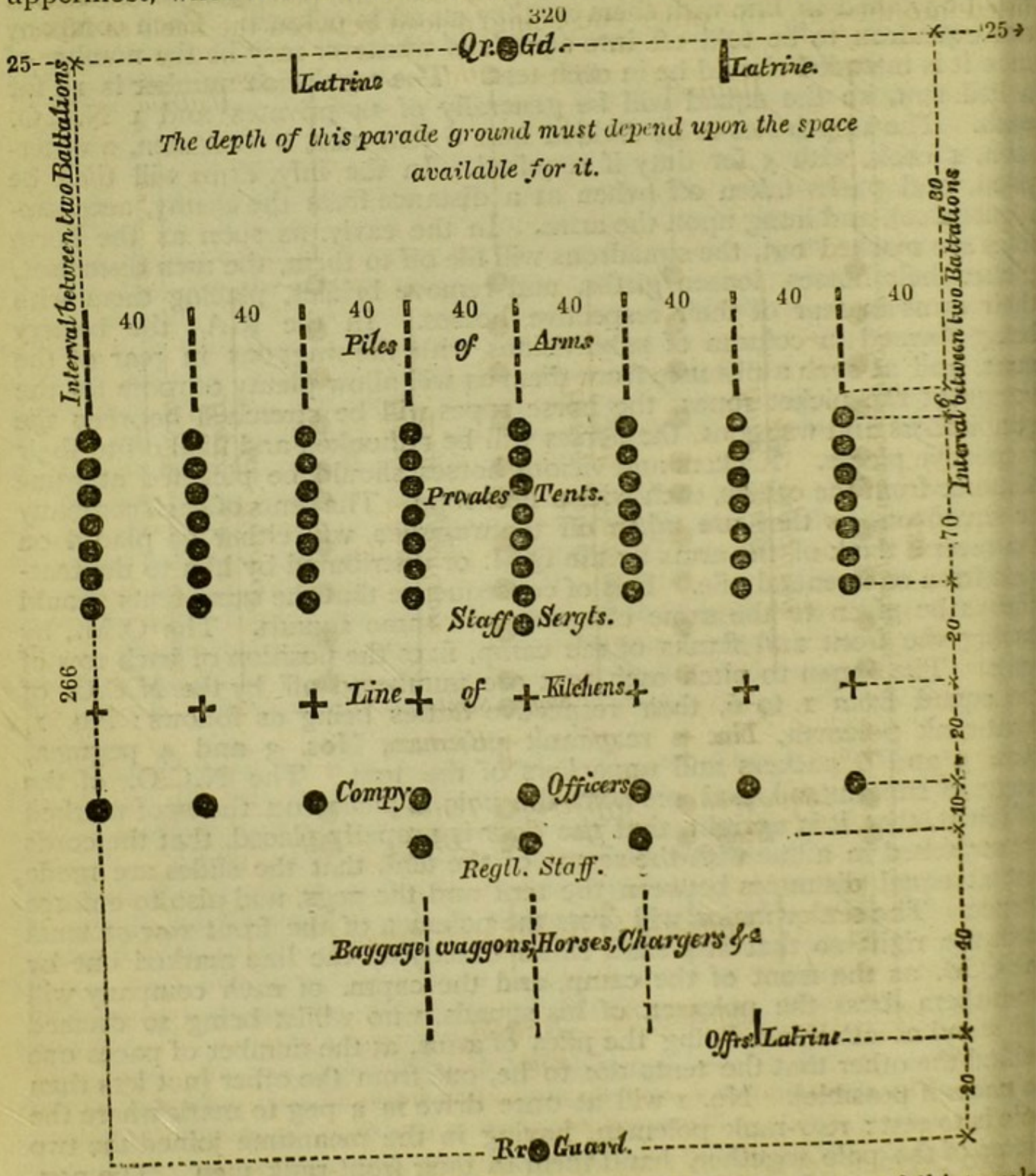


Fig. 17.—Camp of a Battalion of Infantry on War Establishment, at full intervals. Measurements given in yards.

pace away from the feet of No. 1, with the apex pointing towards the companies' tents in rear. The polemen then insert the pole, so that one end is fitted into the cap, the other end being placed between the heels of No. 1,

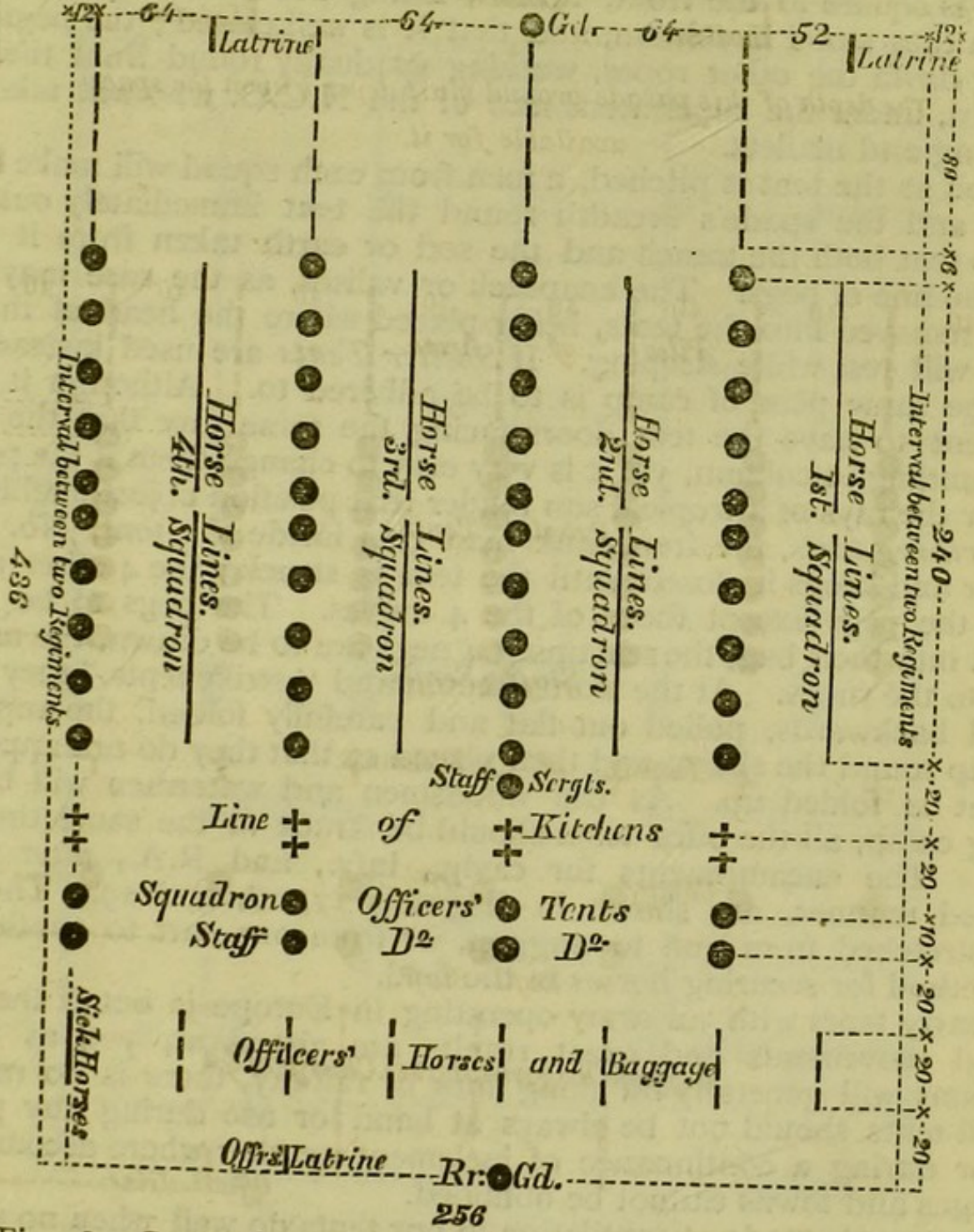


Fig. 18.—Camp of a regiment of Cavalry on War Establishment.
Measurements given in yards.

he two pegmen get hold of the two (front-angled ropes, the two packers of he two rear-angled ropes which are marked with red to distinguish them rom the others). Upon the word of command "raise tents," the poles to be

at once elevated by Nos. 1 and 2, the former getting inside the tent and keeping the pole in a vertical position by putting the end of it between his feet ; the 4 angle ropes to be at once pegged down, No. 2 taking care that the door is square to the front, that is, facing the same way that the men did when they stood in column, and that it is well closed ; the pegmen will then peg down the other ropes, working gradually round from their left to their right, under the superintendence of the N.C.O. who will take charge of tent bag and mallets.

As soon as the tent is pitched, 2 men from each squad will make a trench 4" deep and the spade's breadth round the tent immediately outside the walls, so that both the trench and the sod or earth taken from it shall be within the line of pegs. The knapsack or valises, as the case may be, will then be removed into the tents, being placed where the head of the owner of each will rest while sleeping. If *Shelter Tents* are used instead of bell-tents, the same plan of camp is to be adhered to. Although it is more convenient to have the tent doors facing the same way that the men do when standing in column, yet it is very easy to change them if the prevailing winds or the rays of a tropical sun render that position objectionable.

In striking tents, the front-rank man gets inside the tent, No. 2 closes the door and keeps it closed until the tent is struck ; the 4 other men pull out all the pegs except those of the 4 angles. The pegs to be collected and put into their bag, the remaining 4 pegs are to be drawn, the men holding on to the ropes. At the word of command "strike tents," they are to be lowered backwards, pulled out flat and carefully folded, the ropes being rolled up round the slides, and then placed so that they do not appear when the tent is folded up. As the woodsmen and watermen will be idle in striking camp, all the offrs' tents should be struck at the same time as the others. The encampments for cavly., infy., and R.A., after the most approved manner, are shown in diagrams 17, 18, and 19. The plan of ropes stretched from gun to waggon, or from one cart to another, is the best method for securing horses in the field.

To carry tents with an army operating in Europe is out of the question if rapid movements and great results are aimed at, yet, as in future operations will generally be along lines of railway, there is no reason why the bell-tents should not be always at hand for use during any prolonged halt, or during a continnance of inclement weather where accommodation in villages and towns cannot be obtained.

The attempts made at ventilation in our tents do well when no more than one or two live in them ; but when the number is beyond a dozen, the tin openings for fresh air are of no practical use. The only plan is to insist on the doors being kept open when it does not rain. When it is remembered that each man requires about 4 cubic feet of air per minute, it is unnecessary to dwell upon this point.

The Cl.-Serjts. to be always in the rear tent of each company; the Serjts-Mjr. of troops to be, one in the front tent, the other in the rear tent of each squadron. The largest possible space should be covered by each corps when no military reason forbids such expansion. The practice

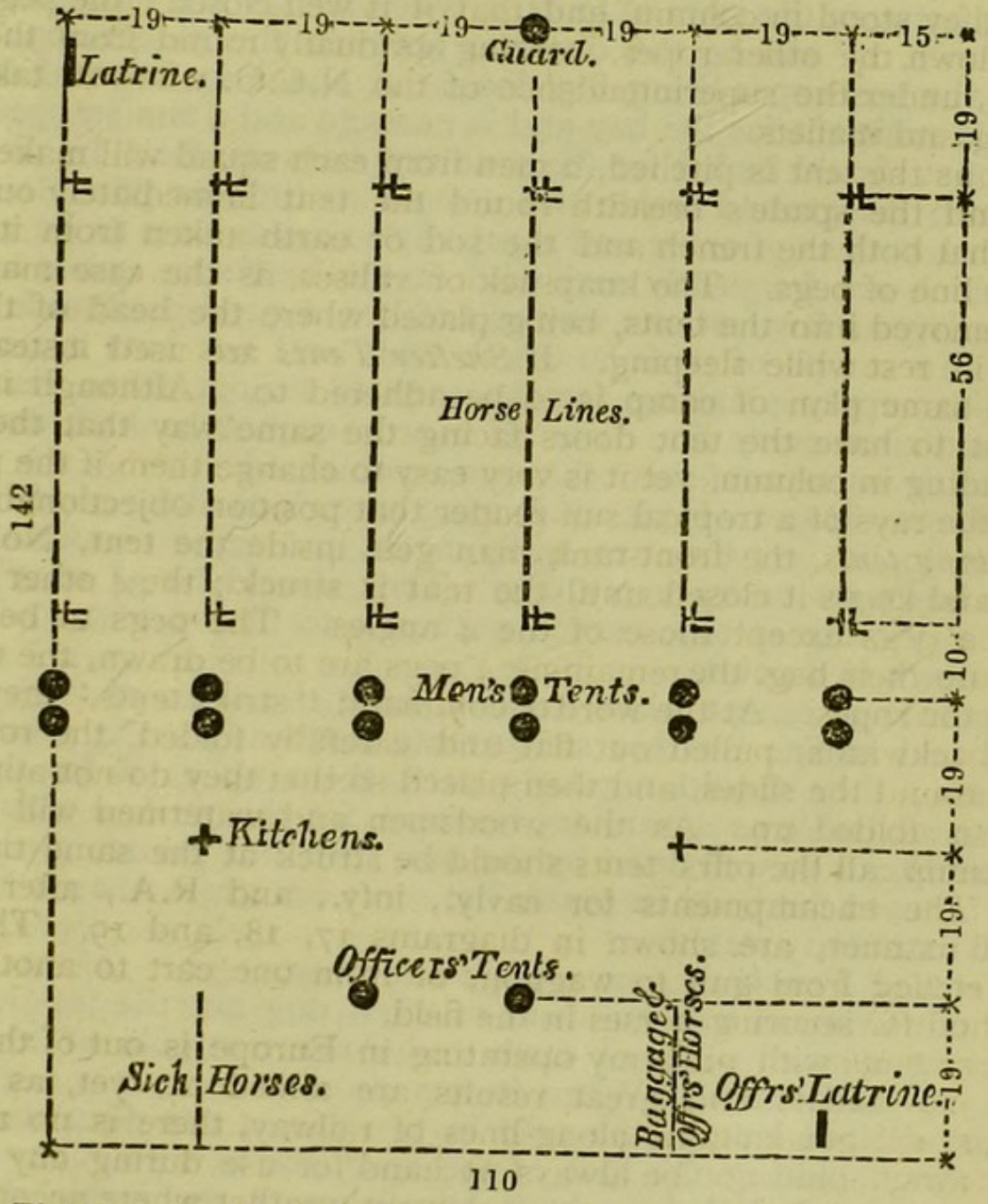


Fig. 19.—Camp of a Battery of R.A. on War Establishment.
Measurements given in yards.

of closing up the tents of every 2 companies together should be discontinued. The distance between the lines of tents depends upon the number of files in each company or squadron in the same way as distances in column are calculated.

Horse lines.—The length of the horse-lines of each squadron will be

according to the number of horses in it, 6′ being allowed for each horse when possible, but never less than 4·5′. If space is limited, a cavly. regt. can encamp by troops instead of by squadrons, the regt. being formed up in open column of troops ; the tents will be pitched as for infy., the horse-lines being between the rows of tents. When horses are pitcketed by head and heel ropes, 15′ will be the distance between the picket rope and the heel pegs, the heel ropes being 8·5′ long. A space in front of the picket rope of 6′ is sufficient for the hay and a passage and a similar space behind the heel ropes should be left for the saddlery, harness, &c. In pitching the tents, disturb the ground inside and around as little as possible. Do not allow absurd notions of order and regularity to cause tents to be pitched in hollows which are frequently met with in the best sites, when by moving the tent perhaps a few feet one way or another, a good position for it might be found. In camps of position where tents and not huts are used, it is advisable to supply planking for the men to lie on, these planks to be removed and aired every fine day. If boards cannot be had, use any sort of tarpaulin or waterproof sheet that can be obtained.

Straw Mats.—If straw is plentiful, issue enough to make good thick mats for the men to lie on ; they are easily made, and most comfortable ; they should be hung up to dry every day. They should be 3″ or 4″ thick, 6′ long, and 2′ 3″ wide at top, curved outwards to fit the tent, and tapering gradually down to a point.

Every morning, except when it rains, have the sides of tents rolled up all round, and in fine weather strike tents frequently ; it is good practice for the men ; they should regularly pack them up as if for the march. This is also advisable as a sanitary measure, for the ground where the tent usually stands can be well dried by the sun. Do not permit grass or green leaves to be used for beds in tents, but serve out straw when it is possible, to be used as already stated.

The Circular Tent is the one used in our army.

During the Crimean war numbers of offrs. dug out the interior of their tents, leaving a small pillar of earth under the tent-pole of about 1′ at top, and 18″ at bottom. When it was possible to obtain a good stout spar of the desired length, the pole in two pieces was discarded, and the pillar cut away, placing the foot of the spar (the new pole) on the bottom of the excavation. A ledge about 9″ all round the inside of the tent was also left, which served as a shelf, so that the excavation was only about 11′ in diameter ; the interior superficial space was consequently very much reduced, although the cubic contents were greatly increased as also the general comfort. There is an art in pitching a tent, which camp life soon imparts to soldiers. They should, however, go through an annual course of instruction in tent-pitching, when the matter should be explained to them. In sandy places it is difficult to keep tents standing in

a high wind, as the pegs draw. Large stones, pack-saddles, &c., should be used to fasten the ropes to ; bushes buried in the sand, the branches pointing towards the tent, with one left sticking up over the sand to fasten the rope to, form the most secure means of keeping tents erect, as they form a species of anchor ; a flat stone or piece of wood should also be placed under the tent-pole, to prevent it from sinking into the ground.

The Shelter Tent we now possess is too heavy and fulfils few of the purposes for which it was originally designed ; bell-tents for a force weigh about the same as our shelter tents for a similar number.

Previous to retiring for the night, all the tent-ropes should be slacked off a little, as the rain or dew will tighten them enough to draw the pegs, and strain, if not tear the canvas. At night and during wet weather all the arms should be replaced in the tents, and fastened with a string round the tent-poles.

2nd. COOKING PLACES.—Each company should have its own kitchen in rear of and in line with its own row of tents. The simplest kitchen consists of a trench dug in the direction that the wind is blowing, of such width that the kettle, when placed on it, should not rest above an inch on each side ; when Flanders kettles are used, the width should be 9″ ; its depth should be 12″. at the end from which the wind is blowing, and continue that depth for 4′, decreasing then gradually to 3″ at the opposite end, where a space must be left equal to the breadth of the trench, to serve as a chimney. For a company on war strength, two such trenches will be required each 10′ long. The fire is lit at the end where the trench is deep ; it should not extend beyond 3′ or 4′ up the trench. The kettles are placed touching one another along this trench ; dry sods should be used to stop up the chinks made by the roundness of the kettles, so that the space under them may form a flue. It is advisable to pile up sods, or, with stones and earth, to erect a chimney of at least 1′ in height at the end away from the fire. All grass round the fire-places should be cut to prevent accidents from fire. If the force halts for more than one day, these kitchens are susceptible of great improvement ; the chimney can be made of mud or kettle and daub, and the draught may be increased by using short pieces of hoop-iron as bars, stretched across the trench to support a filling in of clay round each kettle, or in other words, to make a regular place for each kettle, into which it will fit exactly, so that its position may be frequently changed, to prevent the contents of one being cooked before the other. If the day following the wind may change to an exactly opposite direction, a similar trench must be dug in continuation of the former one, the same chimney being used. In this manner the same chimney will serve for trenches cut to suit the wind blowing from all 4 quarters. The openings from these trenches into the chimney must all be closed with a sod, except that one to be used when the fire is lit. In some places, where bricks or

stones suitable to the purpose are to be had, it is better to construct these kitchens on the ground instead of below the surface. In well-wooded countries like America, 2 logs rolled together in the direction of the wind, the fire being kindled between them, make a good kitchen. In such places fuel is no object, so the construction of chimneys can be dispensed with, and the kettles hung from a stick resting at each end on a forked upright. Near the cooking-places, a small *filth-hole* should be dug to leeward of the camp as a receptacle for all cooking refuse, potato peelings, &c. ; the old one to be filled up with the earth well rammed down over it, and a new hole opened every 2 or 3 days. All refuse that will burn, should be burnt.

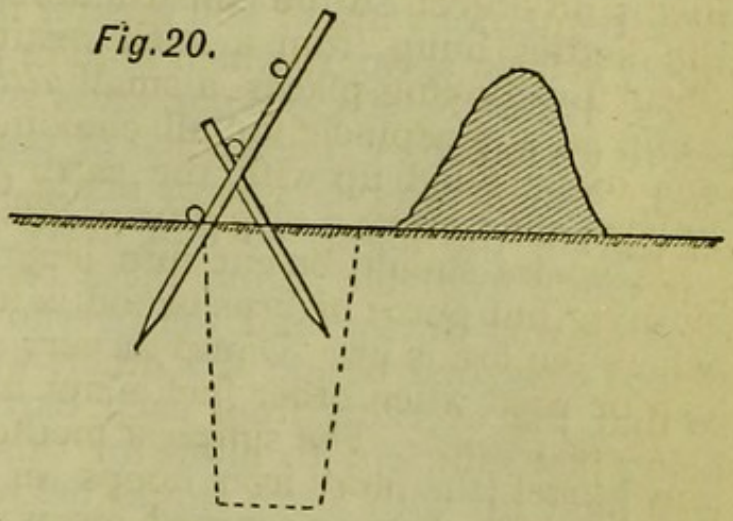
Firewood should be cut into lengths of 1′ and about 2″ square. When nothing but gorse or brushwood is to be had, the trench must be deepened where the fire is lit. Damp or very sappy wood should be avoided. Bones can be used when other fuel is not to be had.

Field Ovens.—The simplest method of making them is as follows. Take any barrel (the more iron hoops on it the better), the head being out ; lay it on its side, having scraped away the ground a little in the centre to make a bed for it ; or if there is a bank near, excavate a place for it, taking care that the end of the barrel does not reach within 6″ of the edge of the bank. Cover it over with a coating of about 6″ or 8″ of wet earth or thick mud, except at the open end, which is to be the mouth of the oven. Pile up some sand or earth to a thickness of about 6″ over the mud, arranging for an opening 3″ in diameter being left as a flue (to increase the draught) to lead from the upper side of the barrel, at the far end, through the mud and earth. This flue is only left open when the fire for heating is burning ; when the bread is put in, it should be covered over. Form an even surface of well-kneaded mud at the bottom within the barrel, to form a flooring to place the bread on. Light a fire within the barrel, and keep it up until the staves are burnt. You will then have a good oven of tough burnt clay, tied together by the iron barrel-hoops. When required for use heat it as if it were an ordinary oven ; when the ashes are drawn out and the bread put in close the mouth with some boards or a piece of tin or iron from a case in which preserved potatoes or other perishable stores have been issued. These ovens were frequently used during the Red River expedition, and answered admirably.

3rd. LATRINES.—As soon as the place has been marked out for them by regtl. Q.Ms., if possible to leeward of the camp or bivouac, they should be commenced by fatigue parties. Those constructed at first should be 3′ wide at top and 1′ at bottom, 2′ deep, and about 12 paces long. The earth, as it is dug out, should be thrown so as to form a bank to the rear and sides, sods and any large stones on the spot being used to revet the inner faces of the bank. If the force halts for more than one day, latrines on a larger scale must be constructed : they should be 5′ or 6′ deep, and

wider at top and bottom than the smaller ones. If possible, a rail or post of some sort should be erected along the edge for the men to sit on; it should be 18" above the ground, and can be supported by forked posts at the ends; another should be lashed on at 3' from the ground to serve as a back rest, and another laid on the ground for the feet to rest on; see diagram. If trees or brush are in the neighbourhood, it can be inclosed by a screen about 4' high, and if time permits, roofed in also. From 15 to 20' of trench is required per 100 men. Twice a day, about 10 A.M. and 6 P.M., the bottom of each pit should be covered with a 3" layer of dry earth, not sand; the wood ashes from the cooking-places should be spread ...ut in the vicinity, particularly where the men's feet rest within the inclosure. If lime is to be had, it should be used in large quantities. C.Os. should hold their Q.Ms. strictly responsible that these duties are carried out efficiently. The work should generally be done by defaulters; and it is advisable that the same serjt. should always have charge of them, so that he may be conversant with these duties, taking his orders daily from the Q.M. When a latrine becomes nearly foul or full, it should be carefully filled in with earth well trodden down, but having a small mound over the spot to mark it. The health and comfort of every one in camp depends very much upon the manner in which these duties are conducted, and the Milty. Police should be held responsible that all men who ease themselves elsewhere than in these latrines are duly arrested. With Indian troops certain localities to leeward of the camp should be fixed upon for them to go to the rear.

Fig. 20.



4th. DRAINS ROUND THE TENTS; they have been described already.

5th. WATERING, WASHING AND BATHING PLACES.—If there is, or is likely to be, any scarcity of water, sentries must be posted over the wells or streams from which it is drawn, and it should be laid down as a rule, that the captain and subaltern of the day on duty in each battn. must visit during their tour of duty the sources from which water is supplied to their men, to see that no irregularities take place there. Immediately that troops reach the ground where they are to encamp or bivouac, water guards must be told off, and orders issued by the Staff for their guidance: in many places such guards should be commanded by offrs. If the supply is from a running stream, the greatest care must be exercised to prevent men from washing clothes, or bathing in it above the point where the drinking water is to be drawn. Two points should at once be marked off: above the first,

water for drinking and cooking to be drawn ; between the two, horses and cattle to be watered ; and below the second, all washing and bathing to be carried on. This is an arrangement of the first importance, both for health and comfort. When positions are to be occupied for any length of time, these regulations are of still greater moment. In many instances the water supply is from springs, which require nice care to make them answer all purposes. Before Sebastopol our water supply was from springs and a few wells ; before we left the Crimea some of our watering places were models of their kind. Small reservoirs were made to catch and hold the supply that ran off during the night, so that every gallon of water that the spring gave was made available : from these reservoirs all the water for drinking and cooking was drawn, and the overflow passed off into a series of ½ barrels placed close one beside the other, with a little tin gutter connecting each, so that the overflow from each barrel filled the one next below it, the fall being just sufficient to allow for this. Say you have 25 of these ½ barrels well built up with loose stones below, 50 horses can water there at a time, 25 horses at each side of the row of barrels. Horses, mules, and bullocks drink about 1½ galls. at a time, and take about 3 minutes each in doing so. The overflow of the lowest barrel is again collected in a reservoir for washing clothes, &c. An offr. should invariably accompany all cavalry watering parties, and instructions should be given that each horse as soon as he has drunk should leave the water, and the party should fall in at a little distance clear of the next comers. Such watering places must have at least 1 or 2 sentries always on duty by day and one by night, to see that the orders regarding them are strictly carried out. They should be visited every day by the B.Ms., and by all the S.Os. of the divn., also by the F.O. on duty, and by the provost sergts. These barrels should be well charred inside ; the more frequently the process is gone through the better. When the same watering places are used by one or more divns., increased care is necessary, and mutual arrangements must be made on the subject by the G.Os.C. concerned. One frequently meets with springs from which the supply is small and difficult to obtain. Dig these out a few feet, and insert a cask charred inside, perforated all round with holes (½-inch), and from it the water may be drawn easily. If animals are to be watered at very shallow streams, dams should be constructed to deepen them, as animals drink more rapidly when the water is about 4″ or 5″ deep.

When *wooden troughs* are constructed, they should be strongly fixed in cradles or trestles backed with stone : their bottoms to be about 2½′ above the ground : they should have a width of 1½′ at top, with a depth of from 8″ to 12″ : 120′ is a good length for them.

FILTERS.—Two barrels, one inside the other, having a space of 4″ or even 6″ clear all round between them filled with layers of sand, gravel, and charcoal, form an excellent filter. The inside one, without a bottom, rests

on three stones placed in layers of sand, charcoal, and coarse gravel: the water flowing or being poured into the space between the two, and having thus to force its way through these substances into the inner barrel, becomes purified. If the water is a small spring gushing up out of the earth, the 2 barrels may still be used, but the outer one must have the bottom well perforated with holes, and the inner one having the bottom in, and being pierced with holes round its sides near the top, through which the water, having risen from the bottom of the outer barrel (by the holes pierced there) through alternate layers of gravel, charcoal, sand, and moss, passes into it clear and pure. In both these filters the water should be drawn off by means of a pipe running through the outer into the inner barrel. For these filters animal charcoal is the best. When, after a time, it ceases to act, it should be removed and well dried. It can then be used again to advantage. It is impossible to use too much of it. Marsh water is most injurious. In India, well water should always be used in preference to that from tanks or jeels.

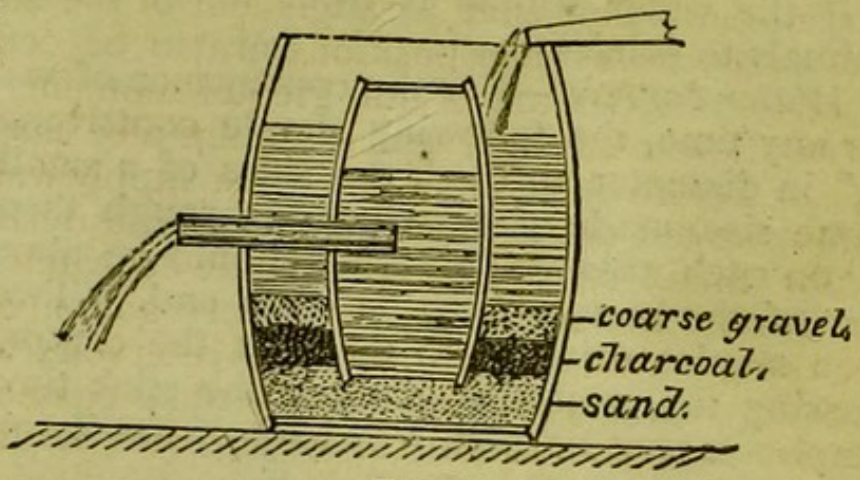


Fig. 21.

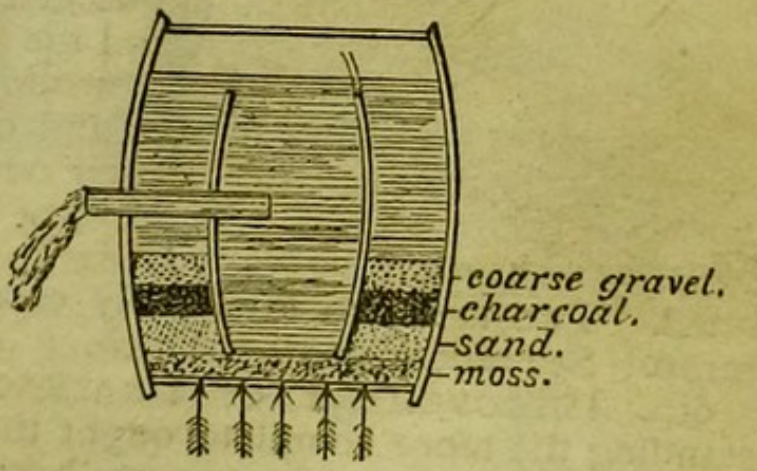


Fig. 22.

Pumps.—There are 3 kinds of pumps generally used for military purposes.

1°. A small hand, lift and force pump with flexible hose: this will draw water from 18′, and throw it about 16′, working with a lift of 18′ and a throw of 7′ (the height of an ordinary water cart); it will yield 7 galls. per minute.

2°. The Norton tube well. This consists of tubes driven into the ground with a monkey, and with a pump screwed on the top. One of these wells takes about 3 hours to fix. It will yield about 7 galls. per minute, and will keep 3 horses drinking at one time. *These pumps are very useful in searching for water.*

3°. The "Bastier Pump" is a pump with an endless chain, working

over a wheel; it yields, from a depth of 45′ (worked with 2 men), 2200 galls. per hour.

If the water supply is from wells, troughs must be provided for the animals to drink out of.

Water barrels.—For the conveyance of water when troops are stationary for any time, the following simple contrivance is very useful; bore a hole 2½″ in diameter through the sides of a small barrel, and pass a stick of the same size, made of hard wood, through them, so that it may project about 6″ on each side. This hole should be about 6″ or 8″—according to the size of the barrel—from its open end. Two poles about 5″ long, having iron staples driven into them at the centre, are used for carrying it, by passing the projecting ends of the stick through the staples. When iron staples cannot be had, a lashing of small rope or stout cord may be substituted. Two men can thus easily carry a large quantity of water about at camp. See accompanying sketch.

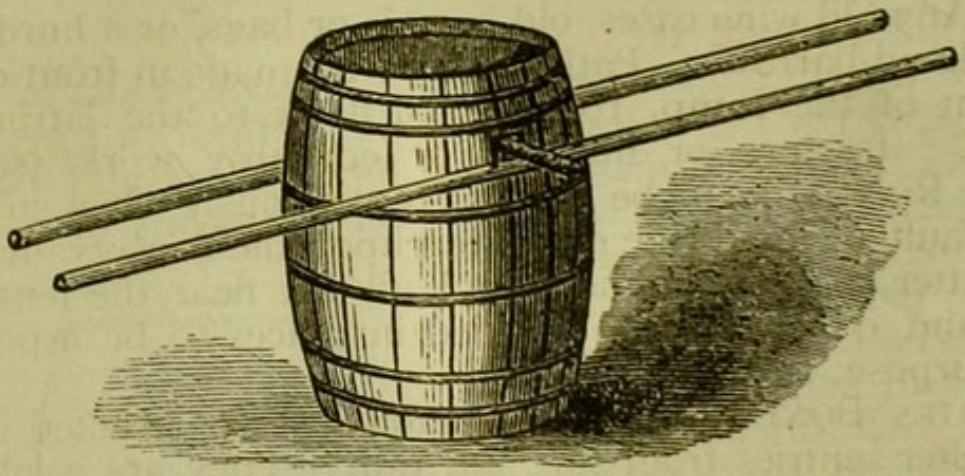


Fig. 23.

6th. IMPROVEMENT OF DRAINAGE.—The longer the camp remains standing the more complete ought the drains to be made. Wherever it is necessary to construct large ones, bridges must be made over them opposite the intervals between the regts. Large flat stones can be used to make a covered-in drain, or barrels sunk, and covered over with small stones and clay well rammed in round them, answer well.

7th. RACKS FOR ARMS.—These should be made where the arms were piled as the battn. stood in open column. They are easily made by driving in 2 forked sticks, one at 4 paces from the front tent, the other at from 20′ to 25′ from it, according to the strength of the company. They should be about 2′ in the ground, and just so much above it that, when joined by a bar on top, it should be 3′ 6″ high. In this bar nicks should be made at intervals of 4″ those on one side being opposite the centre of the spaces between the nicks on the other side. If wood is plentiful,

lay a rail on the ground at each side at 18″ from the uprights, cutting nicks to correspond with those on the top bar. These rails should be picketed down to insure them from slipping. Upon them the butts of the rifles are placed in the nicks, the muzzles resting in the nicks of the top bar. Stones neatly arranged will do well to rest the butts against where wood is scarce. Forked sticks, 6′ or 8′ long, connected by a top bar, should be placed in front of the tents, to hang wet clothes on, to dry blankets, &c. In countries where pine or spruce is to be had, young trees should be cut down, and the branches lopped off to within about 6″ of the stem. About 6′ of such a tree, sunk near each tent door, forms the best possible rack to hang belts on.

8th. STONE PATHS.—These add greatly to the comfort of troops in camp, especially in wet weather, and lend an air of neatness and cleanliness to the place which is very desirable. Stones should be collected by defaulters. Any old wine cases, old barrels or bags, or a hurdle, will supply the place of hand-barrows. Paths should be made in front of each row of tents, in front of the camp, round each flank to the latrines, along the kitchens, &c.; fascines or hurdles, or corduroy work (see Article on "CORDUROY ROADS") can be used advantageously when stones are not to be had. Defaulters should be employed upon the conservancy of the camp. All refuse matter from the kitchens and all dirt near the tents must be collected daily, and either burnt or buried in places to be especially marked off for that purpose.

9th. SENTRIES' BOXES OR SHADES should be constructed in all standing camps, to shelter sentries from sun and rain. They are easily constructed with hurdles; or if shade from the sun only is required, a few branches, interlaced and fastened to a pole driven into the ground, forms an umbrella-like protection that will answer the purpose well.

DAILY ROUTINE OF DUTIES IN CAMP.—The offrs. for daily duty in camp, in addition to those in charge of guards, are to be 1 or 2 generals of the day, according to circumstances and the strength of the camp. In large camps there is to be a Lt.-Genrl. of the day, and a major-general of each wing, or one major-general of cavly. and 1 of infy., and B. Ms., in the same proportion, a F. O. per brigade, a captain and subaltern of the day per regt. or battn., and 1 Adjt., and Q. M. of the day per brigd. The general of the day is to superintend the regularity and discipline of the camp in every particular; he is to visit the guards, and the outposts (unless the latter have been placed under the command of some particular offr.); he is to call out and inspect the inlying piquets as often, and at such times, as he thinks proper; he is to receive all reports from guards and outposts, and make immediate communication of any unusual occurrences to the G. O. C. The F. O. of the day has the general superintendence of the camp of the brigd.: he is to be present at the mounting of all the brigd. guards, which he is to visit by day and by night. The inlying piquets are always to be considered under his command; he is to call them

out, to inspect them, to order such patrols from them as he may judge necessary to insure the regularity and order of the camp, and, in the event of their being ordered out of camp on any duty, he is to accompany them. The captain of the day is to superintend the cleanliness and regularity of the camp of his own corps.: to attend the parading of all regtl. guards; to visit them by day and night; and to report everything extraordinary to the C. O. The subaltern of the day assists the captain in his various duties, and reports to him any irregularity which may come to his knowledge. The brigd. Adjt. of the day is to assist the B.M. in the various details of it, and in the absence of the B.M. is to receive and execute all orders; it may frequently be necessary for him likewise to attend for orders at hd. qrs. It is the duty of the brigd. Q.M. of the day to attend to the cleanliness of the camp, and take care that all broken glass and filth of every kind are removed, for which the Q.M. of each regt. is responsible as far as the camp of his regt. is concerned.

The offrs. on duty and those in waiting as next for duty, who are always to be named in orders, must never be absent from camp. No offr., without special permission from his G.O.C., must sleep out of his camp.

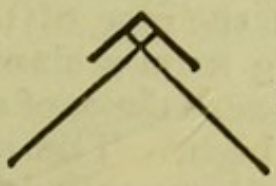
Camp Postmen.—In all large camps, special mounted orderlies should be detailed to go round to all Divnl. and Brigd. Hd.-Qrs. and to the offices of all heads of Departments at stated intervals with and for letters. In fact a system of internal post should be established in all camps to avoid the demands which P.M.Os., and others will otherwise make for foot and mounted orderlies.

On the arrival of a divn. or brigd. on the ground destined for its camp, the Qr. and Rr. Gds. of the respective regts. are to be mounted immediately, and all necessary advanced piquets posted. The grand guards of cavly. are next to be formed, and the horses picketed. The tents are then to be pitched; and until this duty is completed, the offrs. are on no account to quit their troops or companies, or to employ any soldier for their own convenience. G.Os.C. are not to leave their brigds. until the tents are pitched and the guards are posted. They are to encamp with their brigds. unless quarters can be procured for them in the immediate vicinity. Camp followers and retainers of an army in the field are subject, equally with soldiers, to the provisions of the A.D.A. Every encouragement is to be given to the people of the country occupied to supply the camp markets; and any soldier ill-using, molesting, or attempting to defraud them, or to exact anything for their free passage to and from the camp, is to be summarily punished in the most exemplary manner. All foraging parties, and those employed in carrying water, or collecting fuel or straw, are to be attended by a N.C.O. from each troop or company. If a party exceeds 20 men, and is to march any considerable distance from camp, it is to be under the command of a subaltern offr.

The troops of every branch of the service are at all times to be kept in readiness to turn out at the shortest notice. It is expected that in half an hour from the time the troops receive the order to march, either by day or night, the army shall stand formed at the head of its encampment, with baggage packed, and the whole force prepared

to move. This state of preparation is equally essential in cantonments and in camp; and in both the troops are to be accustomed to march without any previous notice. Regts. encamped near villages are to send frequent patrols into them to apprehend any soldiers who may be there without passes, or who, having passes, may behave improperly. Plundering and marauding are, and ever have been, considered highly disgraceful to soldiers, and unworthy of civilised troops. These offences are, therefore, at all times, and in all places, to be promptly and rigorously repressed, and it is to be considered an imperative duty on the part of all offrs. and N.C.Os. to interfere, and endeavour to the best of their ability to put a stop to any proceeding of the kind. All G.Os.C. are, as soon as possible, to make themselves acquainted with the nature of the country in the vicinity of the camp, with the roads, passes, bridges, and defiles, &c., and particularly with the outposts; so that in the event of the Genrl. offrs. being ordered suddenly to support or defend any post, they may be able to march without waiting for guides, and be competent to form the best disposition for the service. They are to instruct their As.D.C. in these particulars, and always to require their attendance when they visit the outposts. An intimate knowledge of the theatre of action, and its neighbourhood, must be of the greatest advantage to every offr., but more particularly so to Genrl. offrs. and others in important commands. By maps, acquired local information, and unremitting activity and observation, they will attain this important knowledge, which will enable them to act with decided advantage against an enemy. Guides may be of service in the common operations of marches; but near the enemy the eye and intelligence of the principal offrs. must determine the movement of troops, and enable them to seize and improve every advantage.

Huts.—In positions intended for permanent occupation, or at bases or temporary bases, the men ought to be hutted. In a sanitary point of view the ground should never be excavated, nor earth piled up against the sides of the huts. Arrange the flooring so that there shall be a current of air under it, and, if possible, have it fastened down with screws, so that it can be removed frequently. This is a most essential point if the huts are intended for lengthened occupation, and are laid on the ground without much previous preparation. If no planks can be had for flooring, it is a good plan to pave the portion not covered with beds, so that it can be swept several times a day. If this cannot be done, then remove about 2″ deep of the earth every 4 or 5 days, putting down dry earth or sand in its place. Ashes from wood fires are a good substance to use.

Arrange for ridge ventilation thus:  If the men suffer from cold, issue extra blankets and other clothing, which it is taken for granted can always be done where troops are hutted, but keep open the ventilators.

That known as the Gloucester hut, made to hold 24 men, and heated by a stove, is about the easiest to put up with unskilled labour. It is 28′ long, 16′ wide, 6′ high at the eaves, and 16′ at the ridge. It can be made in England, and sent out with printed instructions as to the manner of putting it together. To make the roofs water-tight, good tarpaulins, or the coarsest description of calico well tarred over, lasts much better than felt, which latter was issued in the Crimea and was a failure. These huts are the best, without doubt, if they are intended for a hospital in rear of an army; but if it is intended to hut for the winter an army actually in the field, or to hut an army of occupation, it is perhaps better to send out material and allow the men to hut themselves. If this is done, the best plan of hut is that 32′ long, 16′ wide, and 6′ high, from sleeper to wall-plate, to hold 28 men. Two huts should be put end on one to the other, a gable between them being built of brick or stone, with 1 chimney serving for the 2 fire-places, which latter should be large. For these huts the doors with hinges and the windows should be sent out ready made. The material should be scantling, of two sizes: 1st, 2″ × 3½″ thick and 16′ long, for sleepers, wall-plates, uprights and joists; 2nd, 1½″ × 3″ thick and 11′ long, for rafters, ridge-poles and braces. Rafters of that length will give the roof a good pitch. Such a hut would require, for 2 sides and 1 end and gable, 40 planks (¾″) 16′ long and 11″ wide; this would allow for their lapping 1½″ one over the other. For the roof, 48 planks (½″) 11′ long. The nails required would be 2½″ for the sides, 2″ for the roof, and clout nails for the tarpaulins on roofs. The cubic space in huts should be 400 cubic ft. per man. Previously to erecting these huts, the ground should be levelled. Place the sills, when possible, on a foundation of small stones. Except in the tropics, the doors should, as nearly as possible, face the mid-day sun. In cold climates the door should not be on the side exposed to the prevailing wind. Most comfortable huts were made by many of our offrs. in the Crimea and by the Sardinians for their men, according to the following plan. A space the size of the intended hut was dug out 2½′ deep. Gables were then built of mud or stone, or made of boards or wattle and daub; a door in one end, and in the other a window formed by a wooden packing case, with the bottom knocked out of it. The gables should be 2′ wider than the excavation, so that when the roof is put on a ledge will be left all round to serve as a shelf. The fire-place was either made of brick or mud, or sometimes was merely cut out of the face of the earth, forming one of the side walls, a flue being bored from it in a slanting direction, so as to come up out of the ground clear of where the roof rested on it, and was there provided with a chimney about 2′ high. The huts made after this plan by the Sardinians, to contain 6 infantry soldiers, were 14′ 3″ long. and 7′ 1″ wide in the clear. The roofs were made of strong rough rafters, supporting hurdles covered with a layer of about 6″ of mud well mixed up with dry grass or

straw. If the mud is well tempered in this manner, it resists heavy rain for a long time. The Tartars roof their houses so, and indeed it is common throughout the north of China. These huts can be greatly improved by adding a wall of 2′ all round, taking care to leave a space of 1′ between it and the edge of the excavation. If brushwood is very plentiful, the walls may be made of wattle, the uprights being 18″ apart.

The pitch of roof in all roughly constructed huts should be at an angle of 45°. Our troops made good shelter for themselves in the Peninsula by half cutting through a long branch of a cork tree, so that its ends reached the ground; by placing other branches cut for the purpose against it, and interlacing them with others, a good wigwam was soon made.

Log Huts.—In woody countries like America, good huts to last for years are quickly made of logs placed one over the other, being notched ¼ their respective thickness at the angles, so as to fit one into the other. Moss is driven into the interstices. A roof is put on of split logs gouged out in the centre, so that each is like a long curved gutter. A layer of these is placed side by side, with the hollow side uppermost, one end resting on the ridge pole, the other on the walls. A second layer is put over them, with the hollow side down. A large split log, well hollowed out, is used as a ridge piece. Bark taken in long strips from a tree makes good roofing on sides for a wigwam.

Cow-dung is invaluable for finishing huts in the field. If mixed with water, and well plastered over mud walls or floors, it renders them hard, ough, and less subject to injury from weather. A thin coating of this applied very day to the earthen floors of huts adds much to the look of cleanliness which is so essential to comfort. Those who have served in India know ow largely it is used by the natives there for cleansing their earthen floors nd cooking places. In all standing camps it must be remembered that he surface ground round the huts or tents quickly becomes saturated ith filth. It should be scraped once a week, and the ashes from the itchens, or some sand or clay, spread in its place. The surface earth thus craped off should be buried.

HUT STABLES.—Rough sheds with clap-boarded roofs are the best; with he litter and some wet earth, good walls can soon be constructed round the hed; these walls should be vertical on the inside, but with a good slope owards the outside. Sheds made from 28′ to 30′ wide will accommodate rows of horses, their heads being turned towards one another. Plenty of penings must be left for doors by which to remove the horses quickly in ase of fire, and drainage must be well attended to. The stalls, or standing pace per horse, should be 5′ wide and 9′ long.

Billets.—In future wars against civilised nations, our troops must either ivouac or be billeted in towns and villages, as they were in fact during our mpaigns in Spain and France at the beginning of the century. Infy.

should be billeted in the villages nearest the road being marched over, the R.A. in those next further off, whilst the cavly., having the greatest power of locomotion can be billeted in the distant villages with least inconvenience. It is often difficult to obtain suitable billets in large towns for cavly. or R.A. Villages suit them best, but if they must be billeted in a large town, accommodation should be provided for them in the suburbs if possible. In estimating the amount of accommodation afforded by any building or town, the following rules may be safely followed.

"*Accommodation.*" As the occupation of a town, village, or house may be for a period of some weeks in time of war, the *maximum* number of men who can be accommodated consistently with good sanitary arrangements should be stated. The regulation for permanent accommodation in barracks at home is at the rate of 600 cub. ft. of air per man in barracks, and 400 per man in huts. This allowance of space may, however, be regarded as unnecessarily large for a time of emergency. In fixing No. of men to rooms in barracks in warm climates, each man should be allowed 60 superficial sqr. ft. The following is a rough method for calculating the number of men who can be accommodated in a room ; it will generally be found sufficiently accurate for practical purposes :—

For rooms 15′ wide or under, one man to every yard in length.

For rooms over 15′ in width, but under 25′, 2 men for every yd. of length.

For rooms 25′ wide, 3 men for every yd. of length.

As it will be impossible for an offr. to visit every house in a town or village, the best plan to adopt will be to divide the houses into classes as far as possible, and by carefully examining a house of each class and estimating the number of men which it would accommodate, arrive at a fair estimate of the accommodation afforded by the total number of houses. A certain number of rooms (usually those on the upper storey) must be left for the inhabitants, and provision must be made for cooking. If any calculation be made, based upon the actual number of inhabitants, it must be borne in mind that the houses of country gentlemen or large farmers will usually afford proportionately a much larger amount of accommodation than the houses of the poorer classes. As regards horse accommodation, in all good stables a horse is allowed from 1200 to 1400 cub. ft. of space, but this allowance may be considered excessive for a time of emergency ; when stalls exist, the number of stalls may be taken to represent the number of horses which can be accommodated. In the case of barns or large outhouses, about 5′ of their length should be allotted to each horse. If the house is over 24′ wide, the horses can be placed in two rows. The Germans estimate the available accommodation of a village or town by the number of fireplaces they contain, and if this number is unknown they assume it to be $\frac{1}{4}$ or $\frac{1}{2}$ of the number of inhabitants. If the troops are to remain long in a village, the number of men quartered upon each house

is at the rate of 1 man of infy., ½ man of cavly. or R.H.A., or ⅔ man of a Fd. Battery to each fireplace. For 1 night, from 18 to 20 infy. men per fireplace, provided the men have their own rations and have not to depend upon the villagers for food. When the troops are to stay 14 days, from 3 to 6 men and from 1 to 2 horses, and for a week, from 10 to 14 men per fireplace. During the autumn manœuvres, they allow 3 to 4 infy., or from 1 to 2 cavly. per fireplace. When on the march, or if the troops are to stay a night in their billets, 2 to 3 foot or 1 to 1½ mounted soldiers. If more than one divn. is to be billeted in a town, the particular locality that each is to have should be told off to it by a S.O. belonging to army Hd. Qrs. It is a good plan to have a main street for the demarcation between the two, as it prevents disputes. The senior S.O. of each divn. should again divide his portion into two, for his two brigds. to be subdivided again for each corps and dept. The guns and their waggons should be parked in some open square, their horses being stabled as near them as possible. Cavalry had better be near the outskirts. Generals, brigadiers, and C.Os. of all sorts should, as nearly as possible, have their quarters in the centre of their command, and it is to be clearly understood by all, that under no circumstances will individuals, of any rank whatsoever, be allowed to take possession of quarters unless they have been duly given over to them. The commissariat should be established in a suburb, or on the outskirts, so that their waggons and animals can be parked outside in the nearest fields. This holds good with siege and every other other description of trains. It is essential that all these allotments be made before the troops march into the town, for which purpose a S.O., with an offr. from each department and from the personal staff of each G.O.C., should precede the troops on the march by at least 2 or 3 hours. The offr. charged with this duty, upon arriving at the city or town in which the force is to be billeted, will at once call upon the mayor or chief magistrate, for the purpose of making the necessary arrangements with him, to be enforced by his authority and the local police. It is advisable to do this, even in an enemy's town, as long as any recognised magistrate remains in it. If a plan of the town is to be had from him, it will facilitate matters greatly. Each offr. employed upon this duty should have a piece of chalk, and mark with it, upon the doors of the buildings, the name or number of the corps to which it has been apportioned. The street or quarter told off for each battn., &c., must then be subdivided into portions for each company, &c., by the offr. of it who accompanied the S.O. in advance, and notes made in his pocket-book describing the locality, so that he can find it again easily. If the town has been abandoned by its inhabitants, the streets, squares, and principal houses should be named, their names being affixed to them in a legible manner as soon as possible.

Finger-posts, pointing to the Hd. Qrs., Genrl. Hospl., commissariat,

&c., should be erected. The main guard should be as near the centre of the town as possible ; other guards must be posted at the several main exits. The provost establishment will be at the main guard, and all the police duties carried out under the immediate orders of the P.M., with whom no one shall interfere.

Alarm posts must be assigned to each corps, where they will be halted upon first arrival, and where they will parade daily during their stay in the place. The S.Os. must see to the general *conservancy* of the town, making corps keep clean their own particular localities. They will also see to opening out communications, so that when the force marches it may have numerous exits, and that troops and trains billeted in rear of the place, or in the suburbs, should be able to get upon the main line of advance, without going through the city.

Bivouac.—Napoleon preferred the bivouac to tents for men, and there can be no doubt that it is more healthy in fine weather, particularly if operating in a wooded country where fires can be maintained easily. No tents being used adds greatly to the mobility of an army. Englishmen rather shudder at the notion of life without any protection from wind, rain, and dews, because they naturally take a gloomy view of the weather, but after the first few days' experience, most soldiers like it. In Europe it is quite certain that armies when moving cannot have tents, they must either be billeted in the towns and villages or must bivouac. In selecting a site for a bivouac, wood and water are, as for camps, the great requisites, but a good supply of the former is more essential for the bivouac than for the camp, as it is robbed of half its enjoyment, unless the men can have large fires to sleep near. This is all the more essential if the nights are cold. In cold weather, woods are the warmest place for a bivouac. In tropical climates it is pleasanter at night to bivouac in the open. The sanitary principles that apply to the selection of camps, hold good in choosing the site for a bivouac ; dry and sheltered positions should be selected. When camping or bivouacing in a hilly or undulating country, remember that the actual cold is greater in the valley than on the side of the hill ; half way up a slope is generally the best site for comfort as well as for military reasons, for to obtain the shelter of the hill to screen you from the wind as well as from the enemy's observation, and you avoid the cold below. Cavly. & R.A. should not take up a position immediately behind a wood, which, in case of attack, would prevent them acting ; they should have clear ground in front of them. Narrow belts of wood in front form a good screen for infantry, both from wind and from the enemy's observation ; woods, especially pine woods, afford good sites for an infantry bivouac ; they are warm at night and cool during the day in very hot weather. When possible, advantage should be taken of walls, banks, &c., to afford shelter. Cavly. should wheel into open column of squadrons, picket their horses,

and each man sleep in front of his own horse. Infy. having wheeled into column should pile arms, and sleep as they then stand in the ranks, the officers in both instances sleeping on the reverse flank. The R.A. having picketed their horses and placed the guns, waggons, &c., as if for a camp, should, like the cavly., sleep opposite to their horses. R.A. should always bivouac in line. If the enemy is at such a distance as to preclude the possibility of a night attack, all horses should be unsaddled and unharnessed, the saddlery, harness, arms, helmets, accoutrements and kits of mounted corps being placed in front of each horse as he stands at the picket ropes: the infy. should hang their helmets and accoutrements on their rifles as they stand piled, but each man should retain his water bottle, haversack, and valise. When troops bivouac in the immediate presence of an enemy, and a night attack is possible, or when it is necessary to begin your attack very early next morning, the men must remain accoutred, the horses saddled and harnessed. The men with horses must sleep as best they can, taking it in turns to lie down whilst the comrade holds the 2 horses. At times it is even necessary to keep the gun horses hooked-to all night, when the men must sleep by turns. As a rule the form of bivouac should as nearly as possible be that of a camp.

A few logs of wood, sods of grass or turf, or stones piled up to windward afford good protection, and add greatly to comfort. If there is time and material at hand, shelter, after the backwoodman's fashion, should be made by driving into the ground forked sticks, 4′ or 6′ long, and resting a pole between them: branches should then be laid against it to the windward side at an angle of 45°, bark or smaller branches being laid over them again until a good shelter is obtained. In doing this, remember that the thicker ends should always be placed uppermost, the leaves being, as it were, upside down; they will throw off the rain better in this manner. Little pent houses made so are most comfortable when slept under with a good fire at one's feet. If sufficient straw or leaves cannot be found, a hollow should invariably be scraped away for the hip to rest in. The small boughs of the American hemlock, laid with the stalks down, form a luxurious bed. Circles of about 18′ in diameter, made with a bank about 3′ high form a comfortable bivouac; the earth, sods, &c., for the bank to be taken from without the circle, the ground within which should be disturbed as little as possible. The entrance should be on the leeward side; a fire in the middle of the circle adds greatly to comfort. A lean-to can be very easily made with the bank if any good material is at hand. These circles should be made for companies on the prolongation of the piles of arms; each circle would hold 25 men. Cooking places in same line with piles of arms, but in rear of these circles; the offrs. would be most conveniently placed immediately in rear of piles of arms and in front of the circles made for the men, offr's. latrines in front, the men's in rear. Men sleeping together should

always club their blankets, so as to have one to sleep on, the other beir over them. Too much attention cannot be paid to making the sleepir place comfortable. Unless men get good refreshing sleep they cann sustain continued work. The company offrs. should be most energetic this matter, for a little trouble bestowed in collecting dry grass, shaving &c., may prevent your awakening some two hours before daybreak, chill with cold, so that you cannot get to sleep. The author has frequent made use of his sword-hilt, a log of wood, or a stone, and slept mc soundly. When one wakes in the morning, the limbs feel a little stiff; ta a smart run, and the blood will soon begin to circulate quickly, where they who crouch down over their fires feel cold a long time.

Campaigning.—A great object with offrs. should be to keep thc committed to their charge in good health. Without it nothing can accomplished. There are precautions to be taken, and rules to be attend to—the result of experience—which it is now disgraceful in an offr. to ignorant of. Were the C.O. of a regt. in any future war to order men to dig large holes and pitch their tents in them, as was done by genius before Sebastopol, a C.M. would be justified in finding him guilty the murder of those who died in consequence. Under the heads of Can and Positions I have noted down the sanitary points that should be attend to. I shall now merely state a few general rules. Change the positions camps as frequently as possible. When at a distance from the enem scatter divns. regts., and even individual tents as much as possible. T mind and the body must both be attended to: each reacts upon the oth If the man is not well fed, well clothed and housed, the privations m soon tell upon his disposition and his temper. The result can only sickness and uselessness. See that your offrs. and men have someth to eat and drink before they begin their work, no matter how early. A c of hot coffee and a biscuit is a good morning meal before the regu breakfast. You cannot pay too much attention to cooking: try to the men's rations varied as much as possible, and see that no opportur is lost of buying vegetables for them. I advise offrs. to take with them campaigns in wild, uncivilized countries plenty of mustard and cress se Indeed, the Commissariat should have quantities to be issued as requir It is a good anti-scorbutic. Never hesitate to report at once any impro ment that strikes you as feasible and advantageous. If you find that meat ration is not sufficient, report it at once. Get your men hot me when possible. If preserved or cooked rations have been served out, there is time, they should be warmed or made into soup or bouilli bef being eaten. This is of great consequence after a long march, or a day hard fighting. Save your men when you can, as you would your horse; t will be all the more fit for a great effort when you require them to make Reduce the number of your sentries as much as possible. The n

gnorant man knows the advantage of creature comforts to the efficiency of the soldier ; but we are prone to regard our soldiers as machines, merely requiring a certain amount of bread and beef, washed down by a gill of um, to keep them not only in motion, but in perfect order. We are only now awakening to the necessity of developing their moral qualities. A man without hope makes an indifferent soldier : but one without good spirits nd cheerfulness is worse than useless. Strive then, by all possible means, o develop—to create, if necessary—the high moral qualities of human ature in those serving with you. The powers of a weak man, endowed with hope and lofty courage, are always of greater service to the State than hose of a great strong fellow who is discontented and desponding. Employ ffrs. to superintend all large fatigues, and associate them with the men in ll their work. Often have I blushed for my profession, when I have seen ffrs. sitting down under some shelter reading a book, whilst their men were orking, or rather, I should say, supposed to be working ; for after a little me, when the men see that their offrs. do not take an interest in what s going on, they soon follow suit. C.Os. of regts. and brigds. cannot be too trict in such matters, and any S.O. who fails to report or take notice of uch irregularities is unfit for his position. Care should be taken that each oldier has a housewife ; and when time permits, attempts should be made o have them instructed in the art of mending their clothes, and even their oots.

Haircutting.—In the field no man's hair should exceed half an inch in ngth ; this is essential for the well-being and cleanliness of soldiers. It an only be carried out successfully when the offrs. of regts. & depts. set ne example. None except those who have worn their hair after such a shion can appreciate the luxury it confers on service. No man can have at smart bearing, which is the outward mark of a soldier, who allows his air to be so long that he can part it. A well-cropped head is the first great ep towards cleanliness. The beard and whiskers should bc cut close about nce a week. Hair is the glory of a woman, but the shame of a man. Want f cleanliness is a sure source of disease at all times, but especially so when large number of men are living together in crowded tents. If a camp is ationary for even a week in any one locality, endeavours should be made provide a washing place for the men, where there shall be abundance of ater : they should be encouraged to wash themselves all over in cold water, henever opportunities offer for doing so. It is of the utmost consequence at the feet should be washed frequently.

Bathing should be encouraged as much as possible on service ; it is a eanly habit, and is very invigorating ; it should be avoided for 2 hours after eals, or when the man is very fatigued, or in a profuse perspiration ; if the dy is merely warm and perspiring after a smart walk, it will do no harm. ever remain in the water long enough to feel chilly.

Washing clothes.—It is difficult to wash clothes during a campaign, bu it can really be dispensed with for a long time without injury to health linen or cotton shirts should not be used in the field: two good flannel shirts of a greyish colour are ample for all ranks, if worn day about; when th shirt is taken off, it should be hung up, stretched out, and exposed to th sun and wind. It should be shaken and beaten with a small stick, or wel brushed. The same rule applies to trousers and to drawers, when these latter are worn. Washing flannel or any woollen material soon ruins it Never allow your men to be idle except when they require rest, but le them see that the work they are employed on is for their own or the genera benefit. At once give up the pipeclay humbug of the barrack square, an its aimless exercises. Practise your men constantly in shooting and i marching. The army that can shoot and march best, is the best army, an the regt. that can shoot and march best in an army, is the best in that army

Drill.—As for drill, in respect to the battn. & brigd. evolutions require during an action, the worst militia regiment could do enough for all practica purposes, but at the same time, it must be remembered that with our sho service army, drill is more necessary than ever in order to discipline th soldier, both physically and morally. We have now less time to do this tha formerly; we must therefore endeavour to compress more instruction int the week and month than was usually done under the long service systen One of the great objects of careful drilling has always been to dscipline th soldier thereby, and this can be effected quite as effectively by impartin useful information to him, and by practising him daily in exercises corr sponding as nearly as possible with the work to be done when engaged wi the enemy, as by the constant repetition of the showy parade movemen described in our Drill books.

The running drill has been a glorious innovation. What really fatigu and disgusts soldiers is the time that is dawdled away in parades. If t divn. at any of our camps at home is to go through a field day, think the time that elapses between the fall in being sounded on regtl. parade and when the divn. is called to attention by the G.O.C.

C.Os. new to war try to carry out the routine of home service in the fiel it requires a man of good judgment to select those rules that can never relaxed, and for negligence of which men should always be punished, fro the others that should not be enforced. If men have good regular h meals, and are comfortably warm at night, they never become discontent by hard work. See article on "CAMPS," for details of the work to be do Two days in every week at least all battns. should march about 10 mil attention being paid to the advice laid down under the article "MARCHES." Regular work and good food will get Englishmen i training, so that they can do anything.

Origin of Disease.—There can be no doubt that all the diseases

cholera, dysentery, diarrhœa, scurvy, typhus, and malarious fevers, which have been the scourge of armies from the earliest days to this time, have arisen from bad or insufficient food, impure air, bad water, overcrowding in tents or huts, and the misery and depression of spirits ensuing from these evils. The men's boots and socks to be frequently inspected, so as to be certain that they are always in a fit state for a march. If these points are carefully attended to, your men will go into action fit for work. Once there, and having been taught the truth of the distich 'fire low, fire slow,' the English offr. may confidently count upon victory.

Cooking.—In permanent camps it is desirable to establish regular coppers or boilers for cooking. When possible, 3 pots should be provided for each company: one for meat or soup, to hold 1 quart per man; one for vegetables, to hold 3 pints per man; and one for tea, to hold 1 pint per man. When only one cooking vessel is available, its minimum capacity should be 3 pints per man. Calculating losses for cutting up, bones, cooking, &c., the soldier does not get more than $\frac{1}{2}$ the weight of his meat ration to eat.

BOILING meat entails a loss in weight of about 30 p.-c. The water should never be higher than 160°, if hotter, the meat becomes hard and shrunken; the lower the temperature the better are the nutritive juices kept in. The larger the piece of meat the better. Put the meat into boiling water, let it boil for 5 minutes, and then reduce the temperature of the water, either by pouring in cold water, or by reducing the fire until it is about 160° Fahr., that is, as hot as the finger can be put into without scalding. Allow a $\frac{1}{4}$ of an hour for every pound the meat weighs.

ROASTING.—The loss is a little less than in boiling. The meat should be exposed at first to a great heat, for the purpose of keeping in the juice. Allow a $\frac{1}{4}$ of an hour a pound.

RECEIPTS FOR COOKING.

Meat Soup.

16½ lbs. meat.	¼ oz. pepper.
1 lb. onions.	5 oz. sugar.
1 lb. flour.	Small faggot of herbs.
5 oz. salt.	3½ gallons of water.

Separate the *large* bone from the meat, also the gristle, cut the meat into pieces of about 4 oz., take 8 oz. of the fat, and chop it up, slice the onions, put the fat in the boiler; when melted, add the onions, stir them well, so that they do not get brown; in 5 minutes add the meat, which keep stirring and turning over for 5 minutes longer: the meat ought to be warm through; then add the boiling water by degrees, let it simmer gently for 1 hour, mix the flour with cold water very smooth, add it to the soup, with the salt, pepper, sugar, and herbs; simmer gently for 30 minutes, keep stirring it to prevent the flour from settling at the bottom.

The great error commonly committed in making soup is doing it too rapidly, which renders the meat hard and tasteless. Bones and scraps of meat should be collected after every meal, and put down to simmer for next day's soup.

Irish Stew.

16½ lbs. of meat.	6 oz. salt.
16 lbs. potatoes.	1 oz. pepper.
4 lbs. onions.	½ lb. flour.

Cut the meat away from the bone, and then into pieces of ¼ lb. each, the loin and neck of mutton into chops, disjoint the shoulder, and cut the blade-bone into 4 pieces (if the leg, cut into slices) ¾" thick, rub them with the salt, pepper, and flour, and place the meat in the boiler with some fat, brown it on both sides, then add the onions whole, and then the potatoes, and enough water to cover the potatoes; stew gently for 2 hours, keep the fire down and well covered during the cooking.

Beef and Mutton Pudding.

16½ lbs. meat.	½ oz. pepper.
6 lbs. flour.	Sweet herbs.
1 lb. onions.	Water.
2 oz. salt.	

Cut the meat from the bone and sinews, take away 1½ lb. fat for the paste. Cut the meat into pieces of ½" thick, and rub it with ½ the salt, pepper, chopped onions, and herbs; place it in a large dish, or 5 small basins, with a little water. Then make the paste as follows.—Place on the table the flour, make a hole with the hand in the centre, then place in it the chopped fat, salt, and pepper, then put some water in the hole, gradually stir the flour into it until all the flour is moistened, and it forms a paste; work and roll it well for 2 minutes, let it remain as a ball for 10 minutes, roll it out to the thickness required, put a piece of paste round the inside of the dish or basin, and cover it with the paste, taking care that the edges are properly joined together, or the gravy will boil out. Steam the large puddings for 2½ hours, and the basins for 2 hours.

How to soak and plain boil the rations of Salt Meat.—To each pound of meat allow ½ a pint of water, or a pint if handy; do not let the pieces weigh more than 3 or 4 lbs. each. Let them soak about 8 hours, or all night if possible. Wash each piece with your hand to extract as much salt as possible; it is then ready for cooking. If less time is allowed, cut the pieces smaller, or parboil the meat for 20 minutes in the above quantity of water, which throw off and add more. Simmer gently for 3 hours and serve. Vegetables or dumplings can be boiled with it.

Salt Meat, to prepare hurriedly.—Warm it slightly on both sides—this makes the salt draw to the outside—then rinse it well in a pannikin of water. This process is found to extract a great deal of salt, and to leave the meat in a fit state for cooking.

How to stew Fresh Beef, Pork, Mutton, and Veal.—Cut or chop 2 lbs. of beef into 10 or 12 pieces; put these into a saucepan with 1½ teaspoonful of salt

easpoonful of sugar, ½ teaspoonful of pepper, 2 middle-sized onions sliced, ½ pint of water. Set on the fire for 10 minutes until forming a thick gravy. Add a good tablespoonful of flour, stir on the fire for a few minutes; add 1½ quart of water; let the whole simmer until the meat is tender. Beef will take from 2½ to 3 hours; mutton and pork about two hours; veal 1¼ to 1½ hours; onions, sugar, and pepper, if not to be had, must be omitted; it will even then make a good dish: ½ lb. sliced potatoes, or 2 oz. of preserved potatoes; ration vegetable may be added, also a small dumpling.

For a hurried dinner, cut your rations into pieces about the size of a penny, but 3 or 4 times thicker. Skewer them on a piece of iron wire, or hard stick: a few minutes will cook them if hung before the fire.

Vegetables must be carefully washed and cleaned from insects. Green vegetables should be boiled fast in plenty of water, and drained at once when done. They sink when sufficiently cooked. *Potatoes* take from 20 to 30 minutes boiling; they show signs of breaking when they are done, which can be ascertained by sticking a fork into them. *Carrots and parsnips* take from 20 to 45 minutes boiling. Young nettles, sweet docks, turnip-tops, or the young leaves of mangel-wurzel, make good green food. A little pepper and salt should be added to season them. Dandelion leaves, especially when young, make a most agreeable salad. *Dried and compressed vegetables* of all kinds should be soaked from 4 to 6 hours in pure water, and then boiled slowly: if there is any bad taste from putrefaction having commenced, a little chloride of lime will remove it. The '*mixed compressed vegetables*' should be boiled in a little water for about ½ an hour; *the cabbage* to be boiled in sufficient water for ½ an hour, the *carrots and turnips* to be boiled for about 15 minutes, potatoes to be boiled in sufficient water for ½ an hour. Rice should be washed and soaked, and then boiled in plenty of water, *without salt*, for 20 or 25 minutes, then some salt should be thrown in, and the water drained off. Each grain will then be separate.

To make Tea.—If possible, it should be made in a vessel used solely for that purpose; on service this is generally impossible, but it renders great care on the part of the cook all the more essential. Before the tea is made, the kettle must be well washed, and heated with a little hot water and well rinsed. The water for the tea should then be put in, and boiled before the tea is put in; care to be taken that the water is boiling fast when this is done. If possible, the boiling water should be poured from one kettle into another containing the dry tea. The lid should then be put on, and the pot placed beside (but not on) the fire for 4 or 5 minutes before serving it out. Much depends upon the softness of the water; if the water is hard, add when possible a small teaspoonful of soda, to the camp kettle full (for 5 men each).

To make Coffee.—The same rules apply, as regards cleanliness and the description of water, as in making tea. 'Sometimes there is only time to

prepare it by boiling ; but if possible, it is better to heat the coffee in the lid of the kettle, then put it in a kettle, and pour the boiling water on it, leaving it to stand near the fire for 5 minutes, when it will be fit for use. When there is time to do so, it should be strained through a cloth of some sort. When made, the dregs should be collected and well boiled ; if this decoction is poured over fresh coffee, the result of the second making will be found strong and aromatic. To clear coffee some cold water should be poured in from a height. The cold water sinks through the coffee, and carries down the suspended particles.

Plum Pudding.—Put into a basin 1 lb. of flour, ¾ lb. of raisins (stoned, if time be allowed), ¾ lb. of the fat of salt pork (well washed, cut into small dies, or chopped) 2 tablespoonfuls of sugar or treacle ; add a ½ pint of water, mix all together ; put into a cloth tied tightly ; boil for 4 hours and serve. If time will not admit, boil only 3 hours, though 4 are preferable.

Rice Pudding, in which no eggs or milk are required.—Put on the fire 12 pints of water in a moderate-sized saucepan ; add to it, when boiling, 1 lb. of rice, or 1 tablespoonfuls ; 4 oz. of brown sugar, or 4 tablespoonfuls ; 1 large tablespoonful of salt ; the rind of a lemon thinly peeled : boil gently for ½ an hour ; strain the water from the rice, keeping the rice rather dry. *The rice water* is then ready for drinking either warm or cold. The juice of the lemon may be introduced, which would make it more palatable and refreshing. Add to the rice 3 oz. of sugar, 4 tablespoonfuls of flour, and ½ a teaspoonful of pounded cinnamon ; stir on the fire carefully for 5 or 6 minutes ; put it in a tin or a pie-dish, and bake. By boiling the rice ½ of an hour longer it will be very good to eat without baking. This will produce 5 lbs. of pudding, 6 pints of most wholesome beverage. The lemon and cinnamon may be omitted and it will still make palatable pudding and good beverage ; the latter is admirable for sick men, particularly for those suffering from diarrhœa.

Lemonade.—Peel thinly the third part of the rind of a lemon, put it in a basin with two tablespoonfuls of sugar ; cut the lemon in two, lengthways, and squeeze out the juice over all ; stir round for a minute to form a syrup, pour in a pint of water, mix well, remove the pips, and it is ready for use. If you can strain it through a clean cloth, so much the better ; 1½ tablespoonfuls of lime juice may be used instead of the lemon.

Diet.—To be considered here under two conditions ; when on the march, i.e. marching 5 or 6 days in the week ; and when halting temporarily in camp. When marching continuously, the men reach camp very hungry and consequently hurry on their cooking as much as possible ; the result is that their dinners are generally indifferent, as there is not time to make good soup. Regts. would do well to have all bones and scraps of meat remaining after the men have had their dinners collected and put down to simmer together, with some small portion of the ration reserved for this purpose, so that all should have a good basin of soup at about 4 or 5 in the afternoon. The ration of meat might, in fact, be increased ¼ of a pound

with great advantage, whilst the men are doing hard work ; the best fleshy parts used at dinner, and the bony portion reserved for the evening soup. Diet is now a science, and the recent discoveries in it have had the effect of removing the old, stupid, and I may say, cruel notions regarding the system for training either men or horses. The appetite of men taken from quarters, placed under canvas, and marched daily, increases considerably for the first few days ; meat that would be indigestible from toughness whilst living in barracks, is eaten with appetite in the field ; 1½ lb. of fresh meat (bone included) is by no means a large ration for men whilst marching continuously. A man of average size and activity will, "under ordinary conditions of moderate work, take in 24 hours from $\frac{1}{26}$th to $\frac{1}{20}$th of his own weight in solid and liquid food," "the solid being to the liquid as 1 to 2." The daily ration should be varied as often as possible, for men tire of the same food day after day ; the greatest possible variety ought also to be made in the mode of cooking it. Give your men as little spirits as possible ; tea and coffee are much more sustaining and more portable. If in countries where light wines are plentiful, induce your men to drink them (nothing beyond 15 per cent. alcohol being used) ; they are good anti-scorbutics, and scurvy is the one great disease to guard against in war. The old superstition that "grog," is a good thing for men before, during, or after a march, has been proved by the scientific men of all nations to be a fallacy, and is only still maintained by men who mistake the cravings arising solely from habit for the promptings of Nature herself. It is the commonest thing to see men, even when travelling at home, taking brandy "to keep them warm." It is an ascertained fact that alcohol of any sort reduces instead of increases the temperature of the body. The use of spirits in cold weather has been well tested during the various polar expeditions, the M.Os. of which all condemn it as a preventive against cold. No men require greater endurance than the trappers of British North America, and none do a greater amount of hard physical work than the voyageurs and lumbermen there ; none of them drink spirits when in the woods ; tea being their constant beverage. Our armies in Kaffraria had no spirit issued to them as a rule, and no army in the field was ever more healthy (if any other ever was as free from sickness). Our experience in the Indian mutiny also carries out this theory ; for months in some places our men were entirely cut off from all liquor, and they were healthier than when subsequently it was issued to them as a ration. By increasing the allowance of tea, and abolishing that of rum, you diminish the supplies to be carried to a great extent, whilst you add to the health and efficiency of your men ; their discipline will improve as their moral tone is raised, engendering a manly cheerfulness that spirit-drinking armies know nothing of. No men have ever done harder work than was performed by the troops employed upon the Red River expedition ; no spirits of any sort were issued to them, but they had practically

as much of good tea as they could drink; illness was, I may say, unknown amongst them. No spirit ration was issued to the troops on the Nile during the recent Soudan campaign, and no men could have had harder work than those who reached Korti in boats. The use of rum has been so long the custom in our armies, that it is difficult now to discontinue it. It can only be effected by a cheerful co-operation on the part of the offrs. If the men do not receive rum, and have not the power of buying it, the use of wine in camp by offrs. should be given up. It is humbug for an offr. to lecture men about drinking, advising them against the use of spirits, and then go to his tent to be merry over a bottle of sherry. Wine with the offr. holds the place of rum with the private; and although the bottle of wine may do the former no harm, he ought cheerfully to go without his luxury, when he compels those under his orders to forego theirs; feeling that his conduct is for the good of the service should amply compensate him for the privation. As the allowance of baggage to which offrs. are entitled has now been reduced to a minimum, they will not have power to carry about luxuries such as wine with them. The conduct of the men when no liquor is issued is always excellent. Dr. Parkes recommends that after the evening meal, the tea-leaves should be heated again in sufficient quantity of water to enable the men to fill their water bottles for the next morning's march. Offrs. in command of companies should impress upon their men the danger to which they expose themselves in drinking bad water. Poisonous matter of many descriptions may be taken into the stomach with it. In Algeria leeches have in this manner been frequently taken into the body, causing dangerous internal bleeding. There can be no doubt as to the injurious effect upon the health produced by impure water. Dysentery and diarrhœa ensue from drinking it, and in the opinion of the best army surgeons, it is one of the chief causes of those fearful diseases which have devastated armies in so many wars. It has lately been proved that if bad water does not produce cholera, its use predisposes the body to take it when it is prevalent. Bread should always be issued, when possible, in preference to biscuit. We are too fond of issuing salt meat to our men. Doing so saves the commissariat trouble, so that dept. is in consequence always desirous of serving it out. Except under peculiar circumstances, it should not be issued during marches, as it creates thirst. It is much easier to drive live cattle than to carry great hogsheads of salt pork on waggons. It is to be regretted that, during peace, salt provisions are not served out once a week to our men all over the world, in order to accustom them to cooking and eating them.

Medical and Surgical Hints.—On all outpost and detached duties hours, if not days, may elapse before the services of a doctor can be procured: the following hints may therefore be usefnl.

Bleeding from Wounds is from a vein or artery; from the former it

seldom of much consequence ; it is distinguished by the dark colour of the blood ; it requires merely the application of cold water and the slight pressure of a bandage either over the wound itself or between it and the extremity of the injured limb ; the limb should also be raised to a higher level than the body. In all cases of bleeding the first consideration is to put the wounded man in a recumbent position : this is imperatively necessary in all serious cases. A man unconscious from loss of blood will often revive at once when placed on his back with his head on a level with his body. The clothes round his neck should be opened, and a little stimulant may be given.

Bleeding from an Artery is known by the bright red colour of the blood and by its spirting out in jets corresponding with the beats of the pulse. Unless stopped at once, the wounded man must die. To do so it should be remembered that it is only necessary to compress the injured artery against the bone between the wound and the body. Having placed the man as described above, feel for the pulsating artery on the inside of the limb above the wound, and when found keep up a steady pressure with the tips of the fingers, which will control the bleeding ; 2 men, one relieving the other every few minutes, can stay it for a long time in this manner. The pressure should be in towards the bone. If a tourniquet is to be had, apply it just above where the pressure of the fingers is found to control the bleeding. A silk or cotton handkerchief twisted tight by means of a stick passed through the slack, is a good substitute, a bullet or round stone being placed over the artery. The inside seam of the coat or jacket follows the general course of the arteries in the arm. If the wound is in the leg the artery can be easiest found in the groin, whence it passes down inside of the thigh, winding round underneath to the hollow behind the knee. If wounds are below the elbow or knee, the pressure should be applied above those joints. If you cannot find the artery, fill up the wound with some cotton or linen, and bandage as tightly as you possibly can directly over the wound. Bleeding from gunshot wounds is generally slight at first. I have seen limbs cut off by round shot, when there was really no bleeding at all ; still precautions are always necessary, and a man with an artery cut should never be left for a moment without some one by him. Remove all clothing from round wounds, and wash with sponge and cold water. The edges of sabre wounds should be brought together and sewn, or well secured with sticking plaster. *In removing the wounded from the field*, or when carrying them on the march when you have no ambulance or stretchers, construct a framework with two poles 8′ long, leaving 6″ at each end as handles : lash 3 short pieces across, so as to keep the poles $2\frac{1}{2}$″ apart, one piece to come just behind the man's head, one at his feet, and one in the centre ; to this a blanket is securely fastened at each corner, and along the sides, if there is time to do so. A wounded man can be carried very comfortably in this manner.

If a leg is fractured, place the man on his other side and place the injured

leg exactly over the other, with any soft material that may be at hand between them, and then bandage both legs firmly together ; thick wisps of straw with thin sticks or twigs added to increase the support, placed lengthways along the broken limb, and bandaged tightly to it, is a good plan with either broken arms or legs. Two splints should be used, one on the inside of the leg, the other on the outside. A rifle with the stock towards the hip and the muzzle towards the ankle bound to the outside of the broken limb, is a good temporary substitute if a splint is not to be had.

Broken arms.—Rip up sleeve and extend arm gently until bone seems to be in proper place, then apply splints ; if they are not to be had use 2 pieces of board (2 bayonet scabbards will do), and support in slings. A man with a fractured limb shonld have these precautions taken for him before he is removed. Stimulants must be given diluted with plenty of water : taken pure they are dangerous.

Broken collarbone.—Insert a thick, wedge-shaped pad (a round stone or piece of wood enclosed in hankerchiefs will do) in the arm-pit, with the large end upwards ; the arm to be placed in a sling, and the upper part of the arm to be bandaged to the body.

Fevers.—In malarious countries 3 or 4 or even 5 grains of quinine taken early each morning is a good preservative against fever. All English soldiers were given a daily ration of quinine in Ashantee.

Emetics.—A charge of gunpowder dissolved in water is a good and safe emetic, or 2 tablepoonfuls of mustard in ½ a pint of warm water followed by large quantities of the latter. The strongest emetic is 10 grains of bluestone (sulphate of copper), or 20 grains of sulphate of zinc in water, followed by copious draughts of warm water.

Burns and Scalds should be at once covered with cotton wool, or plenty of lint, to keep them from the air, oil being first freely applied to the injured part ; blisters should be punctured.

Rheumatism.—Equal quantities of ammonia, or spirit of turpentine, and sweet oil well rubbed on with the hand, is good. If the following ingredients are to be had, mix up in equal quantities (say ½ oz.), sulphur, nitre, flour of mustard, Turkey rhubarb, and gum guaiacum : take a tea-spoonful in a wine-glassful of water every alternate night.

Faintness from over-exertion.—Open the clothes round the neck : place patient flat on back, the head on a level with the feet : dash cold water in the face ; if hartshorn or ammonia or salvolatile are to be had, pass them under the nose ; give a little spirits and water when able to swallow.

Epilepsy.—Lay patient flat on back, and hold him to prevent him hurting himself, and place cork or soft stick between teeth to prevent him biting his tongue ; apply smelling-salts, and when foaming at mouth and fit is over give him some very weak spirits and water ; put to bed, and strive to induce him to sleep.

Sore feet from marching should be bathed at night in tepid water, having a few lumps of alum dissolved in it: if there are blisters, they should be pricked with a needle or sharp knife, but the skin must not be torn off. Previous to beginning the next day's march the tender places should have soft soap applied to them, or if it is not to be had, any sort of grease. Whisky or rum and water or plenty of grease applied to the feet is the best preventive against blisters.

Sunstrokes.—In countries where such are to be feared, never allow the men to become exhausted, let them eat and drink frequently in small quantities. Let the hat be thick, and covered with white. In the tropics nothing but large turbans can be safely relied on as a protection against the sun. In cases of sunstroke raise the head, open the coat and everything bearing on the throat and chest; if plenty of water is to be had, keep up a stream of it on the head and upper part of the chest, until consciousness has been restored.

Frost bites.—Rub the part affected with snow or any kind of soft fur, and later on, with cold water until circulation be restored: a fire or a heated room its to be avoided.

POISONS.—Cases of poisoning in the army are generally caused by strong irritants, such as nitric, sulphuric, muriatic, or oxalic acids, corrosive sublimate, and caustic (nitrate of silver), or by sedatives or narcotics, such as morphia, opium, Indian hemp (bang), prussic acid, &c., or by arsenic or strychnine. The following remedies should be adopted in the absence of a medical officer: the chance of recovery depends mainly on the promptitude with which the remedies are applied.

Nitric, Muriatic and Oxalic acids.—Give at once lime water, or chalk, magnesia, or carbonate of magnesia in water. In the absence of all these, scrape the walls, if white-washed, or mix up some plaster from the ceiling with water and give it at once. Soapsuds is also good if other means are not at hand. Then give a spoonful of sweet oil: give barley water and gruel, avoiding solid food for 24 hours. Avoid emetics.

Sulphuric acid (*vitriol*).—Give carbonate of magnesia in water or milk. Lime water or simple magnesia unless in small quantities are not advisable. Same treatment afterwards as for nitric acid.

Corrosive Sublimate, Copperas or Blue Vitriol.—Give at once raw eggs, yolk and white mixed. Flour and water if eggs are not to be had. Avoid emetics.

Caustic (*nitrate of silver*).—Give common salt and water, sea-water, milk or yolk of egg in water, in large quantities nntil vomiting is produced. Barley water, gruel and oatmeal porridge.

Opium, Morphia, Indian Hemp, Prussic Acid, and all other narcotic poisons, give emetics at once. Use every endeavour to keep the patient from going to sleep. Give strong coffee or tea; keep him walking about, dash

cold water in face, pour buckets of water over his head, apply ammonia (smelling salts), or burnt feathers to nostrils. In poisoning from prussic acid, cold water poured over the head is especially called for : a few grains of carbonate of ammonia dissolved in water should be given.

Arsenic or phosphorus.—Give the strongest emetics at once.

Strychnine.—Emetics as for arsenic.

In all-cases of poisoning the first thought should be, 'What was the agent used?' A careful observation will generally enable the most inexperienced to recognise the effects of narcotic poisons, by the patient being in a deep sleep, breathing heavily, and probably snoring, with skin cold and pulse weak : the smell of the breath will generally indicate if he is suffering from the effect of spirituous liquors, in which case give emetics and pour water over the head, for fatal results frequently ensue, if nothing is done to rouse men from the comatose state arising from excessive drinking.

Poisonous snake bites.—A ligature of cord should at once be placed round the limb, between the bite and body, and kept if possible until the arrival of a surgeon. If no doctor is to be found, then the flesh round the bite should be at once cut out with a knife, sucked, bathed in warm water to encourage bleeding, burnt with caustic, and have liquor ammonia applied freely. One or all of these external means may be resorted to. The strength should be supported and stimulants given freely. Liquor ammonia may be given in doses of 10 drops in a wine-glass of water every quarter of an hour for 1 or 1½ hours if the patient does not rally. If this is not at hand, apply strong rum or brandy, and make him drunk by giving the same internally.

Bites from Scorpions, Centipedes, Wasps, etc., should be treated externally with liquor ammonia : if there is depression of spirits, give it in doses of 10 drops in a wine-glass of water at a time, or if none is at hand, use strong spirits internally and externally.

Flies and Mosquitoes.—In countries infested with them, they can be cleared from barrack rooms or stables by a spray distributor, using 2 or 3 teaspoonfuls of carbolic acid in half a pint of water. The same put on a towel hung up at the head of your bed will keep you free from these pests.

To restore a half drowned man.—Do not remove him into a house, but try your remedies 'on the spot, in the open air, exposing the chest and face to the breeze.' Send for medical assistance, blankets and dry clothes, remove clothing, braces, etc., from upper part of body, and proceed thus at once to endeavour to restore breathing.

Lay patient on his back, rest head and shoulders on his coat folded to form cushion. Draw forward tongue and secure to lower jaw by an elastic band or tape. Kneeling at patient's head, grasp the arms just above elbow, and draw same gently upwards, count 2 seconds ; by this movement the lungs are refilled with air. Then lower patient's arms and press them firmly for 2 seconds upon his ribs, by this means the air is expelled from the

lungs. Continue this movement without ceasing for 2 or 3 hours, until a spontaneous effort to respire is perceived, then immediately proceed to induce circulation and warmth ; give patient plenty of air. Rub limbs upwards with hot flannels, or by hand alone ; place patient in bed ; apply hot bricks, wrapped in flannel, or hot water bottles, to pit of stomach, feet and arm pits. Give weak warm brandy and water or wine, when patient is able to swallow. Whilst this is being done, others should have removed his boots, putting his feet against their own stomachs next the skin, and hot bricks or stones may be advantageously placed over his groins, and under his arm-pits.

Medical stores, &c., for use of detachments not supplied with a Medl. Offr.—Offrs. before starting on detached duties where they may be for days or weeks without medical assistance, should carry a small store of simple medical remedies, the quantity of which should depend upon the number going with them, and probable length of their absence. The diseases prevailing at the threatre of operations will influence the nature of the remedies to be taken : a local doctor should be consulted on this point. The following should always be taken : a linen bandage to be served out to each man, the serjeant to have a tourniquet. The offr. to carry a small supply of sticking plaister, lint, and a little oil silk, a pair of scissors, a pair of forceps to pull out thorns, a couple of needles and some silk to sew up sword cuts, a small sharp knife. a small piece of nitrate of silver in holder. A supply of quinine in powder, pills for diarrhœa, &c. When a Fd. companion is to be had, it should invariably be taken instead of the above detail of medicine, as it contains an assorted collection.

The weather.—The weather has the greatest influence upon military operations. It is needless to recount the many instances where the most accurately calculated operations have been brought to nought, and perhaps turned to disaster, by such little trifles as a shower of rain, &c. Offrs. of all ranks should endeavour to be 'weatherwise.' In other words, they should by a constant study of the heavenly phenomena, learn to know what sort of sky precedes a storm, rain, &c., &c. From the moment you enter the country that is to be the threatre of war, the small aneroid barometer should be observed, and its height remarked three times a day—upon rising in the morning, at noon, and just before laying down to sleep at night. No attention whatever should be paid to the words 'fair,' 'rain,' &c., noted on the dial, for they are apt to mislead. An aneroid falls sometimes from wind, and rises at the approach of severe frost. The local effect of high wind with and without rain, of rain alone, of frost &c., upon it should be noted. The changes of the moon have great influence upon the weather. Ascertain the month in which the corn is cut, and you may assume it is the hottest in the year.

A halo round the moon indicates approaching wet weather, the larger the

circle the nearer the rain. There is an old rhyme to the following effect regarding the changes of the barometer, "Long foretold, long last; short notice, soon past: First rise after low, foretells stronger blow." The following table is of use :—

If the new moon, the first quarter, the full moon, or the last quarter happens:	In Summer.	In Winter.
Between midnight and 2 A.M.	Fair	Hard frost, unless the wind be S. or W.
—— 2 and 4 morning	Cold, frequent showers	Snow and stormy.
—— 4 „ 6 „	Rain	Rain.
—— 6 „ 8 „	Wind and rain	Stormy.
—— 8 „ 10 „	Changeable	Cold rain, if wind be W.; snow, if E.
—— 10 „ 12 „	Frequent showers	Cold and high wind.
At 12 o'clock at noon & 2 P.M.	Very rainy	Snow or rain.
Between 2 and 4 P.M.	Changeable	Fair and mild.
—— 4 „ 6 „	Fair	Fair.
—— 6 „ 8 „	Fair, if wind N.W. Rainy, if S. or S.W.	Fair and frosty, if wind N. or N.E. Rain or snow, if S. or S.W.
—— 8 „ 10 „	Ditto	Ditto.
—— 10 „ midnight	Fair	Fair and frosty.

Observations.—The nearer the time of the Moon's change to noon or midnight, the more nearly will the result accord with the prediction. It is also said that less dependence is to be placed on the table in winter than in summer.

The moon is new when the points are towards your left hand as you look at it; when they point in the opposite direction, it is a waning moon. The full moon is due E. at 6 P.M.; in northern hemisphere it is due S. at midnight, and due W. at 6 A.M.; the first quarter is due S. at 6 P.M., and due W. at midnight; the last quarter is due E. at midnight, and due S. at 6 P.M. It completes its changes in about 29½ days The full moon rises as the sun sets. It has been stated as the result of long and careful observations, "that the 3rd day before the new moon regulates the weather on each quarter-day of that lunation, and also characterises the general aspect of the whole period." Thus, if the new moon happened on the 26th of May, the term day was the 24th: the weather of that day was to be that of the 26th and the 3rd, 11th, and 19th of June, the quarter days respectively. The almanack carried in the pocket-book should show the changes of the moon. The old farmer's predictions of fine or rough weather, deduced from observing the flight of birds, are really based upon truth, and can be explained scientifically. When swallows fly high, expect

fine weather; when they fly low, the reverse. Sea-gulls flying inland or collected there in large numbers are forerunners of bad stormy weather.

Weather Forecast.—Admiral Fitzroy says, whether clear or cloudy, a rosy sky at sunset presages fine weather; a red sky in the morning, bad weather or much wind (perhaps rain); a grey sky in the morning, fine weather; a high dawn, wind; a low dawn, fair weather. Soft-looking or delicate clouds foretell fine weather, with moderate or light breezes; hard edged oily-looking clouds, wind. A dark, gloomy blue sky is windy; but a light, bright blue sky indicates fine weather. Generally, the softer the clouds look, the less wind (but perhaps more rain) may be expected; and the harder, more "greasy," rolled, tufted or ragged, the stronger the coming wind will prove. Also a bright yellow sky at sunset presages wind; a pale yellow, wet; and thus by the prevalence of red, yellow, or grey tints, the coming weather may be foretold very nearly; indeed, if aided by instruments, almost exactly. Small inky-looking clouds foretell rain; light scud-clouds driving across heavy masses show wind and rain; but, if alone, may indicate wind only. High upper clouds crossing the sun, moon or stars, in a direction different from that of the lower clouds, or the wind then felt below, foretell a change of wind. When sea birds fly out early and far to seaward, moderate wind and fair weather may be expected; when they hang about the land, or over it, sometimes flying inland, expect a strong wind with stormy weather. When birds of long flight—rooks, swallows, or others—hang about home, or fly up and down or low, rain or wind may be expected. When animals seek sheltered places, instead of spreading over their usual range; when pigs carry straw to their sties; when smoke from chimneys does not ascend readily (or straight upwards during calm), an unfavourable change is probable. Dew is an indication of fine weather; so is fog. Neither occurs under an overcast sky, or when there is much wind.

PREVAILING WINDS.—*In the Arabian Sea* the N.E. monsoon prevails with fine and moderate weather from Nov. to March: from May to Sept. the S.W. monsoon, blowing fiercely with bad weather in June and July, but moderating in August; cyclones in April, May, Oct. and Nov. *In the Indian Ocean*, the N.W. or middle monsoon blows from Nov. to March; the wind in light, with squalls, rains and frequent calm; the S.E. Trade blows from April to Sept., and is constant to the southward of the 10th parallel (south); cyclones from Dec. to April. *In the Bay of Bengal* the N.E. monsoon blows from Nov. to March with moderate and fine weather; the S.W. monsoon from May to Sept., blowing fresh with bad weather in June and July, but moderating in August. Cyclones in April, May, Oct. and Nov. *In the China Sea*, the N.E. monsoon blows from in Nov., Dec. and Jan.; the S.W. monsoon from May to Sept., weather moderate with rain, strongest in June, July and August; typhoons from July to Nov. *On the east coast of Africa and in the Mozambique*, northerly winds prevail from Dec. to March, and southerly winds from April to Nov. *In the Red Sea*, N.N.W. winds in northern portion, and S.S.E. winds in southern portion prevail from October to May. Northerly winds throughout June and Sept., variable in strength, but lighter in southern portions *Nile Valley*, the prevailing wind blows steadily from the north.

PART III.

Strategy is a constant science; its rules to-day are similar to those in the time of Cæsar. They should be known to all superior offrs., but don't let any one imagine that every man who can write able books or essays on strategy must be fit for command: you may know the science better than Jomini did, and yet be utterly useless in the field. To deal with strategy here would be beyond the scope of this little work.

Tactics is an art that varies with the spread of civilization: most great inventions so bear, in some way or other, upon the armament, equipment and conveyance of troops, that the tactics of armies have to be frequently remodelled in consequence: the more you can vary them, even during a war without undue risk of introducing disorder into your own ranks, the more likely are you to be successful. An inventive mind and an instinct for war help to hit upon plans which by their very novelty, if promptly carried out, give you a great number of odds in your favour. You won't get any inspiration from our Field Exercise or other books of regulations, whereas the study of Cæsar, of Xenophon, Philip de Comines, Froissart and other kindred books about wars that were waged in times more primitive than our own, will give a daring and able leader valuable ideas as to how positions may be surprised and how posts may be taken from any ordinary cut-and-dry enemy. It is too much the tendency in all modern, well organized armies for every one, from the general down to the sergt., to act in exact accordance with rules they have been taught. Those rules are admirable guides for subordinates, but will be the ruin of the leader who shapes his course by them. In Europe they will be as well known to your enemy as to you.

Tactical formations.—It cannot be too strongly impressed upon all offrs. that our attack formation is only intended to be used against an enemy as well armed and drilled as we are. It is only the dangerous theorist who would adopt it when engaged with Ashantis, Zulus or men like those we met at Abu Klea. In wars against barbarous nations the more you can, however, with safety adopt a line or other close formation without unduly decreasing the effect of your breech-loading fire, the more advantage will your discipline give you over your undisciplined, though possibly more warlike enemy. Your formations must conform to the nature of your

enemy's arms, to his known mode of fighting, and to the character of the country you are operating in. If he be unprovided with arms of precision and it is of consequence that you should hit him very hard, your best policy is to let him come within a range of about 400 yds. before you deliver your fire. If he be a determined enemy he will endeavour to close with you; then is your time to crush him with a hail of bullets. For warfare of this nature, take care that the composition of your columns is in accordance with the work they have to accomplish; for instance, beware of hampering your movements with field guns: you don't require their distant fire, and for close work your rifles and machine guns are much more killing, whilst the horses, carriages and paraphernalia of a battery of artillery in a desert or in an unknown or roadless country, must always be more or less an encumbrance, and their protection a source of never-ending anxiety. *See article on* WARS WITH SAVAGE NATIONS.

Outposts.—The most arduous, while at the same time the most important duties that devolve upon soldiers in the field, are those of outposts. C. Os. should lay great stress upon this fact, and should take every opportunity to instruct both offrs. and men in them. All concerned should feel that the safety of the army and the honour of the country depend upon their untiring vigilance and activity. F.Os. of the day should be most strict in enforcing strict attention to our regulations on this subject. With an army in the field, a well designed, well carried out system of outposts should secure to you positive information of the enemy's whereabouts and movements, and possibly of his intentions, whilst it affords protection to your own army against all possible surprise. The outpost duties with detachments, should be carried on so as to enable such detachments to effect an orderly retreat, if retreat should be necessary, before the enemy could cut them off, or with a view to their being able to defend themselves until other troops can come to their assistance. Outposts should act as the feelers of an army, guarding it from every danger, and keeping it constantly informed of everything that can add to its safety, or assist its movements. They should also screen the movements of the army in their rear, and prevent any intelligence of its movements from reaching the enemy. The outposts thrown out to the front, to the flanks, and when necessary in the rear of a force in the field for its protection, are called by us, "Outlying Piquets," whilst for the purpose of obtaining information of the enemy's position, &c., we use patrols varying in strength according to circumstances. The hand with the fingers well opened describes the outpost system, the nails being the outlying piquets, the middle joints of the fingers the supports, the knuckles the reserve, and the wrist the troops or camp to be protected from surprise. Like advd. gds., all outposts should be as far in advance of the force they are thrown out from as they can be with safety; that is, without exposing them to be cut off or overpowered, before assistance can reach

them. As a general rule $\frac{5}{6}$ths of a force should be able to rest in peace and quiet, whilst to the remaining $\frac{1}{6}$th is allotted the outpost work. It is essential that they should be sufficiently far to the front, to enable the C.-in-C. when he receives the report from them that the enemy is advancing in force, to make up his mind whether he will or will not fight, and if he decides upon fighting, to enable him to occupy the position he had previously selected to fight in, before the enemy could disturb him in the movements necessary for that purpose.

The general distribution of troops for outpost duty is as follows :—

1. Piquets, including vedettes, sentries, patrols, and detached posts.
2. Supports to the piquets.
3. Reserve of the outposts.

Every body of troops, of whatever size, will have its outposts disposed more or less after this system, though it may not always be necessary to carry it out in a complete form. Thus, a considerable force of cavly. such as a Divn. or a Brigd. will have a complete system of outposts, including piquets, supports, and reserve. A smaller body, such as a Regt., may dispense with a special reserve, and will itself become the reserve to the outposts ; while a still smaller body, such as a squadron, will only have a piquet or guard sufficient to supply the necessary sentries and vedettes. As a rule in a mixed force of Cavly. and Infy. the outpost duty by day will be performed by the Cavly. and Mtd. Infy., and by night by the Infy. With us, unfortunately, it is too much the custom to regard outpost duty from a more or less defensive point of view ; our regulations define it as if the object was almost exclusively to guard against surprise. If this duty was classed more as an active than as a passive one, that is, if it was ruled that the primary object to be attained was to obtain information of the enemy's doings, whereabouts, and intentions, the result would be twofold, for not only would the army be protected from surprise, but the G.O.C. would be supplied with most valuable information. The more constantly your patrols and scouts are in contact with the enemy, feeling his outposts, picking up stray prisoners, &c., &c., the more efficiently will you be protected against surprise, and screened from the inquisitiveness of your enemy. The farther you can push forward your advanced parties and their attendant scouts without compromising their safety, the greater will be their opportunities for fulfilling this object. Those parties should cling to the enemy, never losing "touch" of him for a moment. You will lose some men in this work, but their loss will be amply compensated if you are kept daily informed of your enemy's movements. Mtd. Infy. are invaluable for these duties. It is because the two objects to be attained, viz., security from surprise and the possession of constant information of the enemy's whereabouts and doings, are so very closely united, the former being in fact provided for if the latter object be realised, that it is so very desirable that

cavly. and infy. should work together, hand in hand as it were, in outpost duty. The infy. posts on the roads guard them strictly, and their advanced parties prevent the enemy's patrols or reconnoitring detachments from approaching the main body, whilst the cavly. in front and on the flanks by constant patrols clings to the enemy, probing his armour at all points, and so learning not only his doings, but, if the work be well and intelligently done, his very intentions also. It is the nature of the country that should determine the arms of the service to be employed, and to what extent they can both be used together to advantage. I have often seen a couple of H.A. guns used with advantage with a strong outpost on the main line which led directly to the enemy's position. In many positions, as for instance an outpost at a bridge that it is intended to defend, 1 or 2 machine guns would be of great use.

Unless the country is very close, the moving screen of cavly., which should cover the front and flanks of an advancing force, will usually form a line of outposts at night, and so protect the main body, not only from surprise, but from the prying inquisitiveness of the enemy. Behind it, however, the infy. of the Advd. Gd. must form a line of strong outposts, especially guarding all the roads and other possible lines of approach from the enemy's direction. The distance at which cavly. outposts should act in front of the army which they protect, must depend upon the position and nearness of the enemy ; but if possible, and especially in a friendly country, they should be many miles in advance of the main body ; when in contact with the outposts of the enemy, they should watch, feel, and never quit them. Clever outpost offrs. will nearly always divine the movements of the enemy from the conduct of his advanced parties. The outposts should form a continuous chain, and should considerably overlap on both flanks the line or lines of operation of the main army ; but the conditions under which outpost duty has to be performed are so varied as to preclude the possibility of laying down rigid rules on the subject.

Officers employed upon outpost duty will take care before starting that their men have the proper quantity of ammunition, their rations for at least 24 hours (cooked if possible), and their water-bottles full ; they themselves having their rations also with them. Forage, &c., for all horses to be taken with them. Every offr. so employed should have with him a field glass, compass, watch, metallic pocket-book, and above all things a map of the country ; if possible, serjts. should be similarly provided. The name of every one composing the piquet should be entered in the offr.'s pocket-book. A range finder is of very great use.

In front of each Army Corps—which is, say, marching by 2 or more roads —there would always be an advd. gd. of about 4000 or 5000 men (its composition depending upon the nature of the country, *see article on* ADVANCED GUARDS), in advance of the main body either a short day's march, or some

4 or 5 miles at least, according to the proximity of the enemy. The security of the army from surprise will chiefly depend upon the manner in which these advd. gds. do their duty in covering the front well with a chain of outposts, in patrolling in all directions, and in reconnoitring and watching the enemy's movements. The outposts required on the flanks and rear of an army should be furnished by the troops detached in those directions to guard it from surprise during its movements. It is advisable that piquet duty should be done by whole battns. of infy. or regts. of cavly. ; all their baggage, except their entrenching tools and a proportion of their reserve ammtn., remaining in rear with the main body. These units to be divided into 2 equal portions, one to be the reserve, the other to furnish the outlying piquets and their supports. When infy. are used. there should be with every piquet 1 or 2 dragoons to be used for carrying information to the rear. If there is no superior offr. in charge of the outposts, the O.C. a corps sent out to cover a certain portion of the country will, in the absence of specific orders, decide on the positions the piquets are to occupy, covering his front while doing so by a line of skirmishers ; and in the case of cavly. or Mtd. infy. by a number of patrols sent on in advance to reconnoitre the neighbouring villages and discover the enemy's whereabouts. After a battle it may in some instances be advisable to form the outpost line close in rear of the troops who are in actual contact with the enemy, the troops retiring slowly through the line of sentries, when the piquets have been established. The Os. C. battns. on outpost duty should communicate personally with the corps on their flanks, learning the positions occupied by the reserves &c., communicating with them from time to time, should any important information regarding the enemy's movements be obtained.

A battn. of infy. whilst so employed will generally be distributed as follows :—In reserve, 4 companies, and on outlying piquet, 4 companies each of these latter 4 companies to be divided into 2 equal portions, one to act as support, the other divided into 2 or more piquets of about equal strength (of about from 30 to 40 men each) ; they again being divided into equal parts, one furnishing the N.C.O. for the reliefs, patrols, &c., and the privates for patrolling ; the other 2 furnishing 3 reliefs for the double sentries in advance, and for the single one over the arms. A battn. would generally cover from 2000 to 3000 yds. according as the country was close or open. As cavly. and Mtd. Infy. can watch a far greater extent than infy. and by their power of patrolling to long distances in advance can more easily obtain information of the enemy's doings, a regt. of cavly. or mtd. infy. would cover a still larger extent of front, especially as they are generally employed in a more open country than that where infantry is used. The distances these several parts into which a battn. is to be divided should be from one another must greatly depend upon the nature of the country and the arm of the service furnishing the outposts ; but the arrangement must

be of such a nature that under no circumstances whatever, nor by any possibility, shall it be feasible for an enemy to reach the main body of the army until it has had ample time to turn out. In some cases it may be advisable to have a couple of H.A. guns, without wagons, or some machine guns with the outpost reserve. The Os.C. these reserves will, as a rule, send out from each a strong reconnoitring party towards evening, and especially towards daybreak, to obtain information of the enemy's whereabouts. Any important news so obtained to be communicated at once to the G.O.C. the line of outposts, the authority for its correctness being stated.

On ordinary ground when infy. is used the reserve may be about 800 or 1000 yds. in advance of the Divn. or Force to be protected, or its Advd. Gd., the supports about 400 yds. in advance of them, the piquets about 300 or 400 beyond them, with double sentries thrown forward about the same distance; when cavly. or mtd. infy. are used these distances may be doubled, and in some instances trebled with safety. In all large operations the Advd. Gd. will be ready to aid the outpost reserves, should it be intended to accept battle in such an advanced position. The outpost duties should be carried on by a larger force, with increased vigilance, and at a greater distance from the main body, when an army is merely halted for the night in some chance position of no strength, than when it occupies one carefully selected for defence. Under all circumstances it may be assumed that no matter what may be the strength or composition of the force, the advd. gd. upon the completion of the day's march, will, whilst the force is stationary, whether it be only for one night or for any number of days, continue to protect it from surprise by so covering the country with outposts and patrols as to render it impossible for an enemy to approach the main body unseen. When the force is a small one, and the bulk of the advd. gd. is not more than about a mile in advance of it, if it has been very much harassed during the march, it may be deemed advisable to push forward fresh troops from the main body to form the outposts for the night. As a rule, however, when operating with a small force in the vicinity of an enemy, it is better to make the Advd. Gd. do this duty, detailing it to form the Rr. Gd. for the following day's march. The men who had been hard worked the day before, and on the alert all night on outpost duty, would have a good long rest the following morning, as they would not naturally have to move off for some hours after the newly-detailed advd. gd. had marched through their line of piquets. With small operating columns this system would secure to every Regt. or Brigade in succession its turn of the interesting work attendant upon these advanced duties, and its fair share of the dreary and very hard work which invariably falls to the lot of the Rr. Gd. With large forces in the field, when the bulk of the advd. gds. would be from 5 miles to a day's march ahead of the main columns, these large advd. gds. could not be thus

daily relieved, but the advd. gds. which they themselves would invariably have in their front could be so dealt with very conveniently. In a retreating force the outpost duty should be performed, if it can possibly be so arranged, by troops which have not been before engaged. These will have more confidence, and be better able to meet an assault, than men who have already fought and been forced to retire before the enemy.

An Officer commanding a Company or Squdn. will march upon the positions to be occupied by the supports with all the precautions of an Advd. Gd., examining the country he passes over, and selecting positions for disputing the ground, in case of being driven back by the enemy. Having decided upon the position for the support, he will then move forward his two piquets, sending an offr. with each; he will in the first instance go forward himself with one of them and post it, indicating roughly where the other is to advance to, and subsequently correcting the position taken up by it, should he consider it necessary to do so. No shouting or other noise should be permitted at outposts, nor should the men be allowed to straggle, or show themselves to the enemy. The strictest discipline to be maintained, and the inhabitants to be treated with every civility and consideration. Outposts should always keep defiles, bridges, and causeways between them and the enemy. It may be necessary, however, sometimes to have vedettes or sentries thrown beyond them. If a piquet occupies a wood, the sentries should be posted along its edges, whilst the piquet itself should be 100 or 200 yds. behind them. If the orders are for piquets to hold their ground as long as possible in case of attack, they should in such positions advance and make their stand along the line of sentries. When a river is to be watched by a line of piquets, the important places to guard are bridges, fords, and where it forms re-entering angles towards the enemy, as crossing will seldom be attempted where it forms a salient angle towards him. localities where there are wooded islands dividing the river into several channels, should also be carefully watched. As soon as an O. C. an outpost, or advanced piquet (whether of cavly. or infy.), arrives on his ground, he is to endeavour to make himself master of his situation, by carefully examining not only the space he actually occupies, but the heights within musket shot, the roads and paths leading to or near the post, ascertaining the breadth and practicability for cavly. and guns: to ensure a ready and constant communication with the adjoining posts and vedettes, in the day by signals, in the night by patrols. He is to examine the hollow ways that cover the approach of an enemy, and consider all the points from which he is most likely to be attacked. He will by these means be enabled to take measures to prevent surprise; and should he be attacked during the night from the previous knowledge he has obtained of the ground he will at once form a just estimate of the nature of the attack, and make his arrangements for defence with promptitude and decision.

Sentries and Vedettes.—In selecting the line for the chain of sentries, care must be taken not to extend it too much,—to post the men in the most advantageous situations for observing the roads and country in front, and to keep them as much concealed from the view of the enemy as the nature of their duty will admit. It is very desirable that every elevated spot which overlooks the communications in the rear, shall be taken within the chain of sentries; but if this cannot be effected without extending the sentries too far, a party must be sent to occupy the height during the day, and care must be taken to support and ensure the retreat of this party if attacked. Sentries must be so placed, moreover, as to secure one another from being cut off, and at such distances as to prevent any enemy from passing unperceived between them during the night. Sentries should never be posted near any copse or cover from which a sudden rush might be made upon them; but all woods, ravines, &c., in the neighbourhood of the post must be watched, and occasionally visited by patrols, to prevent the enemy from assembling a body of troops unobserved in the vicinity. The fewest possible number of sentries should be employed; with which object impracticable ground, such as ponds, marshes, and precipices, should be embraced in the line of sentries, so as to shorten the extent of front to be guarded. Sentries and vedettes should always be double. If one of the two men on sentry sees or hears anything remarkable, he should call his comrade's attention to it; if both agree it is something to be reported to the O. C. the piquet, the man who first remarked it should go to the piquet to make the report, the other man remaining on the look-out. Soldiers on outpost duty to pay attention to the following indications, which should always be reported: firing,—is it gun or rifle?—its direction, importance, amount, and probable distance: dust and smoke—its direction and distance. The flashing of a heliograph; lights, signals, rockets, torches, &c.; unusual noises, trampling of horses, rattling of carriages, barking of dogs, lighting or extinguishing watch-fires. The offrs. and N. C. Os. with the piquets should visit them frequently during the day, and between every relief during the night and foggy weather. This is all the more essential towards morning. If there is a house or church near the piquet, an intelligent man with a telescope should be posted on the top during daylight. At night sentries should be on low ground, keeping the high land between them and the enemy, so that any one passing over it should stand out against the sky, and so be easily seen. In most countries but few vedettes or sentries are required by day. Bayonets should never be fixed by sentries during the day, or on bright moonlight nights; in thick weather, and on moonless nights they should always be fixed. By day they should have in view those on both sides of them, and at night they must take it in turns to patrol to their right until they meet or can see the next sentry there. However, in clear nights, the less motion there is the better. Smoking should be strictly

forbidden to sentries, and they should not converse above a whisper. Sentries by night should be relieved every hour. It is most desirable to have piquets divided into 4 reliefs for nightwork, but there should never be less than three.

At night, when the offr. or N. C. O. visits the sentries, he should patrol with one of them from 30 to 40 yards to the front, according to the nature of the ground. Sentries are frequently posted in positions which are of such difficult access, or at such a distance from the piquet, that it is advisable to detail a party with a N. C. O. of just sufficient strength to furnish the sentries. The line of sentries should be to the enemy an impenetrable veil, behind which you can move where you wish without the enemy being able to discover the movement, whilst at the same time they should be the eyes of the army, always peering forward to watch and report what the enemy is doing. Every road and byway should be carefully watched by them. Both by day and by night sentries should only allow one person at a time to approach their post until they are satisfied that they are friends. If strangers by night approach any sentry they must be forced to halt until the next relief comes round, when they should be disarmed and taken or sent before the O. C. the examining post. If by day, a signal to be made to the sentry at the piquet (or the connecting one, if the former should be far away). An offr. from the piquet should at once proceed to the spot and will arrange for their being taken to the nearest examining post. No matter who the intruders may be—deserters, spies, or an offr. with a flag of truce—the least possible conversation is to be held with them.

Examining Posts.—In the line of piquets in front of a Divn. or Brigd. as the case may be, an examining post should be established on the main road of approach, to be under an offr. : no one to be allowed to come within our line of piquets except at this post, and all persons approaching them to be warned off and made to go there. The O. C. this post will have orders from the F. O. of the day as to the classes of person who should be given and refused admission within our lines : the utmost care to be taken that no unauthorized person passes this post in any direction.

If a flag of truce from the enemy approaches the line of sentries, it should be made to halt, an officer from the piquet to remain close to it, but not to enter into any conversation with it, until he has received orders from the F. O. of the day as to its disposal. He should not allow it to proceed more than a few yds. inside the line of sentries. He must be careful that advantage is not taken of the situation for the examination of our position. He will therefore detain them in such a place that they can see nothing, or only in the direction of their own camp. *See par.* on FLAGS OF TRUCE.

In the case of deserters, spies, or others coming from the enemy's lines they should be ordered to throw down their arms and to move some paces from them before the sentries or vedettes whom they approach allow them

to come near. Os. C. piquets should be careful that no questions be put to them by their men. If questioned by many, they weary of answering, and become unwilling to give information subsequently, when examined at Hd. Qrs. by those whose duty it is to do so. They should be at once sent to the F.O. of the day, who will dispose of them according to the orders on the subject existing in the army at the time. Sentries should be instructed that they must at once give the alarm by firing at any body of the enemy approaching their posts or the line of sentries in their own vicinity. They must continue to fire quickly as long as the enemy advances, and until they themselves are driven in. They should retire as slowly as possible, one man being always loaded, as in skirmishing, and only falling back step by step, so as to avoid being taken prisoners. In the event of an accident happening to prevent their rifles going off, they must shout as loudly as they can, and if by day wave their caps to attract attention. Should a man desert from the piquet or be taken prisoner, it must be at once reported to the F.O. and to the piquets on your right and left. Officers should carefully select their men for sentry and vedette duty, putting the best men on the most exposed and important posts. In every company there are many near-sighted men, and men whose hearing is bad; these cannot safely be used as advanced sentries; they should be used for patrol duties, sentries over the arms, fatigue duties, &c.

Flanks to be protected.—The flanks of a line of piquet sentries should be thrown a little back, and if not protected by the nature of the country, a detached party under the command of an offr. should be posted in the most favourable position to prevent the flank from being turned.

Connecting Sentries.—Communication should be kept up by means of single sentries between the front line of sentries and the piquets, also between the piquets, the supports, and the reserve. The same men should always be mounted on the same posts, when it comes to their turn to go more than once on sentry. No man to go beyond 20 yds. from his piquet without leave. Single sentries must be always posted over the arms of the piquets, supports and reserves, the arms being placed so that the sun shall not shine on them. For these and the connecting sentries it is most useful to have a rail or a long rod, supported at each end by a forked stick, pointing in the direction of the sentry in advance, upon whom their attention is most particularly to be directed.

Things to be noted by officers on outpost duty. — Officers, particularly those on the staff, should study the general habits and customs of the enemy with reference to their outposts, their hours of *reveille*, their practice in relieving outposts, sentries, &c. By day, the glittering of the sun upon the arms of troops in motion indicates the direction of the march. If the rays are perpendicular, they are moving directly towards you; if slanting from left to right, downwards, they are moving towards your right, and *vice versâ*,

If the rays are intermittent and varied, they are moving away from you. When facing the sun, objects seem nearer than when the back is to it. The neighing of horses, barking of dogs, rumbling of carriages, or clouds of dust, are indications of movements that must not be neglected. *See article on* MILITARY INDICATIONS.

Os. C. piquets in close proximity to those of the enemy must be careful to avoid coming into useless collision with them. Sentries firing at one another, and attempts to carry off detached posts, sentries, &c., unless with some special object in view, are to be avoided, as they lead to nothing, give rise to reprisals, and tend to the general annoyance of all supports, reserves, and even the main body. At the same time, all attempts on the part of the enemy's piquets or patrols to approach our sentries must be stopped. It is wonderful how soon light troops opposed to one another learn mutual respect and forbearance, and come to a sort of tacit understanding upon such matters.

An Officer to strengthen his Post.—An offr. ought to strengthen his post, when practicable, by constructing abattis, breastworks, &c.; where the defence of a bridge or ford is intrusted to him, he ought never to omit throwing up something of the kind to protect his men, and impede the advance of the enemy. An offr. ought not, however, without permission, to block up a main road with other materials than such as are easily removed. A tree felled with judgment, brushwood cut to a certain distance, pointed stakes about breast high, placed on the point most assailable by the enemy, may be attended with the greatest advantages, and can be effected with the common hatchets or billhooks with which the soldiers are provided for the purpose of cutting firewood. He should ask himself what he would do if attacked from different directions. His plan should be prepared as soon as he has examined his position. Though by nature he be slow of thought, he has nothing to fear provided he has made up his mind beforehand as to what he will do when attacked. This is particularly the case as regards night attacks. Nothing checks the ardour of troops more than an unexpected obstacle within a moderate distance of the place attacked; this must not be overlooked, and no impediment he can throw in the enemy's way, at that distance from his post, must be deemed unworthy his attention. He should open up good communications to the rear, by which to retire in case of need. He must remember that, in case of attack, the longer he dispute every inch of ground, and the more he forces the enemy to deploy in order to drive him in, the more efficiently is he performing his duty.

An Outpost must not shut itself up without Orders.—An outpost ought not to shut itself up in a house, or an enclosure, with the intention of defending itself to the last extremity, unless particularly ordered to do so, or that circumstances may render it necessary at the moment, for the preservation of the party, in the expectation of support.

Under what circumstances a Piquet should retire.—A piquet may with safety defend its front as long as its flanks are not attacked; but as soon as the enemy

attempts to surround the post, the piquet must begin to retire. If the piquet on either flank is forced back, you must throw back your line of sentries in that direction, and watch for an opportunity of falling on the enemy's flank as he advances.

Precautions to be taken when fires are allowed.—No fire should ever be lit by piquets; when a support is permitted to have a fire, it should always be as much as possible concealed from observation; and the alarm post, in the event of an attack at night, should invariably be fixed at a short distance in the rear of the fire, so as to prevent the support from being seen, when drawn up, and to compel the enemy to expose himself while passing the fire, should he advance. All cooking for the piquets should, if possible, be done with the supports or reserves. Under all circumstances, at least ⅔ of the outpost should always be on the alert and ready for action. Horses should never be permanently unsaddled, although they may be shifted a few at a time, to examine the pannels, &c. The horses should be fed and watered ⅓ at a time, the bits being only removed whilst they are being fed or watered. The offrs. should take it by turns to sleep for an hour or two; but one must always be on the alert. In bad weather it is advisable that piquets should have shelter tents, care being taken that they are placed in positions where they cannot be seen from the front.

Outposts to be under Arms an Hour before Daylight.—Outposts will get under arms in the morning an hour before daylight; and if everything appears quiet in front, the offr. will, as soon as he can discern objects distinctly, proceed to occupy the same post that he held the day before; but he must previously send forward patrols to feel his way, and should any change be remarked in the enemy's posts or position, he will report it immediately to the F.O. of the day.

When advanced Piquets should be relieved.—As attacks are most commonly made about daybreak, a desirable accession of force will be always obtained by relieving the piquets at that hour.

Arrival of the Relief.—When the new piquet has arrived, the O.C. it will accompany the offr. of the old piquet along the chain of posts, and this offr. will point out the situation and strength of all the enemy's posts, and afford every other information in his power to the relieving officer.

Duty of the Officer of the old Piquet.—When the sentries are relieved, and the weather is sufficiently clear to ascertain that there is no indication of an attack, the offr. who has been relieved will forward a written report to the F.O. of the day, fall back upon the reserve piquet, and march to camp in the same order as when he advanced; but if the advanced piquets should be attacked before he arrives in camp, he will consider it his duty to face about instantly and march to their support.

When Piquets are attacked.—When piquets are attacked, the same rule will be observed as in all other skirmishing, and the detached officers' parties will not run in on the main body, but support the skirmishers; and when compelled to retire, they will, if possible, retreat on the flank of the main body, and thereby afford mutual support to each other. If forced back at night, they should keep up a heavy fire, so as to alarm those in rear.

The principal Object of Piquets in case of Attack.—In the event of an attack, the O.C. a piquet must ever bear in mind that the great object of his efforts is to gain sufficient time to enable the main body in his rear to get under arms and prepare for action. The points he is to dispute in falling back having been previously selected, few cases can occur in which it will be impossible to attain that end, without endangering the safety of his piquet; but even in an extreme case, he must remember that it is his duty to sacrifice himself, rather than be driven in upon the main body before it has had time to form.

Outposts pay no Compliments.—Outposts pay no compliments, but when approached by a general officer, the F.O. of the day, or by any armed party, they will fall in and stand to their arms. Sentries on outpost duty pay no compliments.

PATROLLING.—One of the most necessary and effectual methods of preventing surprise and of gaining information remains to be noticed, viz., patrolling, without which, however active and alert the sentries and vedettes may be, the service of the outposts never can be properly done. The mode of conducting these patrols, their strength, and the distance to which they may be sent, are all necessarily dependent on the ever varying local circumstances in which outposts may be placed; but it may be laid down as a good general rule, that, when near the enemy, a patrol should be sent out once between every relief during the night.

Vigilance, Silence, and Circumspection indispensable in Patrolling.—This must be strictly enjoined upon all patrols: no noise must on any account be made, and when anything is to be said, it should be in a whisper. It is not possible to lay down exact rules for conducting patrols in every case that may occur on service, but one or two of the most usual modes of carrying on this important duty may be briefly adverted to.

Patrolling in front of the Line of Sentries.—The patrol, on leaving the piquet should, when practicable, communicate in the first instance with the next post upon the right (or left), and patrol cautiously along the whole front of the line of sentries just near enough to see them, and communicating with the next post upon the left (or right), return again to the piquet by the rear of the chain. The sentries must not be thrown off their guard by the frequent appearance of these patrols, but taught to expect an enemy in all who approach them: some preconcerted signal, an interchange of countersign in a low tone, should be used, and which shall be changed at every relief.

Patrolling when the Enemy's Posts are distant.—Patrols must also be sent along the roads in the direction of the enemy's posts, to such distance as may be deemed expedient. These patrols must be preceded by feelers, quick intelligent men selected for that duty, whom no sound will escape, and whose experienced ears will detect the approach of danger long before it reaches them. A patrol must, above all things, avoid unnecessary firing, or, in other words, false alarms; on hearing the approach of footsteps, the feelers should instantly fall back to the patrol; and should these sounds indicate an advance of a larger body than a patrol, one or two men should be sent back with all haste to inform the officer of the piquet, who will make immedi-

preparations for defence. The patrol will retire steadily and unobserved, if possible, upon the piquet; but if perceived and overtaken by the enemy, an incessant fire must be maintained, in order to apprise the camp that the enemy is coming on in force. It may safely be inferred, that if the piquets know their duty, and are judiciously drawn up for the defence of the roads, it will be extremely difficult for an enemy, however strong, having failed to surprise the advanced posts, to make head, under all the disadvantages of a night attack, against men who know the ground, and whose plans have been previously concerted for disputing those points in their line of retreat, where disparity of numbers must be in a great measure neutralised.

Patrol to avoid exchanging Shots with the Enemy.—If you fall in with an enemy's patrol in advance of the chain of sentries, retire without exchanging shots, as firing between patrols only tends to harass and to uselessly disturb the troops in rear.

A strong Patrol to be sent out just before Daylight.—It should be sent some distance towards the enemy's posts, and above all others, it must proceed with redoubled caution, for fear of falling in with the enemy's hands. Its object is to keep the enemy's reconnoitring patrols at a distance, to ascertain if the enemy's columns are formed-up and only waiting for daylight to attack; sometimes its mission may be to dislodge or capture some of his advanced parties, to learn what is going on behind them. These patrols should be furnished from the reserves or main body. (See Articles on "SCOUTING" and "RECONNAISSANCES.")

Flags of Truce.—When it is necessary to communicate with your enemy under a flag of truce, select a fine, soldierlike looking offr. having a good address, and possessing great tact, to carry your message. He should be a good horseman, very well mounted, and thoroughly conversant with the enemy's language. If the mission is an important one, a S.O. should be employed. The trumpeter to accompany him should be selected for somewhat similar characteristics, and for his sobriety. He should be warned, on no account whatever to accept any wine or intoxicating drink whilst in the enemy's lines. The offr. should be provided with a large white flag, and should approach the enemy's position in the most open manner, selecting the most open ground in doing so, taking care that his white flag is clearly visible, and making the trumpeter sound frequently to attract attention. If sent out from a fortified post, or from a line of troops in action, or sent to communicate with a post or fortress held by the enemy, all firing from your side should cease suddenly in a marked manner on that particular part of the ground or in the immediate locality where the flag of truce is moving. If the enemy is determined not to receive it, the party will be fired upon—a chivalrous enemy will content himself by firing over their heads. The offr. with the flag should not, however, take a few shots fired at him as a positive no; for private soldiers are often very ignorant regarding the conventionalities of war. When, however, after repeated efforts to approach the enemy's position under the protection of his flag he is convinced that, having seen it, and understood his wish to communicate, they will not receive him, he must

retire. If prepared to admit him, the enemy will most probably send an offr., also carrying a white flag, to receive him or his message. If admitted within their lines, he should, as far as he is allowed, be all eyes and ears being at the same time most guarded in what he says himself, but without appearing to be so. He should be most voluble and gay in his manner wearing the air of a man who felt himself to be without any doubt whatever in his own mind on the winning side, and therefore with nothing to conceal from his enemy. Happiness, contentment, and lightheartedness should be written on every feature of his face, taking care in conversation to impart to the enemy in a roundabout way whatever impression it may have been previously decided it was desirable to convey, and concealing, under an air of extreme soldierlike frankness and volubility, all that it is desired to conceal. If the enemy insist on blindfolding him, of course he must submit to it.

Having carried out his mission, he should return to the general by whom he was sent with the least possible delay, unless indeed one of the objects aimed at from his mission was to gain time—say during an action to allow reinforcements arriving—when, of course, the longer he can postpone the resumption of hostilities by dawdling over his duty, dismounting to look for imaginary stones in his horse's feet, &c., &c., the better. If the contending armies are in presence, it is a good plan to leave the trumpeter—if the enemy will allow it—between the opposing forces at the spot where the flag was met by an offr. sent out for that purpose by the enemy: this marks the spot to which the flag is to be reconducted on its return to its own side.

On the other hand, if the circumstances are reversed, and you suspect the enemy of endeavouring under the cover of a flag of truce to gain time, you should not receive it, or should your suspicions be only excited after the reception, you should, in dismissing the bearer, inform him that you will allow him so many minutes to get back to his lines, after which firing will be immediately resumed. Much nonsense is frequently written about the barity of refusing to receive a flag of truce: it is the undoubted privilege G. O. C. the side to which it is sent to exercise his own discretion on the point, and should he conceive it would be in the least to his disadvantage receive it, he should not for a moment allow any absurd and false ideas humanity or sentimental notions about chivalry, to influence his decision. Never for one moment suspend any movement or operation you may be engaged in, because the enemy has sent you a flag of truce; his object may be to gain time for the arrival of reinforcements or for the execution of some flank or turning operation. If an enemy's flag of truce is seen, the question of its reception or rejection is for the superior offr. on the spot, *i.e.*

general in immediate command of the troops in front of which the flag is shown, without whose orders the firing is on no account to cease. When a flag of truce is seen, the circumstance must, with the least possible delay, be reported to the general, who, if a subordinate, will use his own discretion whether to receive it or not, or to await the decision of the G. O. C. the army or army corps. If it is not to be admitted, a musketry or artillery fire should be kept up on the ground in its vicinity, firing over it, but always taking care not to hurt the bearer or his trumpeter ; this fire to be maintained until the flag is withdrawn. The firing and operations on all other parts of the line to go on as if no flag of truce had been seen at all. If it is to be received, a S. O. with one or two well mounted dragoons, one carrying a large white flag, should go out to meet it ; the farther from your lines it is met the better. If the message is merely a letter it should be taken and a receipt given for it, the bearer dismissed at once with civility and determination, and told to gallop in returning to his own position ; if the messenger is to be allowed into your lines, he and his trumpeter should be carefully blindfolded, and conducted by a roundabout route to Hd. Qrs., the offr. and his trumpeter being separated, so as to be unable to converse together. The latter should be given plenty to drink if he likes to have it, in the hope of being able to extract news from him when liquor has untied his tongue : note the regt. to which he belongs. If you are in a besieged town or work, take care that both the offr. and his trumpeter have plenty to eat ; let them see abundance on the table, no matter how short you may be of provisions ; you cannot be too circumspect in their presence, lest they should gather indirectly any information that could be useful to the enemy, or learn anything as to your real condition. There are circumstances under which it is quite allowable to temporarily detain the bearers of a flag of truce, as for instance when they have, under cover of their flag, approached your lines sufficiently near to ascertain you were engaged in executing some movement that you considered it most desirable to conceal from the enemy. When there is no need to keep them any longer—the movement having been completed, &c., &c.—they should be sent back with many excuses for their detention, carrying a letter of apology and explanation to their C.-in-C. An offr. sent to treat with an enemy, whilst enlarging upon the strength and fitness of his own troops, should refer in a decided tone to the supposed well-known weakness and demoralisation of his opponents. Never allow any high-minded, chivalrous feelings to carry you away and grant really favourable terms to a well-beaten enemy, although you may give him their shadow, in returning the offrs. their swords if they have fought bravely, or in according them other equally empty honours.

An armistice is sometimes determined upon for the purpose of burying the dead, collecting the wounded, &c., or whilst terms of peace are being definitively arranged. It is usual to define certain limits to each army, so

that between the advanced sentries or vedettes of both sides a neutral zone should be left, into which the troops of neither side should penetrate, except perhaps small unarmed parties seeking for dead or wounded comrades. Streams or rivers are the best boundaries to select for this neutral zone. At Sebastopol, this neutral zone was sometimes not more than about 50 yds. in breadth and it must always be more or less restricted during a siege. If the armistice is intended to allow time for arranging the terms of peace, it is desirable that its exact duration should be most precisely stated in the simplest words in the paper drawn up by the officers deputed by both sides to arrange it. You must omit no precaution for the security of your army during an armistice, as the opportunity might be used disloyally by the enemy. If your object is to gain time, the offr. deputed to arrange the terms of an armistice or capitulation can always do so by refusing to agree to the enemy's proposals without a further reference to his own Hd. Qrs. It is an understood thing that no terms agreed upon by the negotiating offrs. are really binding until approved of by the commanders of the respective armies.

Defence of Posts.—The object to be attained by an offr. directed to defend any village, house, garden, &c., is first to render it in a rough manner as like in outline as possible to a regular fortification, the guiding principles of which, it is taken for granted, all know. It is assumed that the garrison is sufficient for the extent to be defended; in other words about one file to every running yard of hedge, wall, &c,, that represents the parapet. If the post is of any extent, there should be about $\frac{1}{4}$ more as a reserve. When guns are used in the defence of redoubts or fortified villages they should be kept out of sight until the moment arrives for them to pitch into the enemy's assaulting columns. They should not engage artillery except under very peculiar circumstances, and when so used, they should be withdrawn as soon as the enemy's guns begin to overpower them. For these reasons they should be served *en barbette* instead of through embrasures about 20 or 30 filled sandbags being kept with each gun, to form a rough temporary protection for the gunners from the enemy's marksmen. An offr. desired to occupy and defend any such place should examine it before occupying it with his men, and will determine upon the exterior line that he will defend. He will then distribute his men along it as they are to stand giving each company or section a certain space to prepare for defence. The place should be searched for tools, if there is any scarcity of them. The first thing to be done by each offr. is to obtain cover for his men whilst he enables them to deliver their fire with effect; 2ndly, to strengthen his portion of the work, so as to prevent an enemy from entering it; 3rdly, to render the approach to it as difficult as possible, and to clear away all cover from his immediate front. The reserve in the meantime to open out communications and strengthen any church or other central building selected as a citadel

To it, or some other building near it, all the wounded are to be carried during the action. Household furniture is of great value in forming breast-works. Boxes, barrels, and bags filled with earth make good parapets, and assist greatly in making loopholes. The glass in all windows of houses to be defended, to be broken. If the roof is of thatch it should be removed. Buckets or barrels of water should be placed in every room. The garrison must prepare for a heavy artillery fire being brought to bear upon it. As all armies are now provided with rifled field-guns, it is impossible in hasty intrenchments to obtain complete protection from their fire, and the plan of banking up walls with earth, unless there is time to construct very thick parapets, is labour thrown away. When time permits, effective cover from artillery can, however, be obtained by digging trenches behind the palings and hedges it is intended to hold. The reserve should be as much as possible screened from fire, so that it may be ready to charge the enemy in any direction where he may have forced an entrance. Everything will depend upon the offrs. If they remain cool and jolly, their men will follow suit. The slightest sign of any one being ready to look over their shoulder to the rear is fatal. An offr. in command who abandons the defence of a post as long as $\frac{1}{3}$ of his garrison remains effective, should be shot. Let everyone remember the defence of Hougomont. In selecting offrs. to command them, the greatest care and discrimination is necessary. Never allow an offr. to be placed in such a position unless you know enough of him to have perfect confidence in his nerve, coolness and daring. How often do misfortunes overtake us from the want of these qualities in offrs. who succeed to the command of troops during a campaign. To give a man command solely because he is senior offr. is not only a folly, but a crime.

Reconnaissances.—The most reliable method of obtaining information as to the enemy's movements is by reconnaissances, which may be divided into four classes.

1st. Reconnaissances in force.

2nd. Those made by a detachment of all arms, of sufficient strength to protect themselves and secure their retreat.

3rd. Those made by S. Os. accompanied by small cavly. detachments.

4th. Those made continually by individual officers from the outposts.

The first is an affair for the C-in-C. and must never be undertaken except by his special orders. It has frequently been adopted previous to a great general action being embarked in, for the purpose of ascertaining the enemy's strength and dispositions. It should not as a rule be attempted until late in the day, when approaching night will inevitably put a stop to all fighting. It should be conducted in a manner similar to beginning an action. When driving in the enemy's piquets, it is advisable to make as many prisoners as possible from different parts of the lines. This must be accomplished by a sudden dash of cavalry to cut off sentries,

vedettes, &c. Having driven in the enemy's outposts, approach his lines at all points by swarms of skirmishers; bring your guns into play from all commanding points, taking care that the waggons are left well in the rear, and that only just sufficient men and horses to work the guns are made use of. By this display of your guns you will most probably force him to show where his guns are placed. During these operations every available S. O. must be in front among the skirmishers, taking advantage of all high ground or trees to observe the enemy's position. They should make sketches, both of the features of the ground and of its general outline, as if they were taking landscape pictures, noting carefully all prominent objects which catch the eye, such as a large tree, a peculiar rock, farmhouse, &c. It is advisable that, previous to starting, each should make in his pocket-book an enlarged plan of the enemy's position, upon a scale of 4 or 6 in. to the mile. Although doing so from a plan upon the small scale of three or four miles to the inch will not give you any idea of the ground, beyond the fact of there being hills at certain places, and the position of the roads and villages, yet if 20 or 30 S. Os. dispersed among the skirmishers along the front of a position, are provided with skeleton sketches of this nature, they can easily fill in enough of what they see in front of them (using their telescopes and prismatic compasses) to make a most invaluable plan when all have been collated. The position of several points in rear, that may be visible for miles in all directions round, should be accurately fixed, so that the reconnoitring offrs. can fix their own positions at all times by them. Each prisoner taken should be asked the following questions:—What Corps, Divn., Regt. or Battn. he belongs to: the names of the Os. C. the above, where his Battn. is encamped; what Battns. and Regts. are on the right and left; what number of Divns. or Army Corps are there present: whether they are under canvas or bivouacking; how long his Battn. has been there. If it has been there some days, have any, and what, troops marched into position since then. Where did his Battn. march from; with how many other Battns., or with what Divns. did it march; frequently a soldier will not know the name of the village or place marched from that morning, but he will always know the hour at which he started, and this will enable you to ascertain the number of miles he had marched before he was taken, and so help you to guess where he had come from. What was the length of the marches, the general hour of starting in the morning, and the hour of halting for the night; did many fall out sick during the march, and are there many sick now in camp; have any large hospitals been established near the positions; what are the daily rations; are they good and efficient; is there plenty of forage; what are the camp rumours; what was in orders lately; have any intrenchments been constructed, and where are they; are they open or closed in the rear; what is the depth of their ditches; where are the Cavly.: are their horses in good condition; is the G. O. C. popular; have they a high opinion

f him; who is considered the ablest man in the army: where are the atteries of his Divn., and how many are there; are there many heavy guns; there a siege train or a bridge equipment, and where is each situated; here is army Hd. Qrs.?

In questioning soldiers it is advisable to begin by talking to them about heir colonel, whose name you should know from your pocket-book; the ore knowledge you can show a man you possess about him and his surroundings the more information you are likely to obtain from him, and as e sees you already know so much he will be chary of telling you untruths. a few prisoners are taken from along the front of an enemy's position, nd they are carefully questioned as to the positions of their own battns., S. O. can easily mark on his plan where each Divn. is placed, by referring the organisation and distribution of the enemy's army into Brigds., ivns., &c,

Reconnaissances of this nature are sometimes carried out by a single ivn. forming the Advd. Gd. of an army marching to attack an enemy in sition, of whom it is necessary to obtain the most accurate information evious to the arrival of the main body. This is a more delicate operation an that already described, and must be carried out with the utmost ution. The enemy's outposts must be driven in, and his position proached by a line of skirmishers, who will try to push back his, and rce him to display his strength. Such operation should not be attempted within a couple of hours of night, and great care should be taken to tch the flanks well by patrols, to prevent the enemy passing in force tween the attacking Divn. and the main body. The reconnaissances of rtresses that it is intended to besiege are made in this manner by the esting force.

THE SECOND CLASS OF RECONNAISSANCES is generally made by a tachment of all arms; its object is to obtain information by approaching e enemy's position, taking a few stray prisoners, engaging, perhaps, in a y partial skirmish, and then retiring. The extent to which it should gage must depend upon its strength, and its strength upon the distance which it has been sent away from support. It is a dangerous operation all times and under all circumstances, for, if the enemy discovers your akness, he will annihilate you; it is a good plan, when it can be done, to cede such operations by rumours that you mean to make a general ack: he will consequently be more likely to show you his strength, and re chary in pouncing down upon you.

f the detachment is composed, say, of 1 Battn., 6 squadrons, and I. A. guns, it would be well in some instances to leave the Battn. and f the guns in some strong position about 1 or 2 miles short of the enemy's posts, whilst the rest advanced as a line of skirmishers with supports and mall reserve. If the Infy. is not left thus behind, it should form the

reserve, keeping about 1000 yards in rear of the supports. If such a force, by marching upon bye-roads, succeeds in keeping its movements unknown to the enemy, so as suddenly to appear some two hours before dark in front of his outposts, a great deal may be learnt without any great risk: the Cavly. can always, in case of need, fall back rapidly behind the Battn. of Infy., and thus being well beyond the influence of the enemy's Infy., with night coming on, it has but little to fear. The C. O. of such detachments should be a S.O. of rank and ability; he will have to display all that he knows of war and its science to conduct it with credit to himself and advantage to the service. It is so difficult to do enough without doing too much; unless the enemy's outposts are driven in, nothing can be learnt, and the act of driving them in may lead to a fight, which, once commenced, it is difficult to withdraw from.

THIRD CLASS.—There are no occasions in life when offrs. have such opportunities for displaying coolness and intrepid bravery, joined to extreme caution, as when sent out with a troop of Cavly. or a few well-mounted men to reconnoitre. This is a duty that Cavly. offrs., above all, should strive to make themselves perfect in. The object is to examine certain districts of country, and report upon its roads, rivers, general features and resources, and to ascertain where the enemy is, his strength, what he is doing, &c. It is taken for granted that the offr. sent on this duty knows as much of the country as it is possible to do from maps and plans; that its principal roads, mountains, forests, villages, rivers, and the bridges over them, are familiar to him by name. In carrying out his reconnaissance, he will take all the same precautions as indicated for a patrol: he will take care to have no squealing horses with his party; when within reach of the enemy's patrols, he will march as much as possible along by roads, and under no circumstances must he ever take up his quarters for the night in a village, or return by the same route he went out by. Barbarous nations are especially prone to lie in wait for the return of the party on the path it went out by. If the weather is bad, the O.C. may avail himself of large open barns to shelter his men in. He should be most careful to spare his men and horses all unnecessary fatigue. Whilst far from the enemy, he may unsaddle all horses except those of his guard. As he may have at any time to depend upon the endurance and speed of his horses, he should watch their condition, wants, &c., carefully. If, before starting, the exact position of all neighbouring villages, churches, hills, and prominent features have been determined, he can have but little difficulty in fixing his position from all the commanding points on his line of route, as described in article "SURVEYING." The art of conducting such a reconnaissance is intimately connected in all its details with surveying, so that the article on this subject should be carefully studied. Reconnoitring parties of this nature will be sent on all the roads that can be made available for the advance

of the army; they should consist entirely of mounted men, from 10 to 50 in number, depending upon how many days the party is to be absent, the nature of the country, and the proximity of the enemy. The best possible guides should be obtained before starting (for whom horses must be provided); they should be well treated, and paid liberally by the O.C., who for this purpose must be prepared with money (to be subsequently recovered upon travelling bills). If there is any probability of the guide attempting to escape, his legs should be tied to his stirrup leathers, to prevent him from jumping off when passing through any close portion of the country. (See Article on "SCOUTING.") If the O.C. does not speak the language of the country, he should be accompanied by an interpreter, and if he is not, it is a good thing to have the following questions in the language of the country, printed on a sheet of paper, which, upon entering a village, he can present to the postmaster or chief man: the writer adopted this plan in China, during the war of 1860, and found it answer most satisfactorily.

'Please oblige me by writing answers opposite the following questions: 1. The name of this village. 2. The names of the three principal inhabitants. 3. The number of inhabitants. 4. Its distance from the several nearest villages and large towns. 5. The nearest market town, and when markets are held there. 6. The number of horses, mules, and vehicles in this village. 7. The number of cattle, sheep, goats. 8. Have any patrols been here lately, and if so, the dates? 9. What was the strength of such patrols in cavly., infy., guns? 10. What is the nearest place where there are any of the enemy, and how far is it off? The names of the leading men of the next village to the front.'

Other questions can be added according to circumstances. The C. of the force should have large quantities of these papers of questions struck off, and distributed to offrs. going out with reconnaissances, who will get them filled up in the various towns and villages, being signed in all cases by those who write them. The opportunities afforded of visiting distant localities by these parties, should be made available for distributing proclamations amongst the inhabitants, promising them protection for themselves and their property, and inviting them to bring in supplies, which will be paid for. When you obtain any information, write it down as soon as possible, and never trust your memory when you can avoid doing so. To obtain information from the inhabitants of a hostile country is an art in itself; except under the most extraordinary circumstances, force should not be resorted to, and the infliction of anything approaching to torture, or corporal punishment, must be avoided. In questioning villagers, it is advisable to use the local information you have obtained from others previously examined; if you know the names of the curé, the mayor, &c., &c., and any peculiarities for which they are locally famous, by adroitly referring to them in your conversation,

your statements will most probably lead to others from those you are interrogating, and will certainly place you on better terms with them. It may often, however, be useful to carry off leading men from villages when they refuse to give ordinary information. Guides taken from villages or hamlets frequently tell you they don't know the way to the nearest localities, which, of course, is untrue. During the Indian mutiny the writer adopted the plan of always making such men accompany him on the march for the next stage, telling them that if they did not know the road he would point it out to them ; they generally managed to recollect all about the country after the first hour's march, and were very glad to accept their day's wage when the march was ended. It is a good thing now and then to make a raid upon a village whilst a fair is being held ; you can then secure men belonging to the place you want information about, or to which you require guides. You can detain them nominally as hostages, so that it be not suspected you mean to move in that direction. Never allow guides to be spoken to by the soldiers, as the rough ways of privates are apt to frighten the timid into stupidity, and to make the obstinate still more obstinate and silent. Keep the guide alongside your own horse ; try to engage him in conversation about his own affairs, the number of his children, his means of livelihood, and so lead him on to talk of the war and the way it is regarded by the people, the general rumours abroad concerning it, and the contending sides, his knowledge of where the enemy are, their position and condition, prevailing sicknesses, &c. This information should not be written down at the moment, lest the guide should see that he is being pumped, but opportunities should be taken to do so as soon as possible afterwards, which can always be found by halting oneself, for a few minutes ostensibly to make a partial sketch, or make a note about the road. If he must be mounted, take care that his horse is a very slow one ; and if you suspect him, let a man ride close behind with his pistol ready to shoot him if he attempts to bolt ; tell him these orders, and he will be careful to save his life. If he is on foot and you suspect him, fasten him with a rope round his arms and waist, the end being secured to a trooper's saddle. Under the following heads will be found the chief objects to be examined and reported on :—

Cities and Villages.—A few houses together, containing a few families, generally called a hamlet : if there is also a church, it may be classed as a village : a town is a collection of better sort of houses, where markets are held and good shops exist : a city has generally some sort of municipal institution. How situated, their population, commerce, and water supply. Are the inhabitants chiefly of the agricultural or of the manufacturing classes. Are they open or fortified : if the latter, of what class, and upon what system. How provided with guns and military stores. Have any large supplies of food been lately collected in them. All attainable

information as to their powers of resistance, and the means of attacking them; are they commanded from without: are their suburbs within range of the works; the strength of their garrison; the name of their commandant; if besieged during any previous war; a sketch of the incidents of the operation, &c. (An offr. of R.E. should be with all parties sent to reconnoitre fortified places, if it is intended to inspect the works closely.) If open, their capability of defence, the general nature of their buildings, the number of their houses, &c. State their water supply, resources in provisions, live stock, transport animals, waggons, forges, wheelwrights and corn mills, and whether they are wind or water or steam mills, and the names of those upon whom requisitions can be most effectively made; the names of the local authorities; the dates when markets are held; is there a post office; the dates and hours when the mails arrive; is there a line of telegraph from it; if not, what is the nearest point at which a telegraph wire passes; how many telegraph operators live there; how many butchers, and what are the facilities for baking, &c. The accommodation they can afford in time of war for troops to be stationed there a few weeks can best be arrived by dividing the houses into classes, and by visiting one house of each class, estimate the number it could accommodate, and so arrive at a fair estimate of the accommodation afforded by the whole place. See article on "BILLETS" for the mode of calculating the number of men a house will hold. What is the fuel in use, and is there any large quantity of it in store.

Roads,—In our home reconnaissances we classify metalled roads as: 1st class, *Main Roads* on which three lines of traffic can move. 2nd class, *High Roads* 18′ wide on which two lines of traffic can move, and 3rd class, *Country Roads* 9′ wide on which a single line of traffic can move with ease and pass occasional vehicles, and on which infy. can march in fours. A width of 15′ is required by mounted men four abreast. Their general width and condition, whether raised or sunken, macadamised, or of sand or clay. If not regularly paved or macadamised, it may be taken as a rule, that roads passing over soil that retains water are bad, particularly if inclosed by walls or banks. Those passing over coarse gravel, sand or rock, are generally good.) If in good order, how drained, and if inclosed by walls, hedges, banks, or ditches; can troops of all arms or baggage get freely on and off them to the fields at either side; the nature of the soil; cultivated with what crops; general character of the country; whether open or wooded; the fences, whether hedges, ditches, or of stone or wood; what rivers, streams, cross them, and the nature of bridges over them; of what material, of how many arches or spans, if safe for field or heavy guns; if the rivers are passed by fords, their character and depths. The ascents and descents, and their slope in fractions thus $\frac{1}{15}$ or their angle thus, 5°. Roads that join or cross; from where to where, and the distances; towns

and villages; can they be avoided by marching round them; what other paths are there to the right and left running in the same direction that can be made available for troops, their nature, &c. If portions are out of repair, whether the material is at hand for repairing it. Are there any parallel roads, and if so, how distant. The distances between all towns and villages to be noted in English miles, also the time taken to march at a walk. All defensible positions; suited for what numbers. If the time permits, rough sketches of them to be made on 4″ or 6″ scale; all good sites for camps, permanent or only for the night, and suited for what numbers. Defiles to be carefully examined.

Railroads.—Their gauge in ft. and ins.: the gauge is he measurement between the inside of one rail to the inside of the other; whether the line is double or single, description of rail used, and how laid down, whether on continuous longitudinal sleepers, or on cross ties; are they secured by spikes or screws, and what is the mode of fastening them one to the other; what is the easiest method of destroying the line; general description of bridges, of what material, their length, and how to destroy them. The stations, whether large or small; built of what material; the length and breadth o platforms, and what facilities exist for enlarging them and constructing others; any large quantities of reserve rails or sleepers; the position and length of all sidings, and means for loading and unloading cattle; cranes points and turntables. The means of providing the engines with water, and how such means can be most easily destroyed; amount of rolling stock, and description of carriages used; the numbers each would carry of men, horses guns, carts, &c. Whether the engines are powerful, and in good con dition; places along the line where they can be repaired, and where old rails can be re-rolled; what quantity of fuel for engines at stations. Wha is the general character of the line; whether level, straight, or the reverse could Cavly., Infy. and R.A. march along line or by its side; must on wheel of wagons run between the rails: raily. bridges generally require t have a flooring put down to fit them for the passage of horses or carts what are the ordinary gradients; if there are any steep inclines, their lengt and nature; how many sets of telegraph poles, and the number of the wire and places where the batteries are kept. Whether there are many larg tunnels, cuttings, or embankments, their extent and exact position Nature of the country passed through, &c., as described in previou paragraph. The reconnaisance of a railroad is most easily accomplished b an offr. travelling over it on an engine at walking pace; when an engin cannot be used, one of the workmen's hand trollies, which are propelled b a couple of men working a crank, are especially suited for this service.

Rivers, Streams, and Canals.—Whence they rise, and their genera direction. Their breadth, depth, nature of their bottoms, banks, and beds current, and the effect of the seasons on all these points; which ban

commands the other ; the quality of their water. Do they freeze over, and when ; for what length of time do they remain frozen ; does the ice bear men, carts, &c.—3″ thick will bear men in small detachments, from 4″ to 7″ cavly. and light guns, from 8″ to 12″ heavy guns. If rivers take their rise in mountains, they will be subject to freshets, which must be carefully inquired into : the seasons when they are to be expected ; whether arising from rain or the melting of snow. Are they navigable ; between what points ; nature of boats and their sizes ; the number that can be collected at any one place. The position of ferries and flying bridges ; number and nature of boats used, their weight, and the number of men, horses, &c., that each can take at a trip, and the time taken in crossing ; breadth of river at such points. Positions of bridges ; their length, breadth, and construction ; if floating, the size and number of the boats, rafts, &c., and the load that can pass safely over them ; are they passable by artillery ; best method of destroying them ; what materials are at hand to repair them if destroyed ; the best positions for the establishment of bridges and works to defend them. A section of the river should be submitted with this report ; it should be made with the greatest possible care, every yard of the river's bottom being carefully examined with a pole to discover the existence of rocks or large stones : rough sketches of such positions to be given on 4″ scale ; best positions for a passage and for our batts. if the enemy holds the opposite bank ; the roads leading to them, where they lead to, &c. ; are there points where the bridge could be constructed unseen by the enemy, and from hence floated into position ; which are the best points to make a feint of crossing to distract attention from the real position, &c., &c. The towns or villages on the banks or close by. Islands : their position, size, wooded, or cultivated. Mills and millraces. The number and size of locks in canals. If easily destroyed, and the best plans for doing so, and how fed with water ; nature and condition of their towing paths, &c. The extent to which both rivers and canals can be made to assist in the conveyance of stores, &c. This must greatly depend upon the direction in which they flow. In examining rivers note down the height of old watermarks above their existing level, and spots where men and horses can be watered. Sections of rivers should be given for proposed points of crossing.

Common expressions applied to the velocity of rivers.

Sluggish, not exceeding 1½ ft. a second, or about a mile an hour ; the fall is slight.

Ordinary, from 2 to 3 ft.	,,	or	2 miles	,,	,, ,,	moderate.
Rapid, ,, 3 ,, 5 ft.	,,	or	3 ,,	,,	,, ,,	rapid.
Very rapid, ,, 5 ,, 8 ft.	,,	or	5 ,,	,,	,, ,,	considerable.
A torrent, all above 9 ft.	,,	or	6 ,,	,,	,, ,,	very rapid.

The simplest mode of measuring a river's surface velocity is with a common log as used by ships at sea, or by measuring one or more hundred yds. on

the bank, and calculating accurately the time any small substance takes in floating from one extremity to the other, repeating the experiment several times, and taking the mean. For mean velocity, see "PHYSICAL MEMORANDA," at end of book. In floods, the velocity of rivers varies as $\sqrt{\text{depth}}$.

Fords.—Their exact position; their length and breadth; nature of their bottoms, whether sand, clay, rock, or gravel; do quicksands exist in their vicinity, and do they remain stationary, or do they sometimes form in the ford itself. Are such quicksands very dangerous, or can they be trampled out by camels. Describe the roads and approaches to the ford; the velocity of the water, whether passable at all seasons; if not, at what time of year; general configuration of the ground on both banks; height of both above river; best position to be taken up to defend them; description and position of works to be constructed to cover and defend them; easiest means of destroying them; what houses or villages are near them. The depth for Cavly. should not be more than 52″ in rapid, or than 56″ in sluggish currents; for Infy. 3′ or 42″, and from 30″ to 33″ for guns and ammunition wagons, according to the strength of the current. Place no confidence in the reports of the people regarding the non-existence of fords. It is very common to find fords about which the inhabitants know nothing. Always examine the fords by crossing them yourself several times backwards and forwards. They are generally to be found above or below sharp bends, and they almost always run diagonally across the river. Those with bottoms of coarse gravel are the best. If in crossing you stir up much mud, it is tolerably certain that large bodies of men or horses in crossing would soon render them too deep to be of use. In seeking for a ford, the easiest plan is to ascend or descend the river in a small boat provided with a short lead line and sounding-pole. It is difficult to render them impassable, but large stones rolled into them, farm harrows with the spikes upwards, ploughs, planks with long spikes driven into them, trees felled and well staked down, a ditch dug across it, &c., will retard the passage of an enemy for some time. It may sometimes be necessary to use fascines to render fords practicable. In India, where quicksands are common, the fascines are sunk by means of stones.

Mountains.—The valleys must be explored, as along them the roads are sure to be found. For military purposes, a knowledge of the roads, passes, and paths over mountains is all that is required. Are they wooded, cultivated, rocky, or covered with heath; describe the strong positions to be found in them, their general shape, and whether practicable, and if so where and for what species of troops. The best way of defending the roads and passes; the works that will be required; the supplies to be obtained; at what seasons impracticable from snow, freshets, &c. If possible, mark on your map the general configuration of the line of watershed. The feasibility of constructing new routes should be reported on.

Forests.—Whether troops can march through or only along the roads; if the latter, the reason. General description of the trees; are there many open spaces; if so, their usual extent. The roads and rivers to be carefully examined; their direction and condition. The necessity and facilities for opening new roads. Are there good positions; can they be turned. Can these woods or forests be avoided altogether by following other routes; if so, describe them. The nature of the country in the vicinity, particularly where main roads go into and come out from such forests. There is no underwood in beech woods. Forests may be composed of green, resinous trees, such as the numerous varieties of pine, spruce, &c., or of deciduous trees, such as oak, elm, maple, birch, beech, &c., or of a mixture of both S.Os. should be able to recognise the various sorts of trees commonly met with, and should know their respective usefulness.

Plains and Heaths.—General character, whether cultivated, sandy, or swampy; if suited for large camps; supply of wood and water; nature of roads; the rivers, ravine, or other obstacles; the towns, villages, and houses, &c. All prominent landmarks, such as tall single trees, &c., to be marked carefully on the map.

Deserts.—There are many varieties of desert; the country we marched over in 1882 in our advance on Tel-el-Kebir was a great sandy plain, destitute of all vegetation, and at some points nearly impassable for an army, owing to the softness of the sand, and the great mounds of driftsand which at places barred all progress. In the Soudan, in 1884-5, we crossed many varieties of desert: some were hilly, almost mountainous at places; some were very rough and rocky, and trying to the camels' feet; others were level, hard and smooth. In reporting on a desert, these are all points to be noticed; but the all-important subject is the quantity and quality of the water procurable, and the exact distances between the wells or natural reservoirs where it is to be had. The amount and quality of herbage or other food for camels comes next, then the supply of firewood. The amount of shade to be had for the men during the halts by day should be stated; trees or the steep sides of rocky hills are invaluable, especially for infantry, for the shade they afford.

Marshes, Lakes, Ponds.—Their cause, and how fed with water. If dry at some seasons; where roads cross them, or means of crossing afforded by boats, ferries, &c.; their general character, &c.

Farmhouses and Residences of the Gentry.—How are they generally built; of what material; their roofs; if generally well supplied with forage and provisions; if they generally have vaults under them. Their defensible capabilities; whether easily burnt. The accommodation they would afford, &c.

Coasts.—In reconnoitring a coast from the sea, the following points must be entered upon as minutely as possible. The most favourable

positions for a force to land: they are generally to be found at points where rivers or streams flow into the sea; if no such exist, the next best are long, low promontories jutting out into the sea of about a mile in width, so that the first Divn. that landed should, in taking up a position to cover the disembarkation of the others, be able to rest its flanks on the sea, and so have the fire from the fleet to sweep across its front in case of attack. No place is good for the disembarkation of an army unless the depth of water, and the configuration of the coast, and general character of its slopes enables one to derive full advantage from the fire of the fleet; this must always be borne in mind when selecting a point for the purpose. All bays, inlets, and the mouths of rivers to be carefully examined, with this object in view; the best position to be taken up by the fleet to cover the landing to be noted on the sketch; the roads leading from the shore inland, with distances to principal towns. Are there woods near, and what is their extent; are there any wharfs, and what are the facilities for constructing them; is there a dangerous surf, or can boats land at all times. What are the winds that render the approach to the shore dangerous; is the anchorage good; is the bottom sand or rock; what is the height of the ordinary and spring tides; is good fresh water to be had in large quantities upon landing, and is it from wells, streams, or tanks; what is the position and number of the enemy's forces in the neighbourhood. Soundings must be carefully taken, showing how near the different classes of vessels can approach. The prevailing winds and currents; is the coast bordered by downs; are there precipitous cliffs. If there is a beach, is it of mud or sand. In reporting upon a coast with a defensive object in view, the points where landing can be effected are to be minutely examined and sketched. All bays, coves, and harbours to be surveyed, and reports made as to the best means of defending them; the nature of the tides; all islands, towns, villages, and houses on coast to be reported upon; all forts and other coast defences, the nature of their armament, capabilities of defence, their existing garrisons, and the strength their garrisons should be for an effective defence. The best position for camps of observation to guard against invasion, and what is the best scheme for the general defence of the coast.

GENERAL CONSIDERATIONS.—In all the various species of country to be inspected, the wants of an army must ever be borne in mind, and the quantity and quality of the drinking water and of the fuel should be reported upon; the slopes and undulations of the ground, the nature of the crops, and of the fences described, whether hedges, stone walls, or rails, &c. The climate should be carefully inquired into. All physical causes supposed to influence it; the temperature in summer and in winter; the length of the seasons, and the dates at which they generally begin and end; the general appearance of the inhabitants, prevailing diseases and means commonly adopted by the people to guard against and cure them; the principal

resources of the country, whether agricultural or pastoral; whether open or inclosed, &c. Give any information you can as to the geology of the country, without entering into technical details; is the soil easy of excavation, and is water easily obtainable by boring wells.

FOURTH CLASS.—THE RECONNAISSANCES MADE DAILY and sometimes several times a day from outposts are conducted by Os.C. piquets, or by S.Os. or by instructed serjts. who taking out a corporal and a couple of men, or sometimes going alone, contrive to creep up to commanding points near the enemy's position, for the purpose of seeing what he is about. They come under the head of patrols when made to any distance beyond the outlying sentries.

SCOUTING.—As long as the opposing forces are at a distance from one another, the front of each will be covered by a screen of Cavly. or Mtd. Infy., or, what is still better, by both combined, under the command of one man. From this screen patrols will be despatched at all hours of the day and night to obtain information, and from these patrols scouting parties will be pushed on into the enemy's theatre of operations, worming themselves through his line of outposts or round his flanks. The offrs. and men in scouting should always go in twos or threes, having been given a place of rendezvous in rear, and a time named when all should return to it, those reaching it after that hour to understand that the others had left, and that they were consequently to make their way back to their regiments at once as best they could; they should avoid the main roads as much as possible, although it is very necessary that they should strike in upon them now and then to ascertain what is taking place there, but as a rule they should keep to by-paths and farm tracks. In England they could do this easily, without running great risk of compromising their safety, as the population would afford them every assistance; but it must never be forgotten that the most valuable information is very seldom to be obtained without danger, and it may often be necessary to lose many men as prisoners, in order to learn what the general requires to ascertain. Every offr. employed upon this duty should have in his possession a detail of the enemy's army, showing the Regts. in each Brigd. and Divn., affording particulars as to the dress and peculiar equipments of each battn., &c. This information will soon enable him to ascertain what are the actual regts. the enemy's advanced force consists of in his immediate neighbourhood, and when collated from a large number of scouting parties acting along an extending front may enable the commander to estimate with tolerable accuracy the total force that an enemy is operating with. This duty is calculated to give scope for all those virtues of daring gallantry, bold riding, individual prowess, and self-reliance, that we pride ourselves upon possessing above all other nations. Upon the manner in which it is performed during war much must always depend. I would therefore urge upon all cavly. offrs. the necessity of learning the use

of maps, so as to find their way through a country by means of maps on a small scale. All offrs. should be able to sketch ground, an art that is now to be learnt by attending a garrison instructor's class.

In every Cavly. Regt. there should be a party of scouts under the best subaltern in it, and when a Cavly. Brigd. is formed, these several parties should be collected into one under a captain, selected for his special fitness for the duty. In a very mountainous or densely wooded country where horses cannot be used, these duties must be performed by infantry, as was the case during the late war in Ashanti. Next to courage, daring, physical strength, good horsemanship, good eyesight, and quick intelligence, an aptitude for finding one's way over a country is the qualification most necessary for all ranks employed upon this duty. An offr. and 2 dragoons will frequently be able to penetrate to positions without being observed, and if discovered will succeed in escaping capture in a manner that could not be looked for from ordinary patrols of the usual strength. This system of scouting is now being taught in some of our Cavly. Regts., and was practised with the best effect by the Cavly. Regts. of the southern force during the autumn manœuvres of 1872. The information thus obtained is better and more reliable than that collected by parties consisting of troops or squadrons, and the work of both men and horses is greatly economised.

Ambuscades.—In a difficult, hilly, forest or bush country, where Cavly. cannot act, scouting must be done by parties of infy., say of from 10 or 20 to 50 men. They should move as much as possible by night. Much can be done by them, especially in savage warfare: by lying in ambush on the paths frequented by the enemy, prisoners can be taken, and heavy losses inflicted upon them. If your ambuscade is on a hill path, place your men on the lower side, as you can see better at night when looking upwards. Before halting quit the path as far as possible from the spot where you intend to form your ambuscade, so that your trail may not be easily visible, and when returning to camp from this duty take always a different path from that you followed in going out, as a precaution against being waylaid. Your party for such duties must be selected for their coolness and intelligence; the men employed should be all eyes and ears, speaking only in low whispers; no fires or smoking to be allowed; cooked rations for 2 or 3 days to be carried by every man. If at any time you think you are being followed by the enemy, get into the bush, and marching back some distance through it, lie in wait for him in a well-chosen spot. When inexperienced men are sent on this sort of duty, it is well to tell them as far as you can the sort of information you wish them to obtain.

The "Touch."—This is not to be secured by merely keeping a squadron or a patrol in view of the enemy's outposts or of his advanced cavly. You must keep pinching him constantly, to find out what he is about. If you content yourself with halting and watching him when you arrive in his

presence, sending your commander word that "the enemy is in my front," without ascertaining his strength and what there is behind his screen of cavly. or of outposts, you may mislead in a fatal manner. Your enemy may in fact be merely a squadron, whose leader, being ignorant of his trade, is stupidly doing as you are, and contenting himself with looking at you; or he may be cleverly inducing you to play this game, taking care that you see nothing through or behind the cavly. screen which faces you on every point. If you are to be of real use to your general, you must pierce or get round that screen, and by taking one or more prisoners ascertain—1st, what force is in front of you, and 2nd, what Divn. or Army Corps it is covering. If you are strong enough, you must sweep the enemy's screen from before you to find out what is behind it, and if not able to do so, you must send small scouting parties of well-mounted men, selected for their daring and intelligence, across country or by roads round the enemy's flank to ascertain for certain the whereabouts and doings of his main body. Don't rest satisfied until you have pinched him well, and perhaps given his main body a good kick. The wider the extent of country over which you can establish his pinching process the better. Hold on stoutly like a bull-dog to your enemy when you have caught hold of him: if he shakes off your grip on one flank or along one particular part of his line for the time being, hold on to him all the tighter at other places. You may even have at times to gallop to escape capture; but at once, when his pursuit ends, turn round and worry him again; and if you cannot seize him in front by the collar, try to catch him by the breeches behind.

MAXIMS TO BE REMEMBERED BY OFFICERS ON RECONNOITRING OR SCOUTING DUTY.—In your reports never fail to print the names of places and of people. Remember that to fight can lead to no military result; at the same time many a reconnoitring party has been saved by the boldness of its commander, who, finding himself cut off by a superior force, makes a dash at it, engages it boldly, and is thus enabled to get safely away under cover of the confusion occasioned to the enemy, who is then apt to mistake his boldness for strength. The timid or hesitating man would be lost under such circumstances. Fertility of resource and quickness in devising expedients, are essential qualities for an officer employed in these duties. No English soldier who is well mounted should ever be taken prisoner. If possible, always avoid returning by the road you went out by.

BALLOONS.—One of the most effective means of learning the whereabouts and doings of an enemy is by means of balloons; for although the undulations of the ground when viewed from the car of a balloon at an elevation of about 1000′ or 1200′ do not show, yet the position of troops can be accurately ascertained in close, still weather. Ascents by night, particularly in wooded countries, are most useful for this purpose, as the fires indicate the enemy's position, and his numbers may be roughly estimated

by allowing ten men to each fire. During an action, a S.O. in a balloon at such an elevation would be of infinite service. The ascent should be made from some height about a mile in rear of the skirmishers ; a telegraph wire from the car should lead to the spot where the G.O.C. had established himself, who could then be kept acquainted with where the enemy's reserves were posted, &c. In a windy country balloons are useless.

MILITARY INDICATIONS.—As stated in the Article on "OUTPOSTS," officers should study attentively the customs of their enemy, their hours for dining, commencing their marches, &c., and the many indications of intended movements which an enemy may unwittingly afford. The collection of boats, heavy guns, scaling ladders, gabions, &c., at particular places, are indications that must always precede the passage of rivers, sieges, &c. If large magazines of stores or provisions are collected anywhere, it is clear that no retreat is contemplated ; if, on the other hand, the parks of heavy, or spare guns, ammunition, R.E. stores, &c., are being sent to the rear, a retreat is imminent, or being prepared for. The dust raised by columns is a fair guide in some countries as to the numbers and composition of the force marching. That raised by Cavly. forms a high light cloud, by Infy. a lower and dense one, by parks and baggage one more dense still. With a good glass you can sometimes learn from the manner in which troops move, and from their dress, whether they are regulars or militia, or if they belong to any special corps. The manner and bearing of the people in a hostile country is usually a fair indication of the public spirit and feeling ; if they are gloomy and anxious, it is an indication of want of confidence in their cause, and that their troops are distant ; whilst if they are excited and insolent, it shows that they rely upon assistance near at hand, and anticipate success from the number and efficiency of their army. In following a retreating army, much can be learnt from its trail ; if the *débris* of arms, accoutrements, &c., lie about, there is a want of transport, and it is a sign of demoralisation according to the extent to which it is the case ; large numbers of graves indicate the existence of disease in the enemy's army. The places where they halted for the night should be carefully examined, and all indications carefully noted. Did they bivouac or pitch tents ; was their camp laid out with regularity ; were their cooking places neatly made (in India much can be learnt from examining them, for when hurried the natives make but few, preferring to eat uncooked messes, to forego the requirements of their caste in such matters). Is their track strewn with dead or dying transport animals ; have they plundered the inhabitants or burnt their crops or houses ; have they effectually or only partially destroyed the bridges, &c. The most insignificant circumstances afford sometimes whole pages of information to officers who, having studied the manners and customs of an enemy, know how to interpret them aright. Os.C. small detached parties sent out on reconnoitring duties, may many times avoid

falling into the hands of strong patrols or detachments, by learning their proximity from their track if crossed anywhere ; the number and composition of such detachments may easily be estimated from it.

MARCHES.—To arrange for the march of a force consisting of all three arms, especially when a collision with the enemy may be expected, is a staff duty of the highest importance. Success in most wars depends very much upon the manner in which this duty is performed by the staff, and upon the manner in which the arrangements ordered have been carried out by the troops. Let me see two armies on the march, and I believe I could tell you the respective fighting value of each. No military quality is so frequently tested as that of marching. Marches are means to an end, that end being a battle which has for its object the destruction of your enemy's army. The more rapidly they are made, the greater becomes the difficulty of feeding your men. There is one general principle which applies to every description of march, no matter when or where it may be undertaken ; i.e., always march by the shortest possible routes and in as many columns as you can, and let each column march upon the largest possible front. Care must of course be taken that no one of these columns is so weak that it could be overpowered before support could reach it. Each column must have its own advanced guard. The greatest harmony of movement should exist between these columns, all working together, not as independent units but as intelligent portions of one machine, the movements of all being at all times known to the staff of each column, all being ready to concentrate when required, and to march to the sound of the cannon when in any doubt as to where that concentration is to be effected. In arranging for the march of an army or of any body of troops where they may have to fight, your first consideration should be, that they should be at all times so distributed as to be not only ready to fight, but to do so with the advantages of position in their favour. When no encounter with the enemy is to be calculated upon, then the greater the number of columns that any army is divided into on the march, the more easy will it be to feed it, and to find accommodation daily for men and horses. The number of columns you can march by will generally be decided by the number of roads more or less parallel one to the other, leading in the required direction ; when far away from the enemy you may extend your columns to the right and left, greatly beyond the extent of front you would occupy when in fighting formation, contracting your front the nearer you approach him, so that when within striking distance you do not cover more than your nominal front of battle.

When it is possible, Cavly. and H.A. together should march by a different road from the Infy., as it is very fatiguing to horses to keep pace with men on foot. If this cannot be done large intervals should be allowed between the mounted and dismounted branches of the service when on the march. Unless the country is deep or very much cut up by canals, Cavly. can often

make its way across the fields, having a detachment of mounted R.E. with tools carried on pack-horses for the purpose of opening ways through and over obstacles. R.A. should not, however, ever march alone. When far from the enemy all your arrangements for the march must be made with a view to the comfort of your troops, and to the convenience of supplying their daily wants, unless you have some object of primary importance, such as great rapidity of movement for purposes of concentration, in which case, of course, everything must give way to it. The fitness of troops for the great final struggle, when they at last meet their enemy, must ever depend greatly upon the manner in which their marches have been arranged. Men overmarched, or whose health and comforts have not been duly attended to whilst on the march, can never be expected to go in at an enemy whose men have been well cared for by an able staff administration. It behoves those S.Os. who have to make arrangements for a march to take good heed that everything has been thought of and provided for beforehand. One of the great advantages of moving troops long distances by rail is, that the men reach their destination quite fresh ; for every 100 miles that are marched continuously, you will lose in strength from 2 to 3 per cent. according to the climate.

Our Regulations are based upon the rule that tents are to be carried for every one, and that the army is to encamp every evening. In Europe the army that attempts to make war upon this system will most certainly be beaten by an army that carries no camp equipment, but that bivouacs and makes use of the shelter afforded by villages and farm-houses, &c. In arranging for the march of an army, the C. of the S. will merely indicate in his instructions or G.Os. the position to be occupied by the Hd. Qrs. of each Army Corps or Divn. every night, and the hour they should be at their destination in a fighting condition, taking care, however, that the march of no two should clash with or cross one another, which is always possible when a road occupies a sort of neutral position between two columns; under such circumstances it will be for the C. of the S. to state in order which army corps or division is to use it. In framing the G.Os. for an march the C. of the S. will be guided by the object sought to be obtained by the movement, and the information he has had regarding the enemy's strength, intentions and movements. At the beginning of a campaign a the available Cavly. and Mtd. Infy. supported by R.H.A. should be pushed well to the front one or two marches ahead of the army, until the "*touch*" with the enemy has been secured ; and once obtained, if the cavly. is well handled by its commander, it should never be lost. As explained under the headings of *reconnaissances* and *scouting*, every movement of the enemy should be ascertained, and in fact his intentions divined by this independent mounted force, and reported—if possible, by telegraph—to G.O.C. the army in rear. In selecting the position for the Hd. Qrs. of an army or

ny force, the rule should be to fix them in as central a place as possible ; his is, however, subject to many modifications depending upon the roads, nd the facilities for communicating orders and receiving instructions from ome : the existence of a telegraph wire along any road would generally oint it out for Hd. Qrs. in preference to others.

Forced marches should be avoided as much as possible, for they fill your ospitals with sick. At times they are of course necessary, but when made o excess, they are ruinous to military efficiency. The wants and comfort f the individual soldier should never be forgotten by the S.O. when fram- g orders for a march, although the exigencies of war may necessitate eir being purposely ignored for the time during some particular operation. bove all things endeavour to spare your men and horses all unnecessary tigue, for the less you take out of them, the greater will be their powers f endurance, when in any emergency you have to call upon them for xtraordinary exertion.

Brigadiers and G.Os.C. should stop frequently to see that the order of arch is kept regularly : it is a good plan for all C.Os. to see their men file st them once every day on the march. They should from time to time nd their As.D.C. along the column to the rear, to see that all is going on ell, and to report any irregularity. *Guides.*—Each divn. must be led by s A.A.G., who is responsible that the correct road is followed. He must btain the guides, marching with one himself in front of the Advd. gd., one keep with the head of the column, one with the tail of it, and one with e Rr. gd. During night marches it is advisable to have one or two others stributed at equal distances along the column : for the treatment of guides, e Article on "RECONNAISSANCES." Unless there is some urgent neces- y for speed, halt always 1 day per week ; in fact, the main features of the arch depend upon the enemy's proximity, the nature of the country (which ars greatly upon the facilities for lateral communication between the lumns), the relative strength of the opposing forces, and the objects in ew. The mode in which the army daily encamps or bivouacs (as the se may be) must depend upon the same circumstances. If obliged to ht at any moment, the infy. can quickly form to the front, on both flanks the leading battn. or brigd. (having left strong patrols on all the roads ding towards the enemy), and will endeavour to check the enemy by reatening or charging his flanks. The army in rear will thus have time deploy into fighting order.

When far from the enemy, your front being well covered by Cavly. and td. Infy., orders for the march of an army may be most conveniently awn up in the form of an itinerary, giving the names of the villages or alities where each Army Corps or Divn. is to be billeted or to bivouac, d where the Hd. Qrs. of its Commander are to be each evening ; the ds to be at the disposal of each Army Corps to be stated thus : "The

1st Army Corps (or Divn., as the case may be) will march by the country lying between the A.B.C.D. and the R.S.T.V.X. roads, both those roads to be at its disposal. The 2nd Army Corps (or Divn.) will march by the country lying between the R.S.T.V.X. and M.N.O.P. roads, but will not move troops on the former, which has been placed at the disposal of the 1st Army Corps, &c., &c." The boundaries so fixed will indicate the extent of country from which the Commissary of each Army Corps or Divn. can obtain supplies either by purchase or requisition for the troops under his charge. The exact position of Army Hd. Qrs. every evening during the operations to be specified, as well as the road by which the C.-in-C. will march. According as you approach nearer the enemy, the orders for the march must become more detailed.

In moving an army it is desirable, if possible, that only one Divn. should march by each road. The largest unit that can at all conveniently march by one road in a continuous column is an Army Corps ; but its pace will be very slow, and great fatigue will be entailed upon men and horses. Previous to all marches it is very necessary that the G. of C. should receive the earliest possible notice so as to make the necessary arrangements beforehand : he will have numerous details to settle with the Medical and Commisst. depts. As the enemy is most likely to receive information through contractors, it may sometimes be essential to keep the Commisst. Dept. in ignorance of your intentions ; upon such an occasion the C. of the S. must satisfy himself that there are ample supplies at hand. A very successful plan sometimes for deceiving an enemy is by the formation of magazines at points far removed from your intended line of movement. With the advd. gd. there should be no hospl., and only a small ambulance establishment the sick to be collected every day, and left—under cover if the weather is bad—in charge of a M.O. until the main body arrives, when they will be provided for by the P.M.O. In open countries like India, the advance of armies is an affair that can be laid down on paper : the baggage being mostly carried upon elephants, camels, and bullocks ; marches, independent of roads, upon the flank which is least open to attack. In future European wars, it may be expected that the advance of armies will be parallel with railroads, along which supplies can be forwarded as required.

The electric telegraph is a new element in war ; wires can easily be laid down as each column advances, by which messages can be sent back to the original starting-place, and so to the front, along the road upon which the C.-in-C. is marching : in other words, he can be in momentary communication with all his columns. Such was the case when the Prussian armies advanced from their frontiers into Saxony and Bohemia in 1866.

The length of ordinary Marches, for a force not stronger than one Divn. moving by one road, should be from 12 to 16 miles a day for 5 days out of 6, or at most for 6 days out of 7. At the opening of a campaign it

essential that you should begin to practice your men in marching as soon as possible, and even during any long halts occurring in a war, give your men plenty of drill and route marching. When there is no necessity for haste, begin by short marches of 6 or 7 miles, gradually increasing their length until your men are in good marching condition. If the men breakfast at 7 A.M., being roused at 6.30 A.M. and starting at 8 A.M., they ought to be at their new bivouac or camping ground, 6 miles off, at 10.15 A.M., and their dinners should be ready at noon. Ordinary marches of 15 miles in fair weather and over average roads should not occupy more than 7 or 8 hours. This does not include the time taken in forming up previous to encamping or bivouacking for the night. As soon as the men are in good marching trim, the distance should be increased to 12 or 16 miles. In extensive operations, however, when large forces have to be moved, not more than 10 miles a day for continuous marching can be calculated upon. There should be a halt from 5 to 10 mins. every hour, and for marches of from 10 to 12 miles it is a good plan to halt for 30 mins. when half way. Sometimes a longer halt is advisable to allow the men to have a meal with cooked tea or coffee. As a general rule, however, long halts are not to be advocated when the men are in good condition, as they prefer getting their march over as soon as possible, and to have a good hot meal then. It is very desirable that the short hourly halts should be made by every unit in the Divn. exactly at the same moment. Each battn., &c., should therefore be ordered before starting to halt for a specified number of minutes exactly at the beginning of each hour. When the O.C. the Battn. gives the order to halt, the leading files of each company will halt, those in rear closing up. If this is not attended to, and the whole Battn. has to close on its leading Company each time of a halt, the men in rear will reap no benefit from the halt at all. In hot countries endeavour so to time your march as if possible to have the sun in your face; at least, to avoid having it on the men's backs, where it causes sickness and sunstroke. For campaigns in tropical regions, the Soudan for instance, *spine protectors* should be supplied to the men. They are easily made with cotton-wool, and should button on the back of the man's jacket. In many districts in the tropics there is always a pleasant and refreshing breeze at certain hours of the day or early morning. Try to have it blowing in your face or on your right or left front as you march.

The rate of Marching.—In calculating the time occupied in marching certain distances, it may be assumed that a Divn. on 1 very good road, during good weather and in a temperate climate, with all its *impedimenta* can march $2\frac{1}{2}$ miles an hour if the arrangements are very good; but in large combined operations, unless the weather is very fine, and the roads very good, the time should be calculated at the rate of 2 miles an hour only. The ordinary hourly halts of about 5 mins. each are included in these estimates. If the roads and weather are bad, and the country deep, large

bodies of troops will not do more than 1 or 1½ miles an hour. Heat has a very serious effect upon the rate of marching: from 4 to 5 mins. more per mile will be taken if the thermometer stands at from 67° to 77°, and another 10° of heat will double the extra time required. Sandy or slippery roads affect the pace seriously, also heavy rain or snow, or a strong head-wind, especially if it be accompanied by heavy dust or rain.

Our *quick time* is at the rate of 116 paces in a minute, or 3 miles 520 yds. in an hour, say of 3·3 miles an hour without halts. At the *double*, 165 paces of 33 inches in a minute, or 5 miles 275 yds. in an hour. When moving in small bodies independently, the rate of marching on fair roads may be calculated thus: for Infy., 2¾ miles an hour; for Cavly. and H.A. 4 to 5 miles an hour, according to the gradients and condition of the road; and for field artillery when marching alone on good level roads, from 3½ to 4 miles an hour (ordinary marching halts included). The larger the force moving upon any one road, the slower will be the pace. Baggage trains under a good military organization can do 3 miles an hour well, and if properly looked after, the animals being good, can do from 90 to 100 miles a week. No march for the train should exceed 25 miles, and this distance should be exceptional. When civilian transport is used, not more than 2 or 2½ miles an hour as a constant rate for large trains can be calculated upon. The rate of Cavly. and R.A. is quicker than of Infy. in the proportion of 6 to 5.

Opening out on the March.—If troops are accustomed to march together in large bodies, there is no reason why on fair roads the opening out—which is unavoidable even under the most favourable circumstances—should for any column not exceeding 1 Divn. exceed 20 p.c. of the depth of the regt., &c. in column of route when formed according to the drill-book. If the weather and roads are bad, and the troops indifferent marchers, from 25 to 30 p.c. should be allowed. It is better at starting to recognise this inevitable opening out, and to allow for it. Instead therefore of marching off with only the regulated distance of 30 paces between Battns., it is better to increase it by 20 or 25 p.c. of the number of paces of road that the Battn. would occupy in column of route according to Regulations. This will give each greater freedom and independence of action, and tend much to abate the inconvenience and irritating fatigue occasioned by those checks, which, do what one may, will frequently take place on the march. The D.A.G. of each Army Corps will make all the arrangements for its march, indicating the hours of starting for each of the divns., and stating the roads they are respectively to march by, and how communication is to be kept up between them whilst on the march, and stating the villages or exact locality where the Hd. Qrs. of each are to be every night. The same will be done for each divn. by its A.A.G., who will go fully into details as to the exact hour when the advd. gd. and the other principal fractions into which the column

are divided should march off, &c., &c., as shown in the supposititious orders given farther on for the Divn. detailed as the advd. gd. of the army.

Time required for Parade.—Fussy and fidgety C.Os., unless closely watched by the staff, are prone to turn their men out earlier than necessary. For Infy. on service, 15 minutes is ample to inspect the arms, ammn., and boots of the men, and to tell them off both in companies and in Battn. ; in the Cavly. 30 mins. is really enough, although it is usual for "Boots and saddles" to be sounded an hour before the Regt. actually receive the order "march" from its C.O. ; in the R.A. 30 mins. is ample, 15 mins. being sufficient for trained drivers to harness, 5 mins. for hooking to, and 10 mins. for inspection. For purposes of parade and preparing for it, therefore, 30 mins. is ample for all mounted troops, and 15 mins. for Infy.; and on the march in the field, C.Os. should not be permitted to exceed that allowance of time.

The hour of Starting.—The season of the year, the distance to be got over, and the climate must determine the hour of setting out ; it should be an understood thing, however, that the men should have some food before starting ; when the marches are over 15 miles, the men should halt for dinner, and have an evening meal when they reach camp. Having as far as possible calculated the time it will take to march to the intended halting-place, and the difference in time of arrival between the head and tail of the column, you can fix the hour for the starting of each part of the column, arranging so that the last wagon of the train shall reach its destination before noon. Unless it be necessary on account of the sun's power to march extremely early, it is better for men and horses not to march until a good hour after daybreak, so that all may have had a good meal by daylight. In warm weather the earlier that Infy. march the better, but one hour after daybreak is more convenient for Cavly. and R.A., as horses feed better then, and the men have light to arrange their saddlery and harness, which is generally badly done for marches begun in the dark, and which entail upon the men much loss of their natural rest and sleep. Owing to extreme heat it may at times be necessary to march by night, and other circumstances may render night marches necessary, but they should be avoided as much as possible : they are very wearying to the men, and require at least half as much time again as the same distance would require by daylight.

Order of March.—In issuing orders for the formation of columns on the march, the nature of the country, the fighting characteristics of your enemy, and the object to be attained, must be duly considered, as troops, guns, ammunition, &c., &c., should be placed in the columns in the order in which each is likely to be required : when there is a possibility of having to fight, tactical considerations must be first provided for ; but when at a distance from the enemy, the comfort of the troops and the convenience of

supply should have most weight in determining the order of march. It is for the G.O.C. to decide the order in which the several arms are to be distributed in the column of route. His S.O. having received his instructions on this point, should indicate in orders the exact time when each important unit of the column, such as the scouting party, main body of advd. gd., head of the main body of each divn., brigd., &c., is to enter the column of route, and to specify the exact spot on the road for each to do so. The time should be calculated as follows :—The exact strength of each unit being known, the space each would occupy in column of route to be calculated, and allowance of from 20 to 30 p.c. made for opening out as stated above. The Table at page 340 will be useful in making these calculations. Say for example, that the distance in the column of route between the head of the 1st and of the 2nd brigds. has been calculated to be 3500 paces, or 2917 yds., it is easy to calculate how many minutes it will take to march that distance by dividing it by 116 or 97 (the number of paces and yds. taken at quick time in a minute) ; in this case it would be 30 mins. If it were intended that both brigds. should join the column of route at the same point on the road, both having bivouacked at equal distances from it, the rear brigd. should not start for 30 mins. after the 1st had left its bivouac ; that would secure to the men that length of time longer for rest before they paraded for the march. It is most essential to the comfort and physical well-being of the men to allow them to rest at their bivouacs until the latest possible moment. When the column of route will extend over several miles of road, it is cruel and foolish to order all the troops to parade at the same hour ; it is by close attention to these minutiæ that men are kept in good health and spirits, and that a S.O. shows he is worthy of the important position he occupies.

Order of March of an Army Corps.—Let us first sketch out what would be the normal order of march of an Army Corps moving by one road in a fairly open country over which Cavly. could act, when the front was not covered by a detached and independent force of Cavly. The several units of Battns., Batteries, &c., are here calculated for at war strength. The Advd. Gd. of a strength as detailed at page 343 would march as follows (the length of road occupied by each Regt., Batty., &c., is given in yds. opposite each) :—

Scouting Party, to consist of the Regt. or Divnl. Cavly., of the leading Divn., should march 30 mins. before the Vanguard, pushing out patrols in all directions a full mile from its main body, and the best selected scouts about a mile still nearer the enemy. If the country be well suited for Cavly., it would be well to send forward the whole Cavly. Brigd., to be some 5 or 10 miles in advance. Any Mtd. Infy. there may be should also march with these scouts, and a detachment of mounted R.E with tools carried on horses. Every road, path, and village to a distance of from 5 to 20 miles of the line of march should be examined by small patrols. The distance

to which these scouting parties should extend will depend upon circumstances, suc as, whether the Army Corps is marching alone or in concert with others to its right and left. The main body of these scouts will of course follow the road, with scouts pushed forward some 3 or 4 miles, and will take care to keep up constant communications with the Vanguard behind it. In some cases it may be advisable to have a machine gun with this main body.

		yds.
Advanced Guard. Vanguard.	1 Regt. of divnl. cavly., of which 1 squdn. to be on each flank	260*
	1 Battery of H.A. without wagons	200†
	1 Company of R.E. with tools on packhorses	100
	1 Battn. of infy. without band, but with tools and S.A.A. carts	460‡
	2 Machine guns	40

Interval of from 500 to 1000 yards; the head of the vanguard will be thus say about 1 mile in advance of the head of the main body of the Advd. Gd.

Advd. Gd. Main Body.	O. C. advd. gd. and staff	10
	1 Battery of H.A. without wagons	200
	1 Brigd. of cavly., with ammn. carts and wagons only (less 1 squadron) and its battery H.A.	1940
	Divnl. battns. of 2nd and 3rd divns. with tool and S.A.A. carts, and band of battn. with Vanguard	940
	1 Company R.E. with tools in wagons, and light bridge equipment	400
	The ammn. wagons of two batteries H.A.	228
	Led horses	140
	Ambulance	80
	1 Squadron of cavalry	112§

The main body of the advd. gd. should march 20 mins. after head f vanguard had moved off, or 50 mins. after the scouting party had tarted.

A distance of 1 or 2 miles.

Main Body of Army Corps.—If the distance be 1 mile the 1st Division to narch 60 mins., and if it be 2 miles, 80 mins., after head of main body of dvd. gd. had moved off, or 1 hour 50 mins. or 2 hours 10 mins. (according o the distance allowed) after scouting party had started.

* *The Divisional Regiment of Cavalry, 2nd Division.*
† *To be furnished from Corps' Artillery.*
‡ *The Divisional Battalion of 1st Division.*
§ *This retention of 1 squdn. from the Cavly. Brigd. of the main body of advd. . for the purpose of bringing up the rear and protecting it would not be necessary an open country.*

		yds.
1st Division.	The G.O.C. Army Corps and his combatant staff	50
	The G.O.C. 1st division and his combatant staff	20
	½ the cavly. regt. of 3rd divn., keeping up communication with Advd. Gd.	260
	The 3 field batteries of 1st divn. with ammn. wagons only	770
	1st infantry brigade with only tool and S.A.A. carts	1400
	2nd ,, ,, ,, ,, ,,	1400
	Divnl. reserve ammn. column	790
	1 field company R.E. and its tool wagons	200
	Ambulance and field hospital	250
	4 Army corps batteries with ammn. wagons only (1 H.A. battery being with Advd. Gd.)	1024
	Led horses of army corps staff and of 1st division	125

This 1st Divn. if closed up would thus cover 6289 yds. of road; adding on 1860 yds. as an allowance of 30 p.c. for opening out, the distance it would cover would be 8149 yds. or nearly $4\frac{1}{2}$ miles. That distance divided by 97 (the number of yds. marched in "Quick time" in 1 minute) gives 84 mins. The 2nd Divn. should not therefore start for 1 hour 24 mins. after head of 1st Divn. had marched off, or 3 hours 14 mins., or 3 hours 34 mins. (according to length of distance between Advd. Gd. and head of 1st Divn.) after scouting party had started.

		yds.
2nd Division.	G.O.C. 2nd division and his combatant staff	20
	The 3 field batteries of 2nd divn. with ammn. wagons only	770
	1st brigade, 2nd divn., with only tool and S.A.A. carts	1400
	2nd brigade, 2nd divn., ,, ,, ,,	1400
	Divnl. reserve ammn. column	790
	1 Field company R.E. and its tool wagons	200
	Ambulance and field hospital	250
	Led horses of 2nd division	100

The 2nd Divn. if closed up would thus cover 4930 yds. If 1470 yds. be added on for opening out, the 2nd Divn. would then cover about $3\frac{1}{2}$ to $3\frac{3}{4}$ miles of road. The 3rd Divn., whose length of column will be the same as that of the 2nd Divn., ought not therefore to move off for 66 mins. after the head of the 2nd Divn. had started, or 4 hours 20 mins., or 4 hours 40 mins. (according to distance of 1 or 2 miles between advd. gd. and head of 1st Divn.) after scouting party had started. Each G.O.C. a Divn. will take care always to keep an interval of about 200 yds. between his leading detachment and the rear of the preceding Divn. The train should not begin its march for $5\frac{1}{2}$ or 6 hours after the scouting party had started, but the chances of the troops being engaged during the day will regulate this.

If a fight is expected, these columns should remain stationary and await an order from the C. of the S. before starting.

		yds.
Train.	Army Corps reserve ammunition column	1600
	Pontoon troop	800
	Telegraph troop	250
	Detachment of military police	40
Baggage Column :—		
	Detachment of military police	40
	Non-combatant staff of army corps	50
	Baggage of army corps, head-quarter staff (1 Compy. C. T. Corps)	300
	Baggage of the cavly. brigd. and of the 3 divns. in the order in which each battn., &c., stood in the column of route, the non-combatant staff being at the head of the baggage of each divn.: tents carried (7 companies C. T. Corps)	2340
	Commissariat trains (7 companies of C. T. Corps) say	3000
	Troop of military police	150

This column of Train, Baggage, &c., will occupy 8576 yds., or with 20 p.c. added for opening out, say 6 miles of road.

Assuming the length of the march to be 12 miles, that the scouting-party marched at 5 A.M., the Vanguard at 5.30 A.M., the main body of the Advd. Gd. at 5.50 A.M., the 1st Divn. at 6.50, the 2nd Divn. at 8.14, the 3rd Divn. at 9.20 A.M., and the Train at 11 A.M., the leading wagon of the Train would, in fine weather and over fair roads, do the 12 miles in about 4 hours, reaching its destination about 3 P.M., when the rear of the 3rd Divn. would also have reached the same destination: the last wagon having started at 12.50 P.M. should reach it about 5 P.M. This calculation is based upon the idea that all the Army Corps had been concentrated in one camp formed astride upon the single road which was alone available for the march; but as a matter of fact, under such circumstances, the Army Corps would naturally be encamped in several echelons along that road, the Cavly. Brigd. most probably in front as the 1st echelon, then the 3 Divns. each in an echelon by itself at 1, 2, or 3, or more miles distance, one behind the other, and the Train behind that again. This would be the only practical manner in which an Army Corps could march by one single road. It would also have to encamp daily in similar echelons. If all started from one camp, the main column from the head of 1st divn. to the rear of the Cavly. closing in the 3rd divn. would occupy about 13 miles, allowing 30 p.c. for opening out.

Allowing only 20 p.c. for unavoidable opening out throughout the whole column (the commissariat trains being as above), the Army Corps with all its baggage, tents, &c., (in this calculation, however, the number of commissariat wagons is very small) from the scouts of the Advd. Gd. to extreme rear of

Trains if thus extended along one road, would cover about 22½ miles of road. It is therefore very desirable to avoid when possible moving more than one Divn. by any one road. Of course, in such a march as that I have contemplated, the Advd. Gd. would be engaged in taking up the line of outposts to protect the new position to be occupied in their rear for the night, about the time when the Train was starting from its old camp. Abroad it is calculated that an Army Corps of 35,000 men with a train of about 1000 wagons marching on a single road would cover about 30 English miles from the leading scout to the rear wagon: and that with only such portions of its train as it can never separate from it, would cover from 15 to 19 miles of road.

The order of march for a Divn. moving independently, when no detached force of Cavly. covered the front, would be normally as follows:—

Advanced Guard. Strength as given at page 343.

Scouting Party. 3½ squadrons of cavly. and all the Mtd. infy. available pushed some few miles well ahead and to the flanks.

		yds.
Vanguard.	¼ Troop to keep up communication with scouting party	25
	2 12- or 13-pr. guns without wagons (H.A., if possible)	60
	4 Companies of infy. without any carts, &c.	180
	Section of R.E. with tools on packhorses	50
	1 Machine gun	15

This vanguard to march half an hour after scouts.

Main Body.	O.C. advanced guard and staff	10
	¼ Troop to keep up communication with vanguard	25
	4 12- or 13-prs. without wagons	130
	4 Cos. of infy. with tool and S.A.A. carts of battn.	250
	Remainder of field company R.E. with tools	150
	1 Machine gun	15
	Section of ambulance	40

This main body of Advd. Gd. should not march for 10 or 15 minutes after the vanguard had moved off, that is, say for 40 minutes after scouts had marched.

Main body of Division:—It should not march for 60 or 70 minutes after the scouting party had started.

	yds.
G.O.C. and his staff	20
¼ Troop to keep up communication with advanced guard	30
The 2 remaining batteries of divn. with their ammn. wagons*	512
Distance	100

* *If the country is very close, it may be at times desirable to place a battn. in front of these batteries, but it should only be done when absolutely necessary, as its presence in front impedes and checks the pace and harasses the gun horses considerably.*

	yds.
2 Brigades of infantry with only tool and S.A.A. carts*	2800
Ammtn. wagons of battery with advanced guard	100
Divisional reserve ammn. column	790
Ambulance and field hospital	200
Led horses	100

Interval of from 1 to 3 or 4 hours, according to the probability of fighting.

Train :—

Baggage master with ¼ troop of Cavly.		30
Non-combatant staff		20
Detachment of military police		30
Remaining carriages of 3 batteries		360
2 Comps. of C. T. Corps.	Baggage of divisional head-quarter staff	1000
	Baggage and Regtl. Transport, &c., of brigds. according to the order occupied in the column of route	
	Commissariat train	
Military police		100

The Advd. Gd. from leading scouts to its rear would occupy about 2¼ miles of road. The main column would occupy nearly 3½ miles of road, and the train somewhat under a mile, allowance being made in these calculations of 30 p.c. for the troops, and 20 p.c. for the Train for opening out. From leading scouts to rear of Train the Divn. with all its equipment, tents, &c., would cover about 9¼ miles, assuming that the Train was able to start one hour after the rear of the column of troops had started. It is necessary to leave this interval of 1 hour to prevent the leading carts from constantly overtaking the rear of the Infy. By leaving this interval, assuming that the Infy. do the march of 12 miles in 4 hours 50 mins., and the train in 4 hours, the rear of the troops and the head of the train should both reach their destination almost together at noon. In the foregoing "order of march," the commissariat trains are placed after the baggage, it being presumed that the men are carrying a day's provisions in their haversacks, as must invariably be the rule when there is any possibility of meeting the enemy.

The orders to be issued for the march should contain :—

1st. General direction and object of the march, giving a brief outline of the military situation and condition of affairs, so as to secure on the part of all Os.C. columns an intelligent conformity with the views, wishes and intentions of the C.-in-C.

2nd. Date, hour, and order of the march, and the roads to be followed by each column, &c., &c.

* *If it is considered advisable to have 2 instead of 1 battn. with the advd. gd., the 2nd must be taken from the leading infy. brigd.*

3rd. Formation of Advd. or Rr. Gds., and special instructions for flanking parties and detachments of all sorts.

4th. Instructions for fd. hospls., reserve ammunition, R.E. pontoons, and military portion of the train generally.

5th. Instructions for supply of troops and orders for baggage and provision columns.

6th. Position of general on the march, and of Hd. Qrs. for the night.

As regards No. 2, it is very necessary that each echelon or fraction into which the column is divided should receive distinct orders as to the exact hour it should start from a named point on the road to be followed, or from a stated rendezvous. To assemble all a Divn. at a named rendezvous to be marched off from thence, is a species of military folly not very uncommon; the unfortunate regts. are kept waiting under arms sometimes for hours, until their turn arrives to march off. The S.O. before issuing instructions for the march must study the position of Brigades, Regts., &c., and see how each can, with most convenience to itself, be brought into its place in the column of route.

Orders for the movement of a supposititious army.—In order more fully to explain the movement of an army, we will suppose that one, consisting of 2 Army Corps and a reserve Brigd. of Heavy Cavly., assembled on a front of about 10 miles, between the villages A and B, is to advance and attack an enemy, or take up a position in his neighbourhood, C, D, which is 80 miles distant. Let us assume that it has not been thought advisable to detach the Cavly. to the front as an independent force to cover the army. The army during its march to be always ready to form line of battle before its Advd. Gd. could be overpowered, all its columns being in constant communication with one another, and the Hd. Qrs. being as near the centre as possible. Even such a simple movement as this requires much nicety of arrangement. If speed is an object, the difficulty is increased tenfold; for when a flooded river, a broken bridge, or other obstacle is encountered on any one of the roads by which the advance is made, the delay can easily be remedied if the army is moving by short marches; but if it is doing 20 miles or more a day, the delay of one column may derange the plan laid down for all. Let us assume that 4 roads, with intervals of from 2 to 3 miles between each, lead from A, B, to C, D, No. 1 on the left being hilly, and generally unsuited for wheeled conveyances; the next one, No. 2, is the main road, paved or macadamized throughout; the next, No. 3, is a good country road; the last, No. 4, is a clay road, passing through an open country. When the maps are not very accurate or detailed, in calculating distances on them, or the time that columns will take in marching over mountain roads, or even those in the plains that twist about very much, allow from 4 to 9 minutes extra for every mile to be marched. The following specimen order gives an idea of the orders that would either be sent in the form of a memorandum to the

G.Os.C. Army Corps, or published in G.Os., as might be thought best; they should be issued by the C. of the S.

Memorandum, (or, General Order, as the case may be,)
Army Head-Quarters,.....
4th June, 1886.

1. The army will advance on Wednesday the 6th inst. in the direction of C, D; the 1st Army Corps by No. 3 road and the country between it and No. 2 road, the 2nd Army Corps by No. 2 road, and the country embracing No. 1 road, and the Reserve Cavly. Brigd. by No. 4 road.

2. Each Army Corps will be covered by an Advd. Gd. consisting of its Cavly. Brigd., &c., &c. (*see Article on* ADVANCED GUARDS). The Advd. Gd. of the 2nd Army Corps will cover No. 1 as well as No. 2 road by which that corps is to march. The Advd. Gd. of the reserve Brigd. of Cavly. on No. 4 road will consist of 1 Regt. of Cavly., 2 H. A. guns, and 1 Batt. of the 1st Army Corps that will be attached for this purpose to the reserve Brigd. of Cavly. until further orders. These Advd. Gds. will march to-morrow the 5th inst. at 6 A.M., constant communication to be maintained between them on all 4 roads; they will halt for the night in the neighbourhood of the villages E, F, G and H. The men will take rations for the day in their haversacks; corn for the day to be carried by each horse; hay to be obtained by purchase from the country. Rations and corn for 1 day to be taken in wagons with each Advd. Gd. to be replenished daily from supplies with main body in rear: these wagons will not march to-morrow until noon.

3. A route will be sent (or, is forwarded with this, as the case may be) to the G.Os.C. Army Corps, and to the brigadiers commanding Advd. Gds. indicating where the Hd. Qrs. of the army, of the O.C. the Advd. Gd., and of each Army Corps, will be each evening during the movement.

4. The O.C. each Advd. Gd. will, as soon as possible after each day's march, report the events of the day to the G.O.C. the column from which he has been detached, accompanied by a road sketch giving the fullest possible information as to the country, supplies, &c.

5. The distance to be maintained between the Advd. Gds. and the columns in their rear will be about 4 miles.

6. Yesterday the enemy had a Cavly. Brigd. at E, F, with detachments at G, H, K, L and M. His infy. occupied N, O, on the first instant.

7. The train will march at noon.

8. The C.-in-C. will march at the head of main column of 2nd Army Corps, and Army Hd. Qrs. will be at —— for the night.

(Signed) G. J. W.,
Chief of the Staff.

The orders issued by each G.O.C. an Army Corps a Divn. or an Advd.

Gd. must be of a much more detailed nature. As an example we will sketch out here those that, under the above circumstances, would be issued by the brigadier detailed to command the Advd. Gd. of the 2nd Army Corps.

Advanced Guard Orders,
2nd Army Corps' Camp, ...
4th June, 1886.

1. With reference to G.O. No. 2, of this date, all reports from the 2nd Cavly. Brigd. will be made in future to these Hd. Qrs.; its B.M. will attend here daily for orders, as soon as possible after the march is over.

2. The Advd. Gd. 2nd Army Corps will march to-morrow at 6 A.M. in the direction of C, D, and, unless otherwise directed, will halt for the night at K.

3. A detachment consisting of the 1/Royal Rifles,* the 7th Hussars,† 2 guns from —— Battery of H.A., a party of 20 men R.E. with tools on pack-horses, and an ambulance detachment, will march by No. 1 road. It will parade this evening at 5 P.M. immediately in front of —— Regt. and proceed to the advanced post near the village of ——, on No. 1 road, which upon being relieved will rejoin its brigade. This detachment will begin its march to-morrow punctually at 6 A.M. Colonel B. J. will command this detachment until further orders, and will arrange his own order of march. It will halt to-morrow night at L.

4. The following arrangements to hold good for to-morrow and for all marches made subsequently, unless orders are issued to the contrary.

5. The order of march for the main body of the Advd. Gd. on No. 2 road will be as follows (see page 327).

6. No bugling, beating of drums, or playing of bands will be allowed in camp or on the line of march without the express order of the Bridgr. Comg. the Advd. Gd.

7. The men will to-morrow be roused at 4.30 A.M. (and on all subsequent marching days 1½ hour before starting), and will at once pack the baggage wagons: they will breakfast at 5 A.M., and will fall in punctually at 5.30 A.M. on their private parades, and will form up in the column of route on the road, so as to be ready to march punctually at 6 A.M. The scouting party will always parade 30 mins. earlier than the main body, so as to be formed up at the outlying piquet on the main road, and ready to start at 6 A.M.

8. The vanguard to-morrow will consist of the 10th and 13th Hussars, —— Battery of H.A. without wagons, —— Company of R.E. with tools on

* *This to be the odd Battn. of the Divn. furnishing the Brigd. of Infy. for the Advd. Gd.*

† *This to be the Regt. of Cavly. belonging to the Divn. furnishing the Brigd. of Infy. for the Advd. Gd.*

pack-horses, and the Scottish Rifles without its band, all under the command of Colonel ——. Upon halting for the day the front to be covered with outposts to be posted by that offr. and taken from the force under his immediate command. The piquets to communicate with those on Nos. 1 and 2 roads.

9. There will be a halt of 5 minutes in every hour : the first being at 6.30, the second at 7.30, and so on, as it is essential that every one should halt at the same moment.

10. All corps will march upon the largest front that the routes will admit of.

11. The Brigdr. Comg. will march at the head of the main body on No. 2 road.

By order
(Signed) G. J. W.,
D. A. A.G. Advanced Guard 2nd Army Corps.

In issuing orders for subsequent marches, but little need be said beyond that "the advd. gd. will march to-morrow at —— A.M., in the same order as specified in the orders of 4th June."

In the foregoing examples of the order in which the several arms are formed in column of route, the cavly. have been shown in front ; but in marching through a very enclosed country, or at night, except on open plains, it would be very dangerous to have the head of the column formed by a large body of Cavly., as they would be nearly helpless in case of attack. The Infy. should be in front under such circumstances, having a few mounted men 1 or 2 miles in front. It will be seen that the guns are pushed well to the front, so that they could at any moment come into action to cover the deployment of the Infy. in case of attack, or the necessity arising for an attack being made upon the enemy.

THE DUTIES OF THE STAFF are endless during the march, and no matter how zealous the junior S.Os. may be, unless the C. of the S. is experienced in war, and a man of ability, roads will become blocked up with troops, wagons, &c. ; Advd. Gds. will find themselves without columns in their rear ; Brigds. and Divns, will lose their way, not knowing they have done so, until their leading battns. have been pulled up short by an impassable marsh, bridge, or river ; baggage will be lost ; short marches will be badly executed at the cost of immense fatigue to men and animals, and if attacked *en route*, nothing but the individual physical superiority of the Briton over all other nations can save the honour of Her Majesty's army.

The minor details to be attended to by Os. C. Brigds. or Battns. as well as those on the staff, are numerous. The following sketch is a general outline of them :—*The physical condition* of the men and horses is of the most vital importance. Do all you can to economise the strength of both by accomplishing your object with the least possible expenditure of vital

energy. Both must be well fed during the march, for the wear and tear upon the system is much greater than when halted; an extra allowance of meat and tea should always be given. See Article on "DIET." The men's stomachs being attended to, their feet come next, and are of equal importance; good shoes and woollen socks are indispensable, the latter to be washed whenever there is a halt. Captains of companies should impress upon their men the necessity for greasing their boots, which, while rendering them waterproof, also makes them soft: they should be instructed to soap their stockings for the first few days' march, taking care to wash their feet and prick any blisters that may have arisen, as soon as they encamp. It is a good plan to rub the feet with a decoction of salt and a little alum dissolved in warm water. Men who suffer in the least from ingrowing nails must have their feet examined by the doctor. Whenever the force halts for a day, captains must examine their men's boots, and take immediate steps for supplying all wants in that respect. The old prejudice against drinking water on the march has been murdered by scientific discoveries: however, men should be discouraged from drinking large quantities at a time, and persuaded instead to drink a little frequently. Make use of the "double" as seldom as possible. It looks very smart, no doubt, to perform movements at a running pace, and some C.Os. are very fond of doing so on the march, but the Colonel who thus "takes it out" of his men is ignorant of his work. If distance is lost, wait for the next halt to regain it. Whenever it is possible, have music to march to. If the band is broken up, the drums and bugles should play together. Nothing is more martial in sound, and the men march a hundred per cent. better to it than in silence. If you have nothing else, get your men to sing by companies. During long night marches in India at the beginning of the mutiny, I found that with singing we got on admirably, whilst, when we marched in silence, as men will do after the first half mile at night, they almost went to sleep, lagged behind, stumbled and fell. The moment a song was struck up the men stepped out briskly.

There are no occasions on which the discipline of a Regt. becomes more conspicuous than upon the line of march, nor on any on which the attention and vigilance of every offr. in maintaining order and regularity are more especially requisite. Offrs of all ranks must be sensible of the importance of preserving the compact order of a column of march, by not allowing irregular intervals, straggling, or falling out, except during periodical halts, which should be frequent and at a distance from public houses. It is quite possible to maintain great precision of formation, whilst the men are allowed to march in the manner most comfortable to each. After a march, the men are to occupy themselves in putting their arms and appointments in complete order. ⁂ Drunkenness, or irregularity upon a march, is to be considered as committed on duty.

When not likely to be engaged, and when tents are used, it is desirable

that the Q.Ms. and the camp colour men of the Advd. Gds. should march at the head of the column : those of the columns of the main body with their respective Advd. Gds., but in rear of them. This will save much time when the several columns approach their encamping ground. When marches are undertaken beyond the enemy's reach, they can best be accomplished by Divns., or perhaps by even smaller bodies. The greater the number of detachments of about 6000 each, and the greater the number of roads marched over, the easier it will be to administer to the wants of every one. In such cases, the comforts and physical condition of the men must be closely attended to, and must regulate the length of the march and the hour of commencing it ; when there is any likelihood of being engaged, military considerations must outweigh all others. Avoid unhealthy and malarious districts ; but, if obliged to pass through them, arrange to halt the fewest possible number of nights there, beginning the march about noon in cold countries, and somewhat later in hot. Places like the Terai in India are mostly deadly at certain seasons, if the nights are passed there, although one may safely march through them in the middle of the day. It can generally be traversed in one march, but if obliged to encamp in it, every ent should be closed after sunset, and kept closed until an hour after sun- ise. Guards should be reduced to a minimum, and every man on night luty should be given from 3 to 5 grains of quinine, both going on and oming off duty. The Indian medical men recommend that every man bliged to halt in malarious places should receive a daily ration of quinine, nd in such cases the expense of physic ought not to be considered. The est time to take it is immediately after the morning meal of tea or coffee.

No matter what the length of march, or how distant it may be from the nemy, all the precautions necessary when in his presence must be adopted. void marching through towns or villages. Go round them if it can ossibly be done. When that is impossible, take every precaution to revent the men from leaving the ranks. Under no circumstances should temporary halt occur within such places. To avoid doing so, the place exit must be kept clear. If any obstruction occurs a little in advance, the lumn marching through the town must not be halted, but kept passing rough and forming up beyond it, until the check has been remedied. hen starting, if in the neighbourhood of the enemy, the men must not rn up the straw and rubbish of their camp and bivouac. At the head of ery column of less than a Divn. should march as a detached body all e Regtl. pioneers, who should take their orders from the S.O. on the spot. is is not necessary when a company of R.E. with tools accompany the lumn. If the obstacle to be overcome is only a small one, care must be en that only sufficient pioneers or R.E. are left behind to accomplish at is necessary ; the rest should go on with such portion of the column can get on, notwithstanding the obstruction. Wherever the road divides

into 2 or 3 branches, the S.O. leading the column must take care to make a mark by notching the trees or breaking down some branches along the road that is to be followed. A pile of turf or stones will serve the same purpose. During night marches, unless there are a number of guides, a mounted offr. or man should be left to point out the way at all places where roads branch off from the one you are following. The discharge of any firearms during the march is strictly forbidden.

March in the most open order when at a distance from the enemy. This is all the more necessary in hot weather and in the tropics. I have seen men drop down dying in India from being marched into action in line of quarter columns, in the centre of which the want of air was actually suffocating. For this reason, fours is a bad formation in hot weather. Companies, sub-divisions, or even sections, are the best formations to be adopted, according to the breadth of road. Os. C. companies to be held responsible that the water-bottles are filled before starting. Take your men cool into camp, and do not allow them to remove their coats for half-an-hour after reaching camp. When tents are up or the bivouac marked out, as the case may be, the men not employed on fatigues should change their under-clothing and wash well. The clothes taken off to be brushed or beaten, and hung up in the wind. In marching with other corps, C. Os. must be careful to prevent as far as possible checks taking place at the head of their column. If a narrow bridge or gateway has to be passed, it should be done at the double or stepping out. G. Os. C. cannot be too severe upon C. Os. who are negligent on this point.

Whenever a stream, ditch, bank, or other obstacle is to be crossed, it will l generally found that, instead of defiling or diminishing the front, the very contra should be done, not only by causing the files of each section to open out gradual before they arrive at the ditch or obstacle, but even by forming subdivisions companies. When a bad place is to be passed, the majors and captains will go the head of their respective wings and companies, to see that any orders which m have been given are obeyed with regularity and steadiness. They will remain at t spot till the whole of their wings or companies have passed, and will then resu their stations in the rear, and give the words, 'March at ease.' When several ro converge upon a bridge, ford, or other defile which must be passed by all the colum in issuing orders for the operation, calculate the march of each so that no two sho reach it together. The exact hour that each should begin to pass it, and will t in passing it, should be noted in the instructions issued. It is of the greatest imp ance that the men should not on any account be hurried on the march; they to be instructed that they are never to step out beyond the regular step, still to double, unless by word of command. No man is to remain behind or quit ranks for any purpose, or on any account whatever, without permission from captain or O. C. the company. Officers are never to give permission to any ma quit the ranks excepting on account of illness, or for the purpose of easing themsel

or for some other absolutely necessary purpose. The offrs. must be particularly attentive to prevent the men from going out of the ranks for water. When this is required, the regiment or column will be halted. Men who obtain permission to fall out for a short time to ease themselves, or for any other cause than illness, must invariably leave their arms and packs to be carried by the section they belong to until they return.

An army moving to fight must be encumbered as little as possible by baggage and wagons of all sorts : tents and provision trains should be left in rear, the men being served out with 2 or 3 days' provisions. The fighting portion of the army to be closed up to the front as much as possible.

Depth of Columns.—The following Table gives the actual number of yds. of road occupied by Brigds., Regts., &c., marching in column of route with regulation distances, no allowance being made for opening out. An allowance for opening out of from 20 to 30 p.-c. for troops, and 20 or 25 p.-c. for carriages, should be added to all these distances in calculating the depth of a column of route. As a very rough rule for calculating the length of road occupied by columns on the march, allow 1 yd. for each horseman, 1 yd. for every 2 foot-soldiers, and 20 yds. for every gun and for every description of wagon. In column of fours, a column of cavly. covers in depth as much as its deployed front would be : in column of sections, twice, and in columns of half sections 4 times that distance.

Desert Marches.—The experience Napoleon gained in Egypt led him to place on record that a country can have no stronger frontier than a desert. Until troops with all their modern appliances have actually to be moved across a desert, it is difficult to realise the full significance of this maxim. The first and greatest difficulty is water. You must provide for the carriage of at least 1 gallon per man per diem, with a surplus of spare water of 25 p.-c. on whatever your calculation amounts to. In the Soudan we used iron tanks, for camel transport, of 3 sizes : 30″ × 15″ × 6″ holding 8 galls., wt. (empty) 28 lbs. : and two other sizes of same length and breadth but with a depth of 7″ and 9″, holding 10 and 12½ galls. and weighing (empty) 31 and 33 lbs. respectively. Also *Barricos* of wood, holding 8, 10, 12½ and 15 galls. and weighing (empty) 20, 34, 38, and 43 lbs. respectively. Also waterproof bags, holding 8, 10, and 12½ gallons, and weighing (empty) 8, 9, and 10 lbs. respectively. The common native skin weighed (empty) about 3 to 5 lbs. and held about 6 galls. The leather camel water-bottle, called Zemyemiyeh, weighed (empty) about 3 lbs. and held about ¾ gall. We frequently stored water in the desert and used the empty (100 lbs) biscuit tin, it held about 36½ galls. Waterproof sheets sunk in the sand also answered very well. If possible, all water so stored should be covered over to prevent sand from blowing into it, and to keep the sun from it. If possible, it is most desirable to carry the infantry on camels. Of course this increases the difficulties about food and water. The camel is a strange

UNITS OF FULL WAR STRENGTH.	Yards of Road occupied, allowing for Regulation distances. Infantry in fours, Cavalry in sections, R.A. in column of route, Transport Wagons in file.
	yards.
A Squadron of Cavalry (50 files) without baggage	112*
Cavly. Regt. with only 2 S.A.A. carts and medical mule ..	520†
Ditto ditto, with tents and all regimental transport	714
Cavly. Brigd. with H.A. wagons, 2 machine guns, S.A.A. carts, medl. mule, but no other transport	2050‡
Ditto ditto, with tents and all regimental transport	2600‡
A Battn. of Infy. with only tool and S.A.A. carts	460§
Ditto ditto, with all baggage, &c., except tents	570§
Ditto ditto, with all its regimental transport	620§
A Brigade ditto, with only tool and S.A.A. carts	1400‖
Ditto ditto, with all baggage, &c., except tents	1730‖
Ditto ditto, with all regimental transport	1880‖
A Battery of H.A. with all its carriages	420¶
Ditto ditto, with ammtn. wagons only	312¶
Ditto ditto, with guns only	200**
A Divisional Reserve Ammunition Column	790
Army Corps Details, Reserve Ammtn. ditto	770
Army Corps ditto ditto	1590
A Field Company, Royal Engineers	193
A half Telegraph Troop ditto	325
A Pontoon Troop ditto	796
Fd. Park with an Army Corps	147
One Company of C. & T. Corps for supply of Infy. Brigd. ..	300
A Divisional Ambulance Column	..
One Field Hospital	..
One Infantry Division with tool and S.A.A. carts, but without baggage: the R.A. with ammtn. wagons only, divnl. Reserve Ammtn. Column included, and a space of 350 yds. allowed for police and medical department	5740
Ditto ditto, with all its baggage, tents, and equipment ..	8500

A two-horse wagon	11 yds.
A four ditto ditto	15 ,,
A six ditto ditto, or gun	19 ,,
Horse, Mule, or pack animal	4 ,,
Camel	5 ,,

Including a distance of 4 yds. between the leaders' heads and the rear of the wagon in front of them.

Allowance is made here for space occupied by Infy. but not by Cavly. Bands.

* Including one squadron interval of 12 yds. † Including 3 squadron distances of 12 yds. each, and a Regtl. distance of 48 yds. and 100 yds. for 56 led chargers and 4 spare draught horses.

‡ 3 distances of 50 yds. each allowed between Regts. for convenience in marching.

§ Including 30 yds. as the distance between it and next Battalion, &c. ‖ Including 3 distances of 30 yds. between Battalions.

¶ A Lt. Fd. Battery is 56 yds. less: a Heavy Batty. is 8 yds. less. These 420 and 312 yds. include a distance of 30 yds. (the regulation distance is only 28½ yds.) either in front or rear of Batty.

** B Lt. Fd. Battery is 56 yds. less: a Heavy one 32 yds. less. This 200 yds. includes a Batty. distance of 30 yds.

brute and most conservative in all his ways, and those ways are not at all well suited to modern warfare. He will carry a load well for a distance of 200 miles in 10 or 11 days, if you allow him to straggle all over the country for grazing when on the march, and you need then give him little or no grain if there is a fairish amount of herbage and leaves to be obtained. This you cannot do, however, if you are liable at any moment to be attacked by a fanatic enemy who will charge you home when he can. It is most essential to have cavalry with each desert column for scouting purposes, for unless you have time to prepare to receive the Arab charge, you will be destroyed. I know that theory tells me, a line can with its fire keep off the most determined enemy, and the military theorists condemns all square formations, but God help the line encumbered with stores and camels, that is charged by Arabs like those who charged at Teb or at Abu Klea! When you reach the enemy's neighbourhood, it is best to form a zeribah and there deposit as much of your *impedimenta* as possible, before you march to attack him in one, two, or three large two-deep squares, according to your strength, in echelon, with cavalry pushed out in every direction to find his whereabouts. If any annoying fire is opened on you, you can deal with it in the ordinary way, attacking, in skirmishing order, or if necessary, in line. The Arabs who fire, don't charge. All you have to think of, is to beat off their determined charge, and this you can always count upon doing if you are prepared for it, everything else is plain sailing; there is nothing beyond this charge that is at all formidable in all this Arab warfare.

Unless the enemy has a powerful artillery, take very few guns with you, they are a great encumbrance in the desert, and require constant protection. A few Nordenfeldt guns that will fire musketry ammunition are, however, invaluable.

Baggage.—Happily for our army the system of Regtl. transport has now been definitely adopted. It is essential that there should be a good active offr. in charge of the baggage of each Divn. *The baggage master* must be considered a S.O. whilst on the march, and as such, being the mouthpiece of superior authority, his orders must be obeyed. He will be, during the march, the S.O. to the F.O. of the day, who, commanding the Rr. Gd., can, if necessary, give him orders; but, unless under peculiar circumstances, it is better that he should leave him to make his own arrangements; supporting him if appealed to by him on questions of authority. After the march he will report to the A.A.G. of his Divn. all irregularities that may have occurred, or the negligence of any offr. with the baggage guard, and will make suggestions regarding the baggage on future occasions. The baggage of corps should be kept together, and not allowed to mix with others; this must be attended to by the Transport Offr. of each Battn. &c., who will distribute his guard amongst it with that object in view. One R.-C.O. should be with the leading and one with the last cart. Under no

circumstances must the guard be allowed to ride on any of the animals, or in any cart, or to put their arms or packs there. The offrs. cannot be too strict in preventing their men from straggling, and all stragglers should be made prisoners. If a load tumbles off, or a cart breaks down, the whole of the baggage of that Regt. is to draw up on the near side of the road, allowing that of other corps to pass on. The guard must then, under the directions of the offr., repack the load, or, if necessary, distribute it in small quantities amongst the others. Os.C. regts. should take steps for punishing those whose baggage tumbles off, for if carefully packed it would not do so under ordinary circumstances.

Allowance of Personal Baggage.—In the field, transport for the conveyance of offr.'s baggage will be provided as follows: all regimental F.Os. and others ranking as such (brevet rank not included), 80 lbs.; all other mounted offrs. 50 lbs.; and 40 lbs. for all of inferior rank. Under our new organization we have a number of Majors with each Battn.; I think they should only be allowed 40 lbs. of baggage each. This includes bedding, &c., but does not include cooking utensils, for which transport will be found at the rate of 20 lbs. for each troop or company, or mess of 3 S.Os. Baggage to include bedding, will be conveyed for civil servants (when authorized) at the rate of 20 lbs. each, and camp equipment will also be provided for them. In South Africa each S. Sergt. was allowed 17 lbs., and 2 kettles per Battn. were carried for them. In Bengal on service 1 camel is allowed for the baggage of each regtl. offr. irrespective of rank (400 lbs. per offr.), not including camp equipment. For service in the hills 1 mule is allowed for the baggage of every 3 offrs.: 1 for the C.O. and 2 for each Battn. mess.

Advanced Guards.—No body of troops, from an army down to company, should march without being covered by an Advd. Gd. It fulfils for troops on the march the same duties that outposts do when they are halted, and the same rules apply to both. Its object is to search the country in the vicinity of the roads by which a force marches, for the purpose of ascertaining where the enemy is and what he is about, so that he cannot possibly take it unawares, and in the event of his attacking, to engage him in action until the main body of the column has had time to deploy and make arrangements for taking up a good position or for retreating as may be determined upon. When the news is first brought to you by your scouts that the enemy is deployed and advancing to the attack, the head of your column may have reached ground where it would be very unadvisable for you to engage: to fight to the best advantage, you might have to move a mile or so backwards or forwards to secure a really good position suitable to your force. Its duties include the repair or preparation of roads and bridges for the use of the main body. To it is often confided some special operation, such as the seizure of some important position, bridge, defile, &c. (machine guns are invaluable for such operations):

should therefore be composed of Cavly. Mounted Infy. and other Light Troops having great powers of mobility, and in such instances, it must be strong enough to hold the captured position against all possible comers until support could reach it; machine guns firing infy. ammtn. will greatly aid in this. Its mission at times may be to engage the enemy at all hazards to prevent his retreat, holding him engaged until the main body can come up. In their composition they should represent a miniature army, the proportion between the three arms being decided upon the same rules that hold good in the formation of an army for each particular sort of country. As a general rule, about from $\frac{1}{6}$ to $\frac{1}{4}$ of the Infy. forming the column should be allotted to the Advd. Gd. It is the duty of the A. A. G. of the Divn. to see the Advd. Gds. properly detailed and formed up, as also the rest of the Divn. The offrs in charge of the baggage, stores, &c., must take their orders from him as to the position they are to occupy on the line of march. The following may be taken as the normal strength of the Advd. Gd. required by an English Army Corps and Divn. respectively, when the front is not covered by an independent force of Cavly. pushed forward as detailed farther on, and as described in Article on "SCOUTING."

For an Army Corps.—The Brigd. of Cavly. with its H. A. Batty., the 3 divnl. battns. of infy., all the available Mtd. Infy., and a couple or more machine guns, 1 H. A. Batty., 1 or 2 companies (according to circumstances) of R.E., with a light bridge equipment if it is likely to be required, and an ambulance detachment. The Advd. Gd. will often be exclusively composed of mounted troops and H. A., when the presence with it of machine guns becomes more essential.

For a Division marching independently.—The Divnl. Regt. of Cavly., minus 1 troop (to be left with G.O.C. at head of main column), the Battn. of Divnl. Infy., 4 guns, or in some instances an entire battery of 12 or 13-prs., any mounted infy. and machine guns there may be available, one company of R.E. with tools, and a detachment of the ambulance. Sometimes it may be desirable to add half or even a full 2nd Battn. of Infy. The fewest possible number of non-combatants should be with all Advd. Gds.

Their distance from the main body must greatly depend upon the relative condition of the two opposing armies; if you are prepared to attack whenever you come up with the enemy, the distance should be small, say about a mile; but if you consider it will be necessary to devote some time to reconnoitre his position before attacking it, or should you not feel sufficiently strong to warrant you in accepting battle at all times and under all circumstances should he assume the offensive, it will be necessary to increase that interval to several miles, say roundly from 3 to 5 miles. The nature of the country will always be an element in calculating these intervals, for if it abounds in strong natural positions, there is less liability of the Advd. Gd. being overpowered by an enterprising enemy before it can be supported by

the main body. The state of the weather and of the roads have also more or less influence upon this point. It is impossible to lay down rules to meet every case regarding the exact distances to be maintained between the main body and the Advd. Gd., and between the component parts of the latter. The general principle, however, should be that under no circumstances shall it be possible for the enemy to open an effective artillery fire upon the main body of the Advd. Gd., until time has been afforded for getting its guns into position, and its Infy. formed up for their protection.

The order of march for Advd. Gds. is given in the Article on "MARCHES." With an army, all the available Cavly. and Mtd. Infy. should be pushed out well to the front, well supported scouting parties being still farther in front of it again, by which means the enemy's doings and intentions are most easily discovered, and the army is in consequence best protected from surprise. There should be a screen covering every approach to the position occupied by your troops, or to the district in which they are operating, and behind which you should be able to move as you pleased without the enemy's knowledge. The distance to which they can be safely pushed to the front and flanks is regulated by the same circumstances that regulate the distance between Advd. Gds. and the army, and also by the strength of the Cavly. and Mtd. Infy. at your disposal for this most important duty; generally and roughly speaking, the distance may be stated at from 5 to 15 miles. H.A. and machine guns should accompany a force of Cavly. so employed, also some R.E. either mounted or carried in carts, their tools being on horses. The fewest possible number of wheeled conveyances ought to be with such a force, and the baggage should be reduced to a minimum, to render it as movable as possible; it must live, as a rule, upon the resources of the country and no tents must be taken with it. When the army is not covered by Cavly. as above described, it must when on the march not only have its front covered by what may be called 'moving outposts,' but the flanks must above all things be protected by detached parties. The scouts and patrols sent out from the advanced parties, and the extent of front covered by them and their skirmishers, should render it impossible for an enemy to be concealed in sufficient numbers near the line of march to make any serious attack upon the flanks of the army. All ground that could afford cover to an enemy must be examined, and Cavly. patrols sent to all villages near the line of march. Each patrol to be commanded by an offr., who will approach the village or houses he has been sent to examine with the greatest possible caution, sending files round both sides of it to reconnoitre it well from several positions before he enters it. He must endeavour to obtain information upon all such occasions from the respectable inhabitants. S.Os. not required for immediate duty with the columns should accompany the patrols for the purpose of collecting information regarding the enemy.

When the front of the army is well protected from surprise by an in-

pendent body of Cavly. covering its front at a distance of 5 or 10 miles from it, the Advd. Gd. of an Army Corps or of a Divn. may march as one body without greater intervals between its component parts than are required for the convenience of marching. Of course, under such circumstances it would be composed almost exclusively of Infy., machine guns, and R.A., which should be formed in an order of march best suited for coming into action as quickly as possible. The object of such an Advd. Gd. is not to protect from surprise, but to be a small, handy, compact column of all arms, stripped of all *impedimenta*, and ready to fight in any direction at a moment's notice, and to hold the enemy engaged whilst his force and position were being reconnoitred, and your main body was being deployed in its rear. It is very advisable that a detachment of the signal corps should accompany the Advd. Gd., the offr. or N.-C.O. in charge of which can communicate with the signal parties sent to the high points in the neighbourhood. All advanced parties and patrols should be instructed by the offr. from whose company or squadron they have been detached to make known the presence of the enemy to those in rear by means of some preconcerted signal, such as holding up the shako on the end of the sword or rifle, &c. See Article on "SCOUTING."

Entering a Defile or Hollow Way.—The head of an Advd. Gd. must never commit itself by entering a defile, or hollow way, without previously occupying the heights on either side by flanking parties. When the heights are thus crowned, the leading party on the road will send on a single file, which will be followed by others in succession, near enough to keep the preceding one in view, the flanking parties on the heights of either side continuing to precede the centre until the defile is passed, when they will gradually fall back to their former stations, and the whole move forward in the original formation.

The Flanks of an Object to be turned.—Generally speaking, the flanks of every object capable of affording concealment to an enemy will invariably be turned, and the rear threatened previously to its being felt in front; by this means the enemy will be discovered, and most frequently dislodged without loss.

Ascending a Hill.—On coming to a hill the flank files will first move in both directions round the base; a leading file will then ascend, creeping up when near the top so as not to show itself upon the summit, but making its observations from behind the brow; it will then signal to the rest of the party whether the enemy is in sight or not.

It is very desirable that the O.C. the Advd. Gd.—whatever may be its composition—should have orders as to the course he is to pursue, (*a*) if his scouting and advd. parties are stopped by detachments of the enemy that refuse to retire and that can only be made to do so by being attacked; (*b*) if attacked himself by superior numbers.

Rear Guards must be considered under two aspects:—

1st. As a small guard to close in a forward movement, to pick up strag-

glers, and, if in an enemy's country, to be sufficiently strong to prevent a few armed inhabitants or small parties of Cavly. from annoying the baggage or carrying off individuals. It should march with flankers particularly taking care to guard the flanks of the line of baggage. The troops composing the Rr. Guard, even though small in number, should be commanded by an offr. of rank, certainly not under that of Lt. Col. for an Army Corps. It must on no account commence its march until all the wagons and baggage have moved on. The baggage master or other transport offr. should report to the O.C. the Rr. Gd. when all the *impedimenta* are formed up and moving off, and such offrs. should be in constant communication during the march. As most of the provost establishments must be with the baggage and Rr. Gd., the O.C. should lend every assistance to the P.M. and his assistants, and take charge of all prisoners made by them. As several hours will almost always elapse after the Advd. Gd. marches before all the baggage is *en route*, the piquets which were guarding the rear during the night must remain at their posts until almost everything has moved off, when they will be withdrawn by order of the O.C. the Rr. Gd., and form part of it. A staff offr. should remain behind with the Rr. Gd. until it marches, to direct in the collection of the baggage, and forming it up, in accordance with the orders issued by the C. of the S. upon the subject. When all is *en route* he will gallop to the front, to report to the C. of the S. that all is correct. It is at times essential that a S.O. should remain with the Rr. Gd., to assist in carrying out the orders of the O.C. it. No more disagreeable duty can fall to the lot of an offr. or soldier than that which has been briefly described above. It is sheer hard work, without any excitement or glory. Under the most fortunate circumstances the men composing such a Rr. Gd. cannot expect to be in camp for some hours after the main body. It is most fatiguing to march in the dusty wake of an army, but it is on such occasions that offrs. show their true metal ; any man can be cheerful and zealous with an Advd. Gd., or even with a Rr. Gd during a retreat, but it is only those who have the keenest professional feelings who can throw all their energies into every little duty, irrespective of its being agreeable or otherwise. Unlike all other duties, it is advisable that whole Battns. should seldom be employed upon a Rr. Gd. of this nature. If should be formed of companies from several Regts., their cooks and a few men to help them, being sent on with the main body ; by this plan the men composing it will find upon arriving in camp everything ready for them, their rations drawn, if not cooked, &c., &c., and they should never, except in extreme cases, be employed for the rest of that day upon fatigues. It would be well to punish irregularities on the part of offrs while thus employed, by ordering them again on a similar duty, if necessary without their own men.

THE SECOND CONDITION under which a Rr. Gd. has to be considered

that when it is acting between the Advd. Gd. of the enemy and its own army. Circumstances, such as want of provisions, political combinations. &c., may require an army to change its position, sometimes even its base and line of operations ; such a movement should be protected by a strong Rr. Gd. ; or it may be necessary, to cover the retreat of an army during a retrograde movement, made in order to take up a position in rear, like that made by the English on Quatre Bras, and the Prussian force under Ziethen on Charleroi in 1815 : or when covering the retreat of a beaten army. Under such circumstances its strength should be similar to that laid down for an advanced guard.

The great object to be attained is to retard the enemy, which, with a well-disciplined army that has not yet engaged—as, for instance, the allies previous to Waterloo—is comparatively easy, but with a beaten and perhaps a demoralised army, is the most trying of all operations. For this reason it should be strong in artillery. The O.C. such a Rr. Gd. should be the best in the army ; it may not be necessary that he should be so *rusé* as the commander of an Advd. Gd., but he must be one for whom danger has at least no horrors ; he must possess dogged determination, courage of the highest order, and untiring energy. Feeling the responsibility of his position, he must be at all times prepared to sacrifice himself and those under him to the necessity of the time, and for the safety of the army which he is protecting.

Rr. Gds. have not the same necessity to reconnoitre the ground to be passed over as Advd. Gds. have, for the army having already marched over it, prevents the possibility of an enemy being concealed there. A Rr. Gd. of this nature must have no *impedimenta*. Indeed offrs. should be without baggage altogether whilst so employed ; all baggage should be sent to the front, to march with that of the reserve. Its wounded should be forwarded daily as far to the front as possible. It may even sometimes be necessary to leave its wounded behind : in such cases a M.O. should always be left with them ; he should be left supplied with money and with medicines if they can be spared.

Rr. Gds. told off to cover the retreat of a beaten army should be formed from the reserves, or at least from the freshest troops : their strength should be $\frac{1}{4}$ or $\frac{1}{5}$ of the whole force. If the road by which the retreat takes place is not well known to the O.C the Rr. Gd. experienced S.Os. should be told off specially to reconnoitre the road a day's march ahead of the Rr. Gd. : they must of course act in concert, under one as the head, who will send back reports constantly as to the condition of the road, its bridges, the streams and villages to be passed, &c. ; every position suitable for the Rr. Gd. to defend itself in to be especially noted, and a rough sketch supplied of its features. If this most important of duties is ably performed, it will render the commandant's duties much lighter, and tend above all things towards

the main object in view—that of the retarding the enemy, so as to afford the army time to retreat unmolested in an orderly manner. The nature of the country must affect its manœuvres and composition. In an open country all the available Cavly. and mounted Infy. should be with it, for the pursuing enemy's advance is sure to be chiefly formed of mounted men. Under all circumstances, however, it should have some of the best Infy. with it, for all countries, where armies can operate, must have rivers, streams, or watercourses of some description, and such generally afford positions where Infy. can make an effective stand ; the pursuing Cavly. being arrested, they have to wait for their Infy. If the position occupied by the Rr. Gd. is in an intersected country, the enemy will have to reconnoitre it and form up his troops for attack : perhaps deployment may be necessary. All this takes time, and worries pursuing troops beyond description, when it is constantly repeated with the same result, viz., when completed having only the satisfaction of seeing the Rr. Gd. march off under a cloud of skirmishers. To conduct such manœuvres properly requires the coolest head, endowed with great judgment. No man who has not had some experience of war can command a Rr. Gd. efficiently ; without it he is apt to relinquish his vantage ground too soon, or remain there too long—both serious errors, the last a fatal one. His watch must be his guide in a great measure, unless he has a clear view of the enemy's movements. His flanks will always be his weakness, particularly if there are one or two other roads running in the same direction as that by which he is marching. If so, they must be provided also with Rr. Gds. the relative strength of each to be dependent on their distance from the main road, and upon the manner in which the pursuit is conducted. If at any time the enemy concentrates and attacks one of these secondary Rr. Gds. in force, it must be at once supported from the main body of the army, and the attacking party driven back at all hazards. The fact of there being several parallel roads cuts both ways ; for if it gives the pursuers opportunities for outflanking the Rr. Gd., it also facilitates the retreat immensely, the balance of advantage being greatly in favour of the latter. The great art of Rr. Gds. is that of being able constantly, without risk, and with but little trouble, to force an enemy to deploy, attack, and then to get safely away without any serious fighting ; in other words, the Rr. Gd. should by frequent occupation of strong positions be continually threatening to fight, as it is by so doing, and not by actual conflict, that it best fulfils its purpose. In a long retreat, when this course has been followed for a number of successive days, the G.O.C. the pursuit is apt to become reckless, and, neglecting to take all necessary precautions, may push on to attack with an insufficient force at hand, or in an irregular manner ; it will then be for the G.O.C. Rr. Gd. to pounce suddenly upon him, with all his available force, and having struck him a severe blow, at once resume the retreat. The G.O.C. must not allow himself to be carried away by an

partial success of this nature so as to forget his primary duty, for he should bear in mind that he cannot stop, except to retard the pursuit, and that every succeeding quarter of an hour brings his enemy reinforcements. The length of time that a Rr. Gd. can remain with safety in a position depends on its intrinsic strength, and the obstacles in the way of an enemy's turning it. The distance that a Rr. Gd. should be from the main body depends upon the nature of the country, its numbers, and the manner in which the pursuit is conducted. If the pursuit is slack, and the Rr. Gd. is composed of an Infy. Divn. and a suitable proportion of Cavly. it can safely be a march in rear. Under all circumstances, however, constant communication should be maintained between it and the main body.

In the absence of a regular force of Mtd. Infy. if a few hundred Infy., selected for being good shots, can be mounted, they will be found invaluable with a Rr. Gd. : working with the Cavly, they will enable a position to be held after the Infy. have retreated. When seriously pressed the H. A. can limber up, and go off at the trot until it reaches the main body of the Infy. when these Mtd. Infy. and Cavly. skirmishing on foot, might run back to their horses, mount and be off at the trot or gallop. The manœurvres of a Rr. Gd. should be performed as much as possible in echelon, each echelon supporting the other, and retiring alternately when pressed. The actual rear of the Rr. Gd. should be a line of skirmishers, as far as the nature of the country will admit of it, the three arms being used according as the ground is suited to them. It is not necessary to have any large reserves of ammunition with the Rr. Gd., as the main body can drop daily all that may be required, and the fewer waggons the easier will be the work of the Rr. Gd.

An army of 2 Army Corps and a reserve Brigd. of Cavly. retreating by 3 roads about 2 or 3 miles apart, with a Rr. Gd. of 1 Infy. Divn. and 2 Brigds. of Cavly., and a reserve Battery R.A., would be disposed upon the three roads, as shown in Fig. 23, if the ground traversed by each road was of the same general nature and tolerably open ; in this sketch the supporting parties of Cavly. are not shown, neither are the numerous flanking parties.

In retreating over a bridge that it is intended to blow up, arrangements must be made that the fuse or saucission that is to fire the charge cannot be got hold of by a sudden rush of the enemy. When all the troops have passed the bridge to be destroyed, all the disposable guns should be in battery, so that the ground immediately in front of it may be well swept by a heavy fire. If hardly pressed, and the country is so inclosed that R. A. and masses of troops can only move upon the roads, to set fire to a village after the R. A. has got safely through is a good means of retarding the enemy. Care must be taken to burn and destroy all provisions, standing corn, &c.—in fact, everything that would serve as supplies for the pursuing enemy. His great difficulty will be to feed his army when moving rapidly

away from his base; so everything that tends to increase that difficulty should be attended to.

To retreat through a defile with a beaten army must be annihilation, if your enemy understands war; but if the main body succeeds in getting through it before the Rr. Gd. has been overpowered, much time can be gained for the general retreat by an obstinate contest at both extremities of the defile as well as in it. The nature and length of the defile must determine the movements to be made; but provided that the heights on

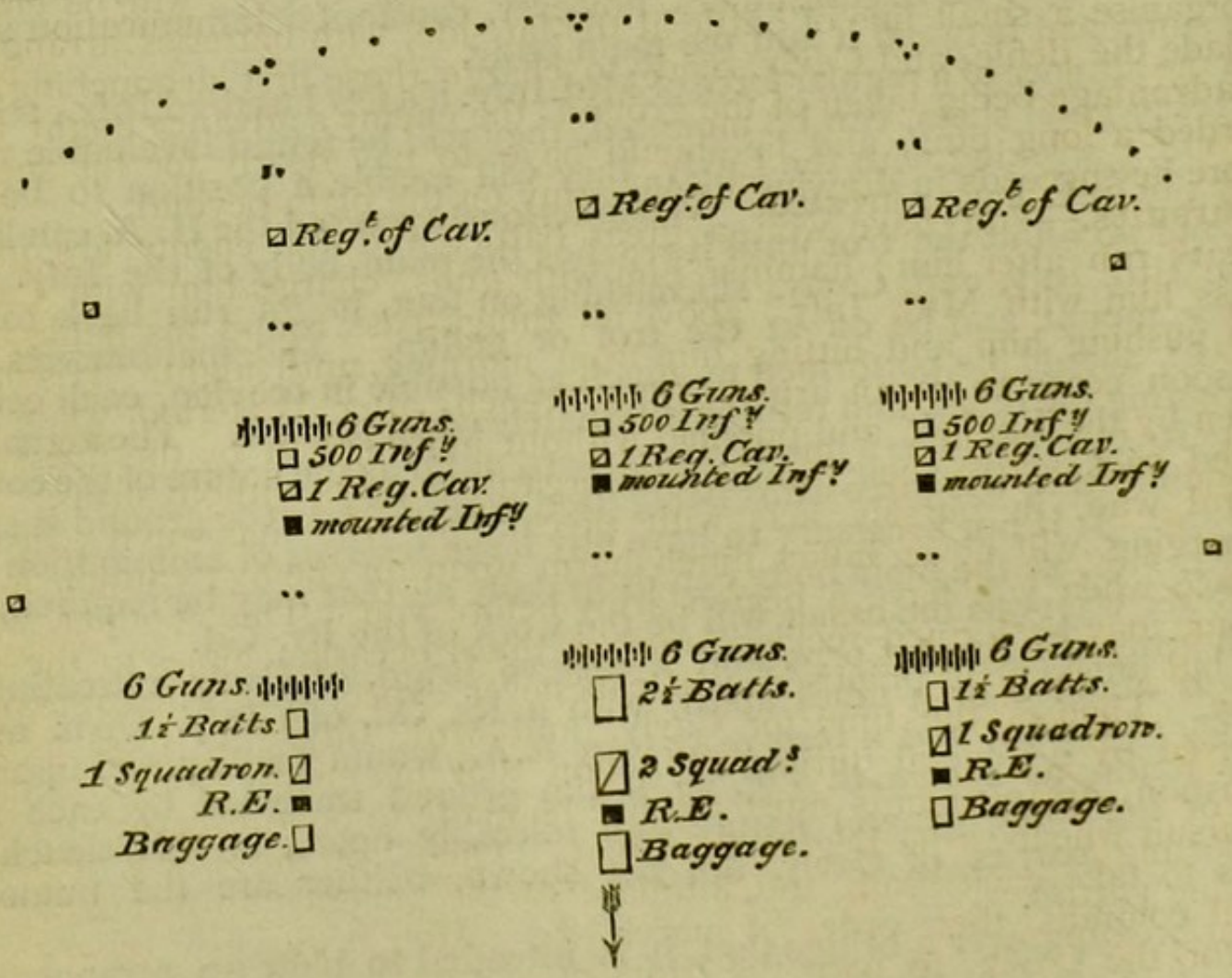


FIG. 23.

both sides have been well crowned by troops from the main body, f which there will be ample time prior to the arrival of the Rr. Gd., t enemy ought to pay dear before his army can form up beyond the defi It is a vulgar error to suppose that the most determined stand should made on the near side of defiles; the entrance to them should witho doubt be disputed, and the troops employed in defence should not be wit drawn until the enemy had deployed in force, and begun to scale t heights on either flank; of course the R.A. should go firs havi

fired their last shot, the guns (to be the lightest of the army) will limber up and gallop off, their waggons having left previously. A strong line of Infy. skirmishers to be well posted on the heights on both sides. The main body will then move off, followed by the supports. If possible the last line of skirmishers should be furnished by Mtd. Infy. When the supports had reached the entrance to the defile, these skirmishers should mount and gallop to the rear; they will soon be safe from the swiftest Cavly., for once past the line of Infy. skirmishers posted along the flanks of the defile, the fire from these last will soon check pursuit. If the ground is well disputed in the defile itself, the G.O.C. will be enabled to organise a small line of battle at the far side, with batteries arranged to enfilade the defile, and Cavly. ready to charge those first debouching from it: advantage being taken of the ground, the enemy's advance ought to be retarded a long time, and he should have to pay dearly for his success before he succeeds in drawing up his army on the plain beyond.

Pursuits.—You have won a great battle, and the enemy are in full retreat; run after him; hammer him with guns, charge him with Cavly., harass him with Mtd. Infy., above all things pass round his flanks, and keep pushing him and hitting him from morning until night. His forces will soon cease to be an army. The French, after Waterloo, when well beaten by the English, and pursued without intermission by the Prussians, flocked back across their frontier a disorganised mass without arms. The general who, in pursuit, acts with precaution, who manœuvres instead of charging, will never inflict much harm upon an enemy; caution is out of place when you have a beaten army before you. This conduct, which by some may be termed reckless, may at times occasion losses to the pursuer, but unless it is practised, you can never expect to crush a retreating enemy. Then is the time for Cavly. and Mtd. Infy. As soon as it is perceived by a general during an action that his enemy shows signs of exhaustion, arrangements must at once be made to have everything ready for pursuit whenever he begins to retreat. The C. of the S. will detail the troops to take each road, and intimate to the generals to command the several columns, their order of march, &c. After a success, theory says it is for the Cavly. to reap the fruits of victory by a harassing pursuit. The first requisite is a daring, able, adroit and determined Cavly. leader, and he is indeed a rare man to be found. This intensely active pursuit is not always possible, but if you have any Cavly. at all, you can at least keep touch of the enemy. Napoleon paid dearly for losing touch of the Prussians after he had defeated them at Ligny. A retreating enemy will naturally do his best to conceal his line of retreat, by freely using his Cavly. Mounted infy., and H.A. If you are strong enough in those arms, you will naturally push him back; if you are not strong in Mtd. Infy. with which to press him hard, you must still watch him closely by means of

scouting parties under officers, who must endeavour to get round his flanks, and by obtaining a view from some high ground in his vicinity, ascertain to a certainty the roads he has retreated by. When, as in instances of pursuits, the services of Cavly. and Mtd. Infy. are urgently required, do not be deterred by a dread of using up your horses; you could not lose them in a better cause. Don't fritter away your Cavly during an action; keep it fresh for the pursuit when the day is yours. In future I am sure that machine guns, firing Infy. ammunition will play a most important *rôle* in all Cavly. operations, especially in pursuits. The enemy will, of course, endeavour to cover his retreat by all his freshest troops, with whom he may even, perhaps, make an offensive movement. Then is the moment for reserves to be launched out upon him to crush him; the whole of the army should go in straight at his Rr. Gd. by front and flanks: with his main body formed up in columns of route, and considerable portions of it already well in retreat, everything is in your favour, and no such opportunity can be expected to offer itself again. Whenever subsequently, during the pursuit, you come upon the enemy's Rr. Gd. formed up, you will be in column of route your-self, and by the time you have deployed and are ready to attack, he has again moved off; whereas at the end of an action you are deployed and formed in order of battle. No effort should be spared then to take advantage of one's position. In all our battles against Napoleon's troops, and lately against the Russians, we have shown ourselves incapable of reaping the benefit of victory. Wellington won many battles, but never delivered any very crushing blow to his opponent, *because he failed to pursue*. Waterloo is no exception, for the pursuit was effected by the Prussians.

Of course the C. of the S. will know all about the roads by which the enemy can retreat; he must select that by which to send the main body the great object to be obtained is to get rapidly along with your Calvy. and Mtd. Infy. and H. A. in the same direction as the enemy, with the least possible resistance, in order to fall upon the flank of his main body and retard it, so that your Infy., following him up behind, can fall upon it. The manner in which General Sheridan pursued the Southern army in its retreat with what was called Cavly. in America, but what was, in reality, only Mtd Infy., and forced it to surrender, should be carefully studied. Pursue with your main body upon the largest possible front, and whenever you know that the enemy has to pass through defiles, such as bridges or towns, spare no trouble to press him hard. Alas for the army that has no Cavly. or Mtd. Infy., or is very weak in them! Its pursuing power is small. Every available quadruped should be pressed into the service for the purpose of carrying Infy. in pursuit: everything should be made to give way to furthering it. A battle cannot be won every day, and the general who, having won one, fails to reap all due advantages from it because his has wounded to look after, or because his men are tired, should never

be employed again. The staff have a busy time in pursuits, for the great difficulty is to feed your army. Of course the enemy will burn and destroy all supplies that he leaves behind him, and every day takes the pursuers farther away from their base of supplies. In Europe, in future, there will be generally railroads running parallel with all lines of operations, so that a pursuing force can be fed by them. Marshal Saxe says of a general sent in pursuit of a beaten army, "Il faut poursuivre sans cesse, toutes les manœuvres sont bonnes alors ; il n'y a que les sages qui ne valent rien." A pursuing army must bivouac, no matter what the weather may be.

Retreats.—The retreat of one army before another will be considered under two heads :—

1st. As merely a change of position to the rear, effected by one or two armies facing each other, and in close proximity.

2nd. The retreat of a beaten army closely pursued.

The Articles on this subject, and on "PURSUITS," apply both to armies and small detachments.

1st. An army in presence of another, wishing to retreat, should, above all things, endeavour to conceal its intention from the enemy. To do so efficaciously, a general should begin by concealing it from his own troops. The egress of all country people from your lines should be stopped. The inventive genius of a general is displayed upon such occasions. An English general of the present day is in the most unfortunate position in this respect, being surrounded by newspaper correspondents, who, pandering to the public craze for "news," render concealment most difficult. However, the post and telegraph will always be in the general's hands, so he can lay an embargo on the mails whenever he wishes it, without its being known for a long time ; or he can, by spreading false news among the gentlemen of the press, use them as a medium by which to deceive an enemy. There have been many instances of an army getting clear away from the presence of another without its being discovered for a day or two. The general should take the smallest possible number of his staff and heads of departments into his confidence. The C. of the S. will make all the necessary arrangements, and have instructions for each G. O. C. who is to command a column written out, stating the number of columns in which the army is to retreat, the roads by which each is to march, the exact time at which they are to be at certain places, &c. Means must be taken to prevent all communication between the outposts and the main body, and for having it spread abroad among the latter that the enemy has retreated. The parks of stores and provisions in rear should commence moving about sundown : the baggage should be collected a couple of hours afterwards and commence its retrograde movement. Rumour should always say, "upon the best authority," that this is being done to allow greater freedom in pursuing the enemy, &c., or that they are only being

sent a mile to the rear, where they are to halt until the army moves off when they will follow it. Much will depend upon the state of the roads their number, the general topography of the country, the season of the year, and the age of the moon, as to the hour when the troops should begin their march. If possible, it is better that they should move about a couple of hours before daybreak: they will then have got sufficiently to the rear before it is light, so that the dust occasioned by their march may not be visible from the enemy's position. It will be for the G.O.C. the Rr. Gd. to play the game of brag as long as he can. He should always have everything ready for his march, so that if attacked in force he may retire fighting in good order. His weakly men should have been sent to the rear with the main body of the army. If unmolested, he will begin his retreat early, leaving only Cavly. and Mtd. Infy. outposts in front of the enemy. These outposts should not retire until forced to do so. Aided by a few guns, and by a force of Cavly. if the ground is open, these outposts can then retire slowly before the enemy.

Whenever a force of any description or strength is stationary for more than a day, its C. of the S. should put on paper the arrangements for a retreat, and write out in his memorandum book the orders to be given to each O.C. a column, so that if sent for in the middle of the night by the general, and told to arrange for a retreat in the morning, he should have little to do but assemble the G.O.Cs. or other C.Os., according to the composition of the force, and read over to them the orders for the movement, entering into verbal explanations of anything that they did not clearly understand. It is most necessary that as many divisional S.Os. and B.M. as possible should be present. The staff arrangements should indicate exactly the rendezvous for each column, naming for this purpose some well known natural feature, or such and such a mill, church, cross-roads, &c. The time and order for the withdrawal of the outposts to be clearly stated and explained to the F.O. for the day, or whatever officer is in charge of them. In retreats of this kind, everything depends upon the order and silence with which they are executed; and that such are attended to depends upon the manner in which the staff duties are carried out.

2nd. *The most difficult of all military operations is the retreat of a defeated army before a pursuing enemy.* The only hope of safety lies in the conduct of the offrs. and men who form the Rr. Gd. Their duties have been already considered. When, during an action, the G.O.C. imagines that things are going against him, he should at once direct his C. of the S. to make the preliminary arrangements for a retreat. This must be done most quietly, alleging any motive but the real one for the movement executed. The first thing is to get away the baggage, sick, wounded, and reserve supplies, &c. They should be despatched at once to the rear, by as many roads as possible, each column having its own orders. It is taken

granted that they have been started off a good hour at least before the actual moment arrives for a retreat of the army. Before then, it is to be hoped that the force destined to be the Rr. Gd. may be already in the nearest defensible position suitable for it that is to be found in rear, the R.A. belonging to it retaining only one line of waggons, sending the other to the rear. The peculiar circumstances of the engagement must determine the order in which the several Divns. will retire. The movement to be more or less in echelon. It may sometimes be necessary to cover the first movement to be made by a general or partial attack, or by a Cavly. charge. If the ground is so open that batteries can retire anywhere over it, all the available Artillery must open fire protected by all the Cavly. When obliged to fall back, every alternate battery should limber up, and trot, say about 1000 yds. to the rear and then come into action, those in rear limbering up in their turn and trotting the same distance to the rear of those who had previously retreated and formed up, and so on. As soon as the Rr. Gd. can get away from the gripe of the enemy's Infy., it is all tolerably safe, for its own Cavly. and R.A., assisted by Infy. as required, can make a good fight against the two former with Infy., as the enemy must break up his force into columns to follow with any speed. Strong lines of skirmishers should be formed in the rear, through which the columns will pass: these, aided by strong batteries, placed on all the commanding ground, will generally suffice to hold an enemy in check for some time. No opportunity should be lost whereby his advance can be checked. Villages through which he must pass should be set on fire, bridges destroyed, &c. A tree felled across a roadway may check an advance for 5 minutes, and 5 minutes under such circumstances may be worth millions of pounds to the nation concerned.

During a retreat, the troops must always bivouac. The arrangements for blowing up bridges should be made by the main body, for if left to the Rr. Gd. to do, there may not be time for it to do the work efficaciously. It does not follow that if the staff is good, the retreat of a beaten army will always be carried out successfully, but it is certain that it must quickly degenerate into a disorderly flight, unless the staff is of the first order.

Positions.—Having given in detail the principal sanitary considerations which should weigh with an officer in selecting positions for encampments or for the occupation of troops for purposes of defence, &c., the military considerations may now be dwelt upon. An offr. is either sent to examine certain positions, or else to find positions suitable for a force of a certain strength. One frequently comes upon positions which, to the uninitiated, appear of great strength from their inaccessibility, &c., which are at once condemned as useless by the experienced S.O., owing to the absence of wood and water (these being of first importance in all positions), or from some other serious defect in them. Every position should afford a depth of 500 or 600 yds. upon which all arms can manœuvre. Free communication

from right to left and from front to rear are essential; positions cut up transversely by deep gullies, rivers, or other obstacles, are objectionable. Good roads in rear, to retreat by in case of necessity, the more the better, are essential; without them no G. O. C. should take his troops into action. A front of fortification after Vauban, before he gave such prominence and development to the ravelin, is an exemplification of what a position should be. It should be a series of curtains flanked by strong projecting natural bastions. In the first case an officer has to consider the number and description of troops the position is calculated to hold to advantage; as a rough calculation it may be taken as 1000 men to every 150 yds. for small positions. This is calculated for 2 lines and for a force with an ordinary proportion of guns. It is, however greatly dependent upon circumstances, for the different parts of a position require to be held in different strength; for instance, steep places that cannot well be attacked, and open glacis-like ground, forming as it were the curtain to bastions situated on either flank by the fire from which it is well swept, require but few defenders, whereas ground easy of access, particularly when it forms if not the key, at least an important tactical point, requires to be occupied in force. For extensive positions, allowing for a reserve of about $\frac{1}{5}$th of the force, from 6000 to 8000 men will be required for every 1000 yds. of open ground, calculating for an army with about $\frac{1}{6}$th of its whole force as Cavly.* In the 2nd. case he has to find a position suited to the development of the force for which he is seeking it, attention being paid to the peculiarity of its composition so that it be favourable for the action of the arm which is in preponderance, each arm should be placed so as to afford mutual support. A position that is admirable for 20,000 might be an absurd one for half or double that number. One that is good for Infy. and R. A. alone, might be useless if there is also a proportion of Cavly. and so on. An army of 2 army corps and a reserve Cavly. brigd., would require a front of about 5000 to 8000 yds according to the natural strength of the ground, for the stronger it is, the more extended may be the front occupied.

To find the number of Infy. deployed in 2 lines that will fit into a given number of yards, multiply that number by 6; for paces multiply by 5. This makes no allowance for skirmishers in front, or for reserves. A deduction of 10 per cent. should be allowed for intervals; as, however, it is very seldom that Infy. will be in action without guns, it may be taken for granted that the Infy. removed from the lines to make room for the batteries will ample for skirmishers and a small reserve. The numbers already given, viz., 1000 yds. for every 6000 or 8000 of all arms, will generally be a safe calculation, allowing for a reserve, &c.

* *At Waterloo the English and French had both over* 12000 *men to the* 1000 *and at Gravelotte the proportion in the French army was* 10·5 *men per yd. Woerth the French were* 7·3 *men to the yd. occupied.*

Cavly. in one line requires 1 yd. to each file, with intervals of about 12 ds. between squadrons. R. A. in line requires 95 yds. to each field, or I.A. battery, with intervals of 19 yds. between each, or between them and ther troops. The frontage required by Infy. is 2 ft. per file, with intervals f 30 paces between battalions. Infantry can take up a position anywhere, nd its fire will always be effective ; posts scarped towards the front capable f holding 100 or even 50 men, and having a great command, may sometimes e of material advantage during an action, particularly if they are about oo yds. in advance of the general front ; as an advancing enemy not liking have such on his flank will try to take them, and will lose men accordingly. or the general line of Infy., however, it is advisable that the ground be uch as to enable it to assume the offensive at any moment, the slope ot being greater than 10° ; the position at the Alma occupied by the ussian Infy., in the vicinity of the battery stormed by the Lt.-Divn., was early perfect, as it resembled a glacis with a serious obstacle below it, hich destroyed all formation in crossing. If the Russians had been rong enough to have assumed the offensive, and charged down the hill pon our men when they were broken and mixed up together, the result ight have been serious. For R. A. the first requisite is that the ground be ard and firm, with a slope of not more than 4° ; it is advisable to post it so at the limbers and waggon should be near at hand and yet protected from e. For Cavly., firm open ground devoid of ditches or fences is the best. avly. cannot charge down hill effectively at a slope greater than 5°.

Positions are of two kinds :—

1st. Those where it is intended to accept a decisive battle, and

2nd. Those which it is only intended to hold for a short period, until your vn forces have had time to concentrate, or until you have forced the enemy concentrate all his forces to attack you ; or, for merely checking the emy, as would be the case with strong Rr. Gds. in retreats.

Waterloo and Talavera are specimens of the former, Quatre Bras and saco of the latter. Elevated ground in some part of the position is most eful for enabling you to perceive the enemy's movements to a considerable stance : positions where this power is afforded to the enemy are objection- le. It is of the utmost advantage that the ground should so dip, imme- ately in rear of the position, that the 2nd line and reserve can be kept out view and protected from fire ; this will also enable troops to be moved m one flank to the other without the enemy's knowledge, which is of the eatest consequence, if it is intended at any moment to assume the offensive : by it a large force might be massed upon one flank ready to pour down on the enemy, when by a series of false attacks made upon the other he d been induced to strengthen it to the disadvantage of the wing about to seriously engaged.

The protection of the flanks is a serious consideration ; one at least ought

to rest upon some impassable obstacle, such as a deep marsh or river, or chain of inaccessible mountains, &c. Villages built of mud, such as there are in India, which cannot be burnt, or even large farmhouses, may be made strong points upon a flank, if properly fortified and held.

It is seldom that one finds a position of more than a mile in extent in a straight line; there are sure to be salient points in it, that is portions of the ground jutting out towards the enemy like bastions. If these are strong by nature, or easily capable of being strengthened by art, they add immensely to the strength of a position, as they must be attacked and taken before the main line, forming the curtains as it were to such, can be approached. Villages and farmhouses somewhat in advance of the line answer the same purpose—La Haie-Sainte and Hougoumont at Waterloo, for instance.

In general, positions will either curve convexly or concavely towards the enemy, or be a mixture of both. For purposes of defence, if the flanks are strong and cannot easily be approached or turned, the concave is the strongest, as an attacking enemy must, in moving toward you, expose both his flanks to a pounding from the R. A. safely posted with your advance flanks. If, on the contrary, the spots whese your flanks rest present no feature of strength, and can be easily turned, it is better to have them somewhat retired, thus forming a convex front towards the enemy. This will secure to you the advantage of short lines of communication, so that if a wing requires support, the reinforcement has only a comparatively short distance to go from the reserve. An obstacle, not actually an impassable one running somewhat parallel to the general form of the position, and about 200 or 300 yds. in front of it, adds greatly to its strength. It breaks the enemy's formation in advancing, and consequently throws him more or less into disorder, affording you opportunities for assuming the offensive by charging him in front with the bayonet, or in flank with Cavly. It must be remembered that all such obstacles as high banks, hedges, and deep gullies running parallel to your front that afford cover to an assailant, are most dangerous; if they cannot be avoided, care should be taken that a raking fire of artillery is brought to bear upon them, or else they must be cut away so as to be seen into by Infantry fire. The river at Alma broke up our force dreadfully when crossing in line, but the high bank which screened us on the Russian side enabled the line to re-form whilst sheltered from fire. Obstacles that cut up one's own line are above all things to be avoided, but those that are perpendicular to the front, and cease at our first line within 100 yds. in front of it, strengthen the position by cutting up the assailants into distinct bodies, incapable of mutual support; a counter-attack under such circumstances has everything in its favour. Positions with wooded ground in front of them, under cover of which the enemy can form his columns of attack, should always be avoided. The same remark applies to high ground, the reverse slopes of which cannot be observed.

Beresford very nearly lost the battle of Albuera from having a hill to his ight front, behind which Soult massed his column of attack without being erceived. Positions should be as nearly as possible at right angles to the

GRADATIONS ADMITTING OF MANŒUVRES (M. LEHMON).

Up to 5° "Gentle."	10°	15°
Infantry. May move with order, and has down hill the most effectual fire and charge. *Cavalry.* May move with order, and charge effectively either up or down hill. *Artillery.* Has a more effectual fire down than up hill.	*Infantry.* Its close movements become more difficult. *Cavalry.* Can only canter down hill: the charge possible only up hill. *Artillery.* Moves with difficulty up hill, and requires the drag down hill; its effectual and constant fire difficult.	*Infantry.* Cannot move any considerable distance with order: their fire up hill not very effective. *Cavalry.* May still trot up and walk down hill. *Artillery.* Moves with great difficulty: its fire almost totally ceases.

GRADATIONS THAT MAY BE ASCENDED AND DESCENDED SINGLY.

Over 20° "Steep."	25°	Over 30° "Very steep."
Infantry. Cannot move in order, and can fire only singly with effect. *Cavalry and Artillery.* May still ascend at a walk, and descend without order, and that only obliquely.	*Light Infantry as before.* Light cavalry may ascend one by one obliquely, and descend in the same way, but with much difficulty.	*Light Infantry as before.* Light cavalry may ascend obliquely, but with great difficulty, and when the slope is of soft earth. Impassable for infantry in close formations, and on steeper slopes, i.e., up to 45°; single men can only climb with difficulty.

neral line of retreat, which should cover that line well. If there is but e road to retreat by, it should run from nearly the centre of the position,

A line of skirmishers and supports composed of the Divisional Battalions.
A front of 5,500 yds.
Small Posts of Cavalry watching the flanks and rear
1st Brigade of Cav.
1st Div
2nd Div
3rd Div
4th Div
5th Div.
6th Div.
2nd Brigd. of Cav.
3rd Brigd. Cav.
Baggage parked
Batty.
Regt Cav
300 yds.
1000 yds.
A Toole, R.E and SA Aearts

Positions are consequently to be looked for on Ls. of C. where they are crossed at right angles by small streams or low lines of hills. A very common locality for them is with the front along a stream, which runs into a large unfordable river or into the sea, upon which one of the flanks rest. Such were the positions at the battles of Prague and Alma. No position is worth much for an army unless it affords the power of assuming the offensive at all periods of a battle.

Occupation of a Selected Position.—We shall now suppose that a good position for an army of 2 Army Corps and a Reserve Brigade of Cavalry, of about 8000 yds. in extent, has been found by the S.O. sent out for the purpose, and that the C.-in-C. intends to accept battle there.

It may be advisable to march there at once and await the arrival of the enemy, or it may be intended to await a further development of his plans before doing so. In either case the most careful plans should be made of it and its approaches, and the exact place for every brigade decided on. Rough pen-and-ink sketches should be prepared for distribution to the G.Os.C. Divns. when about to occupy the ground.* In the event of occupying it some time previous to being attacked, it is advisable that the camp should be formed some 2 or 3 miles in front of where the battle is to be accepted ; somewhat nearer, if it is determined to strengthen it to any great extent by field-works, for which large working parties would be required. It may be presumed that the army taking up a defensive position is the weaker side. All the available Cavly. and Mtd. Infy. should be kept between the main body and the enemy some 5 or 6 miles, or perhaps a good day's march in advance. Its duties should be those of an Advd. Gd. ; to retard and annoy the enemy in every way, breaking up roads and bridges, and keeping the C.-in-C. constantly informed of all the enemy's movements, &c.

The disposition of troops shown in plan on previous page gives generally a rough idea of how an army corps in an open plain, without any natural supports whatever for any part of the line, should be formed up either for attack or defence. It is not likely that an army would ever halt to fight in exactly such a formation, as it is needless to add that the distribution of the three arms must entirely depend upon the nature of the ground, and its adaptibility for the movements of each.

Infy. should never be posted in rear of guns that are in action. In undulating ground a succession of ridges, like so many waves of the sea, are frequently to be met with. These are of incalculable advantage by giving you command for your R.A. fire, whilst behind them the Infy. not actually engaged at the moment can lie down under cover, and your reserves, Fd. Hospls., &c., may remain hidden: it is very essential in defensive

* The larger the scale upon which these plans and sketches are done the better; it should not be less than four inches to the mile.

positions that your guns placed in rear of your first line should be able to fire over it. The enemy will naturally begin his attack upon your position by a heavy artillery fire; your previous study of the ground should enable you to foresee where he will place his guns, so all your arrangements should be made with a view to overwhelming his artillery with musketry or artillery fire—with both if it is possible—whilst he is in the act of unlimbering. You know the range, and it will take him some time to ascertain it; hence your opportunity.

Your plans should be devised with a view to forcing the enemy to divide his forces, so that you, perchance, acting upon interior lines, should by means of skillful combinations meet him everywhere with at least equal strength, whilst upon decisive points your force shall be preponderating. To do so effectively, you must occupy some portions of your defensive position with a small force, using the pick and shovel to counteract your numerical weakness. Where the steepness or marshiness of the ground render it difficult of access, a line of skirmishers may be sufficient to hold it. No direct attack, no matter what may be its strength, should ever succeed in turning a line of Infy. out of a shelter trench in front of which there was no cover within about 300 yds. of it No scheme for the occupation of a defensive position can be good when provision is not made for counter-attacks at some points of the line: it requires true military genius to decide properly the when and the where. It often happens that even an ill-planned, ill-timed, offensive return by a flanking movement is of great service if conducted vigorously, for it seldom fails to embarrass an attacking enemy.

As a rule, you may generally expect the most serious attack will be made upon one or other of your flanks. The nature of your position, the approaches to it, the distribution of the enemy's army in the theatre of war, and a knowledge of the objective point that your adversary wishes to secure, will generally enable you to determine with tolerable accuracy upon which flank that attack will be made. Under all circumstances the flanks of the position should be protected from surprise by Cavly. detached according to the direction of the roads and configuration of the country. It should be well to the front, and cover the utmost extent of ground with its patrols, always careful to keep up communication with the main body, and prepared at any moment to advance upon the enemy's flank and harass it in the event of success, or to hang upon his flank and retard him in case of a general retreat being necessary. The greatest possible extent of ground to the right and left of the position must be carefully watched by your Cavly. to warn you of, if not to prevent, any endeavours on the enemy's part to overlap or turn your flank. The arrangements for the defence of positions have not undergone great radical changes in the way that those required for offensive tactics have done.

If one of your flanks rests upon no strong ground, and is therefore the one most likely to be selected by the enemy as his point of attack, one of the best methods for securing it is by posting a Brigd. or a Divn. in direct echelon, say about half a mile to its rear; thus posted, it can fall upon the flank of the enemy's troops attacking the exposed flank, who, assailed in front and flank, should be made to suffer very severely. Your Mtd. Infy. should be with this retired echelon. The bulk of your reserves in defensive positions generally, can be of most use to you on one or both flanks with a view to making a serious counter-blow when the enemy has fully developed his attack. If there are any impassable obstacles, or any that are very difficult to pass, such as a small stream, deeply-scarped ground, or a marsh, the guns of position should be placed behind them, and when acting purely on the defensive, they afford admirable positions for the artillery generally. They cannot be got at by the enemy, so they do not require any troops to be specially told off to take care of them, and the enemy's fire, if the least short, plunges harmlessly into such obstacles. The localities and circumstances can alone determine the position to be occupied by the *impedimenta*. The carts, waggons, &c., should be parked at some convenient place in rear, well out of fire, or left halted and closed up in column of route along the side of the road by which they had been advancing; the officers of the C. & T.C. together with the police and the provost establishments, must be responsible for their order, and above all things guard against individuals straggling away from the main body. Purely military stores should always be parked separately. It must be an understood thing that the baggage is never to be parked in such a position, that in the event of a retreat it is forced to begin its retrograde movement by marching through a village, crossing a bridge, passing along a narrow causeway, or other defile. Plenty of wide openings should be made from fields where baggage, &c., is parked, leading out clear to the main roads, by which an advance or retreat must be made. In distributing the troops along a chosen position, some parts of it will require to be held by much greater numbers than others. If the steepness or the marshiness of the ground at any point renders it difficult of access, a line of skirmishers may be sufficient to hold it.

The commander must determine which are the important parts—the keys, as they may well be called—of the position; such parts must be occupied in force with reserves near at hand. A commander should for the moment imagine himself in the enemy's place, and arrange in his own mind what he would do, if it were his luck to be the assailant instead of the defendant; reflections of this nature will cause him to realise his weak and his strong points, and enable him to make his arrangements accordingly. He should then set to work to strengthen himself artificially. A few hours' work bestowed on a village or on a substantial farmhouse may turn the scale in your favour. If time permits, parapets to screen the gunners, at least, from

musketry fire, should be thrown up: each army corps has its troop of R.E. carrying tools for such work. The strength of the garrisons required for all such villages or houses depends upon the amount of flanking fire that can be furnished for their assistance by the main line, and upon the facility of supporting them when hardly pressed. When such posts are in front, it is essential that supports should easily reach them, the more under cover, and out of view of the enemy, the better. Posts of this nature add immensely to the strength of a position, but as the enemy must take them at all hazards, one must be prepared for the toughest struggle for their possession. If taken and held by the enemy, they give him a point of strength from whence he can launch out suddenly on the main position, or they will at least afford him a cover from which to annoy you; so they must always be held to the last, and garrisoned by the best and steadiest men. If several small villages or farmhouses come into the line of the position, it is always better to retire the line of infantry, so as to run from the rear of one village to the rear of another—in other words, to be the curtains to the bastions formed by the villages. The same remark applies to any redoubts or other field-works it may be considered advisable to erect at important points along the front line. If time permits, all villages immediately in rear of the position that are within easy artillery range of an attacking enemy should be destroyed, and larger openings made through them for the free passage of troops. Unless this is done, the enemy's shells are certain to set them on fire, which must inevitably occasion much confusion, and interrupt the free communication of troops and ammunition.

In the defence of villages forming part of a position, the great development of modern shell fire has altered the conditions under which their defence—especially in its earlier stages—can be effected. To place a strong garrison within a village that can be well battered by the enemy's guns, would be to deliver the men over to demoralisation if not to destruction. The bulk of the men intended for the defence of such villages must be kept under cover outside them until the enemy's artillery fire becomes more or less masked by his own infantry advancing to attack it. The real strength of all such villages lies in the flanking fire of your own batteries and upon the facility of supporting them when hardly pressed. Here and there in some villages possessing deep hollow roads or streets, groups of men may from the first be advantageously posted within them, but to attempt any general occupation of the houses and garden walls in the manner formerly done, is now seldom advisable. The force allotted for the defence of a village forming part of a position in which battle is to be accepted, or to be occupied by an attacking army for the purpose of covering an exposed flank whilst the attack was being delivered, may be conveniently told off into 3 equal parts: the 1st, to construct and to occupy (as long as they can be held) a line of shelter trenches

round the front and flanks of the village, and distant if possible from its houses and garden walls about 40 or 50 yds. : all existing hedges and ditches to be utilised as far as possible for this purpose. This section of the defenders must throughout the attack do their best to keep down the fire of the enemy's artillery by volleys, the distances to all points within 3000 yds. where guns could be well posted having been previously ascertained and notified to all officers taking part in the defence. As soon as the enemy's Infy. deploys to attack, the heaviest possible fire must be kept up upon it. All Os. C. companies in these shelter trenches must make arrangements for the retreat of their men when necessary within the village by openings fixed upon, and if necessary, constructed beforehand, avoiding as much as possible the main entrances to the village and the principal streets. Between the shelter trenches and the outskirts of the village, places should be found or constructed where small supports for the front shooting line can be safely posted. These supports should not be in the village itself, and the proportion between them and the men in the front shelter trenches must depend greatly upon the extent to which good cover can be provided. 1000 men can occupy about 400 or 500 running yds. of shelter trench, and also furnish the necessary supports.

The 2nd portion is to be the garrison of the village, and to strengthen it as far as time permits. As soon as the enemy concentrates any powerful batteries upon it, this garrison must remove to the points previously selected, where it will be best sheltered from this artillery fire : in many villages it will be necessary for it to withdraw behind the village to obtain the necessary shelter. The moment the enemy's Infy. approaches near the village, and his artillery fire slackens or ceases in consequence, this garrison should occupy the place in the manner previously determined upon, each captain of a company leading his men by the route he had fixed upon, and had previously explained to his officers and all ranks under him.

The 3rd portion will form the Reserve to be drawn up under natural or artificial cover in rear of the village. In the event of the enemy assaulting the shelter trenches on the flanks, this reserve may have a good opportunity for an offensive return, taking the enemy in flank ; but generally this reserve will be kept to assist the garrison when the enemy, having stormed the shelter trenches, has forced an entrance into the village itself. A counter-stroke delivered by this reserve without the village just as the enemy had entered its outskirts, if made vigorously, will have a very telling effect. It is seldom desirable to place guns in villages except they are very large, with wide streets, and have large open spaces within them : guns can be used to much better advantage outside them. Indeed, it is essential that their flanks, and if possible their front, should be swept by powerful batteries from other parts of the main position, whose fire should be directed upon the enemy's guns until his Infy. attack is well developed, when it should be

turned exclusively on the attacking troops. Machine guns are especially adapted for street fighting or for the internal defence of fortified villages. The result of many a battle has turned upon the struggle for possession of a village, and such will be the case again in all wars. If the defence is ably and bravely conducted, the assailant's loss should be very great, no matter what may be the result; but if the village, by its general plan, position, surroundings, and the nature of its buildings, is one that lends itself naturally to a prolonged defence, the defenders have so many advantages on their side, that they should blush for shame if they do not remain masters of it. When driven from your shelter trenches and the first line of defence round the immediate outskirts, your interior line of defence, if properly prepared and occupied, ought to give you an immense superiority over your enemy, who can no longer make use of his guns. Your walls and houses will have been carefully loopholed, and flanking defence provided for, so that he cannot show himself in the streets or lanes, and must resort to the methods described under the head of street-fighting, and work as best he can with heavy loss from house to house. As long as the soldierlike spirit of your men can be maintained, the advantage will be all on your side; but the success of his attack upon your outer line, the remembrance of the awfulness of the converging fire he brought to bear upon the village in the first instance, and the dread of being cut off and made prisoners, too often exercises a heavy influence upon the spirit of the defenders, and causes them to relinquish the struggle just at the moment when all the positive advantages of the position had become theirs.

The formation of each Infy. Divn. into 2 lines with its own independent reserve has many advantages. It renders the command of each general of Divn. more compact, as it is easier to exercise control over troops deployed in 2 lines and occupying a front of about 1100 yds. with a depth of some 200 or 300, than if deployed in one line, and occupying twice that front. Brigades in the same Divn. become more attached to one another as they mutually support each other in turn. This system, however, has the disadvantage of granting to subordinate generals the power of using the 2nd line and the reserve at their own discretion, which some are prone to do too early in a battle. We all know of the repeated messages Wellington received during Waterloo from different general officers praying for support; his answer was always the same, "You must do your best and hold the ground," although at that moment he had reserves at hand that he might have used. This use of reserves, or even of the 2nd line at too early a period of the day, is the most dangerous of all faults: and Divnl. Genrls. ought to feel that their 2nd line is their reserve, and the only one they can look to for support. In deciding when and how to use your reserves, remember that the worst use you can put them to is to fritter them away piecemeal. Whenever it is necessary to use it, the circumstance ought to be immediately reported to

the C.-in-C. Brigades ought not, except under most peculiar circumstances, to be divided part in the 1st and part in the 2nd line.

The senior S.O. with each army corps will point out to the P.M.O. the positions for the Fd. Hospls. All good buildings in rear, that are well out of fire, should be made available for wounded men.

In conclusion, it can also be added, that all arrangements made should have constantly in view the object to be obtained by fighting, and that under scarcely any circumstances is a position worthy of the name that does not afford facilities for assuming the offensive at any moment, nor are the arrangements creditable unless everything is prepared for doing so. As these arrangements must, in every instance, be made by the staff, great is their responsibility. Every arrangement should be well thought-out by the C. of the S. previous to the action, for the two results, i.e., victory or defeat. He should have all the details in his head, so that, at any moment, he could give, almost without any reflection, orders in either case: this is all the more necessary for retreat, as then everything depends upon regularity and precision; if there is confusion there must be loss, if not disaster.

Disposition of Troops for the Attack of Positions.—The use of arms of precision has rendered necessary a modification of the tactics which were so successful for purposes of attack at the beginning of this century, it is therefore urgently recommended to all officers to examine carefully the tactical system adopted by the Prussians in their late offensive battles.

Let us suppose an army marching to attack an enemy who is known to have taken up a strong position.

The army, as usual, is to be preceded by Advd. Gds. on all the roads made use of. (See Article on "MARCHES.") They should be very strong in artillery, to open fire as soon as the enemy's position is approached within range. The operation should be considered under two phases:—

1st. The army has halted within sufficiently easy distance of the enemy to make a march of from 5 to 10 miles with the intention of attacking as soon as it arrives, as the allies did at the Alma.

2nd. It has halted at too great a distance for that purpose, so it marches up to him, and bivouacs for the night, to attack next morning, as Napoleon did at Waterloo.

It occurs sometimes that two armies are marching one after the other with an interval of from 6 to 10 miles, the Advd. Gd. of one being in constant contact with the Rr. Gd of the other, and that the army in rear is most anxious to bring the other into action; they may have marched in this manner with partial skirmishes for several days, when unexpectedly, in the middle of some march, the retreating force is found halted, and drawn up to receive battle.* Under such circumstances, with an enemy who had not previously been beaten, when the contending forces

* *The battles of Busaco and Salamanca are good examples.*

exceeded 20,000 each, it is useless commencing a battle late in the day, for one cannot expect to win a decisive battle and be able to follow it up before night sets in. It is usual, therefore, to spend the evening in making all preliminary arrangements for the next day's fight. Under these circumstances, the arrangements are those described as No. 2; but should the enemy be demoralised from previous defeats, or other causes, he ought, as a rule, to be attacked whenever he turns to show fight; under such circumstances the arrangements are those described in No. 1.

In the first instance it is taken for granted that the staff have learnt from spies, maps, reconnaissances, &c., a great deal of the enemy's position, whether and how he is entrenched, how his flanks are posted, &c. The point in the enemy's position the capture of which promises to afford the most decisive results should be selected for attack. The art of war is to get your troops there with the least possible exertion to them by the shortest route, and in the formation that is best calculated to develop most highly the power of each arm employed. The general direction of the march before the actual encounter is a strategical question, but the selection of the point for attack in an enemy's position may in some instances be decided upon exclusively tactical considerations. Every S.O. should at all times know with tolerable accuracy the time his Brigd., Divn. or army corps, will take to deploy into fighting formation on the centre or to a flank. The configuration of the ground, the nature and direction of the roads and paths, so influence this calculation, that for each special operation a new one should be made, based upon the actual effective strength of the Divns., &c. The nature of the country and its communications must determine the mode of advance; but it should resemble as closely as possible the order in which it is intended to fight, covered by a screen of Cavly. and Mtd. Infy., or by a line of moving outposts as an Advd. Gd. There should be no hesitation on their part, for they must sweep away everything between them and the enemy's position. During the march as many S.Os. as possible should be in advance. It is advisable to make a few prisoners, who should be at once questioned. The more roads used the better, as less time will be taken in deploying. If the country is uninclosed, like the Crimea or India generally, the advance might be in columns at deploying distance. The nearer you approach the enemy the more essential closing up towards the front becomes. The Inf. and guns should march on roads as much as possible, the Cavly. marching through the fields.

In some instances, where it is known that there are bridges to cross, or other obstacles that may require work to be done, it may be necessary to send on all the R.E. with the Advd. Gd. As all offensive battles must be begun by a heavy artillery fire, the great bulk of your guns should be near the head of your columns.

As soon as the enemy has been discovered in position, the Advd. Gds. of the several columns in which the army is advancing to attack should deploy into fighting order, all the available guns opening fire, the batteries from the heads of the columns joining those already in action with as little delay as possible. Under cover of this fire from $\frac{1}{2}$ or $\frac{2}{3}$ of all your guns, the Infy. deploys, and the C.-in-C. makes his reconnaissance of the enemy's position. As many S.Os. as can be spared, scattered along the front and getting as near the enemy as they can with safety, availing themselves of all commanding ground in his vicinity, can materially assist their chief in ascertaining how the enemy's position is occupied, &c. &c. All information so obtained should be communicated to the C.-in-C. without delay. The enemy's weak points must be sought for, and a clear decision arrived at as to the localities, the possession of which would so endanger his retreat, that he would have to fight at a disadvantage to recapture them, or to fall back to save his communications, or the occupation of which would so cut his line into two or more distinct portions, that one of them might be effectually crushed before he could reinforce it in time to save it. Upon his decision will depend the formation that each Divn. will have to assume, according as each arrives in presence of the enemy. It is essential that all deployments should take place well beyond effective range of the enemy's guns.

The 1st line of infantry, composed of a Brigd. from each Divn. (as shown n sketch on p. 360), formed into 3 lines (as described at p. 384), will engage he enemy along his entire front: the 2nd and 3rd lines, composed of the ther Brigds. and of the Divnl. Battns., will be in quarter columns at eploying distance, or in such other formation as is best calculated, accord- ng to the nature of the ground, to screen it from the enemy's fire. The st line will thus have 3 Battns., the 2nd 2, and the 3rd, or Reserve as it ay be called, will have 2 Battns. also. The distances between these lines ay be considerable—say 1000 yards—at first, but they should be decreased s the action proceeds. In future, owing to the long range of all arms, ttacks upon the centre must be very exceptional: the flanks will be the oints to aim at. The flank to be attacked having been selected, a gradual xtension of front in that direction should be initiated, false attacks being ade upon the other flank. In all flank attacks and wide-turning ovements, especially those made to distract the enemy's attention from e real point aimed at, the assistance of Cavly. and Mtd. Infy. is most luable.

It is very necessary to give to Os.C. Battns., Brigds., Divns., &c., a eneral line of direction for their movements in attacking an enemy in osition; if the nature of the country does not enable you to indicate a ad, a valley, river, &c., for this purpose, a compass direction should be ven. In a close country it is very desirable to do this also for all sup-

porting columns, as they are likely to lose sight of the troops to whom they are the supports.

As artillery cannot, henceforth, owing to the deadliness of musketry fire, be in line with attacking Infy., it is very desirable that the configuration of the ground opposite the selected point of attack should enable you to maintain an artillery fire upon the objective points up to the last moment before making the final and decisive charge with your Infy., and that a similar advantage should be denied to the enemy. Whenever you can secure this double advantage, you have many chances in your favour that, *cæteris paribus*, ought of themselves to secure your success. As stated in many other places in this book, all attacks must in future be made by the skirmishing line, which should be constantly reinforced, each reinforcement pushing the line on nearer and nearer the enemy, until at last you have established within striking distance of him a force having all the strength of a regularly-deployed line, without any of its stiffness or slowness of move-ment. Such a skirmishing line, formed here and there by a few files only, at other points, where a dip in the ground affords shelter, by several companies, taking advantage of every little inequality of surface in front to push on nearer and nearer to the enemy's position, will soon find some chink in his armour, some weak point from which he will recede, and thus enable you, by working in there, to take the stronger parts in flank. This operation should be assisted by every available gun that can be brought to bear upon the enemy's Inyf. & Cavly. The configuration of the ground can alone decide the extent to which guns can assist in such attacks, for unless there is rising ground somewhere, either immediately in rear of the attacking infantry, or on either flank, from which the batteries can keep up a well-sustained fire upon the particular point to be gained possession of, without interfering with the movements of the infantry, artillery cannot now-a-days directly assist in such an operation. It may by a well-sustained fire upon the enemy's forces in other parts of his position—the nearer the point to be attacked of course the better—prevent reinforcements being sent from distant parts of his line to the threatened quarter, but it can do no more. As described farther on, in the article upon the "EMPLOYMENT OF ARTILLERY IN ACTION," batteries cannot now be safely taken nearer than 900 yds. to the enemy's musketry fire: they cannot, as formerly, accompany attacking columns during their advance, for the purpose of opening fire within canister range of his lines. There is much nonsense talked at present about the increased necessity for artillery; and some officers, who are intelligent upon most points, would have us double the number of guns in our divisions, forgetting how difficult it is to obtain positions for numerous batteries when acting offensively, from which advantage can be reaped from them. Artillery may assist to win, but cannot of itself win a battle; a battle can only be gained by Infy. seizing upon the enemy's position, the fruit

of victory being secured by an active Cavly. and Mtd. Infy., and H.A. pursuit. Troops acting on the defensive would be generally so posted as to suffer little loss from artillery fire, which, except when directed upon columns or closely formed up troops, has a much greater effect upon them by its terrifying influences than by the actual injury which it inflicts.

Constant pressure upon the rear of the skirmishing line must be maintained by pushing on companies after companies, till at last its very strength impels it forward—the exact moment for doing so to be decided by a senior officer actually on the spot: one in the rear cannot tell when the proper moment for such a charge has arrived: one must be in actual contact with the enemy, and in the midst of the men about to charge, enabling you to feel the pulse of both sides, as it were, in order to know and appreciate clearly when the moment has arrived for rushing upon the enemy. At the distance of about 200 yards in rear of it there should be a line of supports of such strength that they should, when deployed, form or nearly form a regular line. In order to be very strong for this attack, it will be necessary to weaken your line elsewhere. This requires care, and can best be accomplished safely by false attacks, or demonstrations made by attacking from such weak points, as to prevent your enemy, if possible, from following suit: indeed, your success may entirely depend upon being able to deceive him; so when you have decided upon the point of attack, you must use all your cunning, not only in order to conceal your intentions from the enemy, but by well-devised artifices lead him to expect their opposite. Your attack being successful upon the selected point, your whole line should press forward, unless you can hope, by pouring in troops through the gap made in the enemy's position, to take his troops elsewhere in flank and rear, and so make large captures of prisoners: in that case it would be better to hold him to his ground by a well-sustained skirmishing conflict in his front, whilst your successful troops operated upon his flank.

Such, in the author's opinion, is a brief outline of what attacks must be in future, and if he is correct, our system of skirmishing and our offensive tactics require some modification.

If, however, during the march you come upon the enemy in position, as the French did upon the English at Busaco, or that in advancing to attack, you meet the enemy marching to attack you, as the French did the Austrians at Solferino, more time will be required to deploy and make all arrangements for attacking. The first thing to be done is for the Advd. Gd. to take up some defensive position, as it is assumed to be some 4 or 5 miles in front of the main body: positions sufficiently strong for this purpose are to be found everywhere, for before it can be seriously compromised, support will have reached it. The G.O.C. should at once hasten to the front to take his reconnaissance of the enemy, Having done so, he must send out orders to the several Divns., informing them where they are to deploy, &c.

It is evident that all such dispositions must entirely depend on whether it is intended to await the enemy's attack, or attack first yourself, and in this latter case, upon the point of the enemy's line that it has been resolved to attack. On the ability with which this has been selected depends whether the results will be great or insignificant in the event of success, When it has been decided to await the enemy's attack, it will remain to be considered whether it is better to reinforce the position taken up by the Advd. Gd. with the main body, or to withdraw the former to a position taken up by the latter.

During every phase of an action, offrs. should do their utmost to collect the men of their companies, regts., brigades, &c. It is easy to lose sight of your men, and they scatter whilst fighting so very quickly if not closely looked after by their offrs., that the more frequently and assiduously they are swept together as companies, &c., the more effective will be the force under the general's hand. Fresh troops are very much required at the end of an action to enable the success to be followed up. Without a keenly followed-up pursuit you may be successful, but you will never be victorious. Men who have been fighting for hours, and fighting very likely on badly filled stomachs, are too tired to pursue, and are very probably out of hand from Battns. being mixed one with another. However, if you have no fresh troops at hand you must pursue with those you have: don't spare your men at such a critical moment. Many a well-planned and successfully carried-out action has led to no result, because the G.O.C. thought his men too tired to pursue. One of a general's difficulties lies in deciding upon the number of men he will preserve intact during an action for pursuit when it is over: he may cripple himself so by doing this whilst the action is in progress that he may fail in taking the enemy's position, which, after all, is the primary object of all his movements.

The attack of villages included in an enemy's position.—Every effort should be made to turn the enemy out of such villages without having to make a direct attack upon them. A concentrated fire of very large batteries upon them whilst their flanks and rear are threatened by turning movements, may sometimes be effective, especially when the village is on the extreme flank of the enemy's position. Wide-turning movements, however, occupy a great length of time during an action, and it is very difficult to ensure the attack being made at the necessary moment, or to calculate with any certainty upon the exact time when it will be delivered. It will therefore be for the G. O. C. to decide between the chances and risks always inseparable from such turning movements, and the very heavy losses which he knows he will have to encounter in a direct attack upon a large and well-defended village.

The first necessity for the success of such an attack is an overwhelming and a converging artillery fire, that will literally destroy the place, set it

fire and prevent any garrison remaining in it, and that will search out with its shells every corner in and around it where troops can find ordinary cover. The shelter trenches should be rained upon with shrapnel, and the enemy's batteries capable of affording it any assistance overpowered completely by the superiority of your fire. This means that you should be greatly superior in guns, and this I may say is, in these affairs, the first necessity of success. Unless you can secure this superiority, all other things being equal, it will be better to avoid attacking the village. If the ground lends itself to the possibility of employing a body of Infy. to pour a long-range rifle-fire upon the village and its shelter trenches without interfering with the advance of your attacking infantry, this effective means of demoralising the defenders, of preventing their movements and of silencing their guns, should not be neglected. All cover between your batteries and the village should be occupied by your Infy. as soon as possible, and a heavy fire kept up from it, whilst groups are pushed forward as near as possible to the enemy's shelter trenches or other defences, and as much as possible round their flanks with a view to enfilade them. It is advisable that these parties should have entrenching tools, so as to increase the cover they find, and to make it capable of holding larger numbers. Every arrangement must be made for an excessive expenditure of ammunition, the reserve of which must be pushed forward as much as can be done with safety, and every soldier before engaging in the fight should have 100 or, if possible, 150 rds. of ammunition on his person. The nearer your encircling line of skirmishers can be pushed forward, and the greater the cover they can obtain or construct, the easier will be your final assault: this should be made by fresh troops in attack formation, pushed forward simultaneously and concentrically from all the neighbouring points of your own position as soon as the enemy's artillery fire is sufficiently silenced. The Germans divide the force assigned for the attack on a village into $\frac{1}{6}$th for the first stage, i.e., for the distant attack, $\frac{2}{6}$ths for the close attack, $\frac{2}{6}$ths for the final assault, and the remaining $\frac{1}{6}$th as a reserve. The reserve should join the troops forming the distant attack as soon as those allotted for the close attack have passed them, as it is very seldom that the nature of the ground will allow a musketry fire to be maintained over the heads of attacking troops.

When the final assault is made, the whole force engaged must push quickly on, all joining in the cheers of the assaulting troops. Every endeavour should be made under the influence and the excitement of this converging assault to drive the enemy completely from the village, the farthest side of which, from which the enemy has retreated, being at once strongly occupied, and all cover on its flanks being at once taken possession of, from which the flanks of the enemy should be vigorously assailed in the event of his endeavouring to retake the place. It is of the utmost consequence that there be no hesitation on your part during the first moments of your success,

lest the enemy should be allowed time to recover from the moral effect your charge has created: you must push him out of the village at once, if you can, for if he continues to occupy the internal defences he may have prepared, your further proceedings will be necessarily slow and costly in life. You can no longer make much use of your guns; but if you have only succeeded in obtaining possession of part of the place, you should try to so post some batteries outside it as to crush those parts of the village in which he still holds out, and do your best to threaten his retreat by pushing Infy. round one or both flanks, to occupy any cover there may be in the rear. If you succeed in driving him from the village by your final charge upon it, any Cavly. you may have at hand should then come into action upon the retreating enemy; then is the Cavly. officer's opportunity, and a few squadrons under a dashing leader may spread such disorder amongst the retreating enemy as to remove all chance of a counter-attack upon the village.

Employment of Cavalry in Action.—As has been laid down in the Article on "POSITIONS," the first essential is, that Cavly. should be placed on ground where it can act freely.

The trot is the true manœuvring pace for Cavly.; if changes of position, and the advance preliminary to charging are made at the gallop, the horses are blown, before that moment, when brought into actual contact with the enemy, they should be able to exert their greatest speed. The ground should be hard, level, and free from hedges, ditches, ravines, woods, or fences; nothing is more trying than vineyards, over which no Cavly. can gallop. The debated questions of arming and equipping Cavly., and of its general organisation, are foreign to this subject. It will be an unfortunate day for the English general who is called upon to fight an enemy who has a proportion of good Cavly., whilst he himself has none, being deprived of them in pursuance of some cleverly stated theory. Without Cavly., it is really impossible to obtain information of the enemy's doings, or to keep up your communications efficiently. Cavly. can be, however, of but little use, unless the officers and N.-C.O's. are well educated in reconnaissance duty.

The Cavly. should be composed of young men; an old man, as a rule, is out of place in its ranks, either as an offr. or as a private. It wants the dash and fire of youth; age brings caution, and with it hesitation. Time is the great element in all battles; but with Cavly., minutes are nearly as important as hours are to Infy.

The use of Cavly. may be briefly stated as:—

1st. To charge upon first coming into the enemy's presence, for the purpose of gaining time, whilst the Infy. deploy and a sufficient force is got into position to keep the enemy in check.

2nd. For charging Cavly. or Infy., if possible in flank, that had been repulsed in their attack upon Infy., so as to complete their rout, and take prisoners.

3rd. To cover the retreat of Infy. repulsed in its attack upon the enemy's position, and either by charging, or assuming a threatening aspect, to prevent it from being followed, as was done by the Russian Cavly. at the battle of Tchernaya, and by the Austrians after Sadowa.

4th. To check a serious attack from Infy. upon the position, by forcing it to form square, either by charging, or by threatening to do so.

5th. Charging batteries that cannot otherwise be silenced. This should only be resorted to when they can be taken somewhat in flank, or when they are but weakly supported.

6th. Grand charges in force upon Infy. Unless the Infy. has been well shaken by a heavy artillery fire, or is of an inferior quality, or is taken at a disadvantage, such as in the act of deploying, or some other manœuvre, these grand charges are but waste of men and horses, if made against Infy. armed as at present. Circumstances may, however, render it necessary to make this sacrifice for the purpose of gaining time.

7th. To disperse and cut up lines of skirmishers that had ventured too far into open ground; two or three squadrons are enough for this purpose.

8th. Supporting the flanks of columns pushed forward to attack, and so protecting them from charges of cavalry.

9th. Taking up the position vacated by such columns of attack, or filling any gaps that may occur in the line during an action, or at first whilst the troops are getting into position.

10th. Being victorious, to pursue an enemy to the bitter end, allowing him no time to rally, or even to breathe after his defeat. See Article on "PURSUITS."

The use made by the Germans of their Cavly. at Mars-la-Tour in 1870 should be studied carefully. By the charge and self-sacrifice of about 800 men on that occasion the whole French army was paralyzed.

The duties enumerated under these 10 heads comprise what may be termed the fighting uses of cavalry; and although very recent examples of each can be cited, some will serve more as warnings of what to avoid than as models to be copied. The days are past when battles were to be won by charges of imposing masses of horsemen, but the necessity for having with every army a large mounted force is as great now as formerly. The front of a manœuvring army should be covered by a screen of Cavly. detachments, from which patrols and scouting parties should spread out like a fan. (See Article on "SCOUTING," page 315.)

11th. Furnishing detachments, patrols, and scouting parties to the flanks, front and rear, to guard against surprise, to obtain information of the enemy's doings, and to screen your own from his observation. In future I believe that machine guns will be largely used with cavalry and mounted Infy.

During engagements Cavly. should be withdrawn from view and fire as

much as possible. Infy. can always find more or less shelter from fire by lying down, and the smallest slope in its favour screens it; but with Cavly. it is otherwise. It should be in rear of the Infy., and as little exposed as possible. Its speed enables it to be so placed, and yet be always available, for it can reach the front line before an enemy marching from his position to attack it can do so. All reasoning soldiers know that a man on foot is better than a man on horseback, both being armed alike; indeed, it is rather a matter of doubt in the writer's mind if a man on foot with a long stout stick could not baffle the best of dragoons on horseback, armed only with a sword. But there is always an "if" in such questions; a large proportion of men on foot get flurried when they see a horseman charging down upon them with a bright sabre flashing in the sun, and the moral effect of a large number of such men charging in a formed body is much greater in proportion: the very noise of the horses galloping has a terrifying effect that frequently goes home to the heart of Infy., particularly if it has been at all shaken previously by artillery fire. The writer has witnessed more than once the dread entertained by good Infy. for Cavly. when in action. This must be familiar to all offrs. who have commanded skirmishers or their supports when advancing under fire. Let there be the slightest suspicion of Cavly. charging, let but a few horsemen show themselves in the vicinity, and I have always found it have a most unsteadying effect upon the men. Doubtless a good deal of this arises from our system of drill, by which our men are constantly practised in forming square to resist Cavly. The writer saw 3 Battns. armed with rifles form square, by order of the Brigadr., to resist a horde of Tartar horsemen, who were cantering up towards them, although it was known that their principal weapons were bows and arrows. It is a favourite argument with those who, basing their opinion on theoretical notions, think that Cavly. is a species of anachronism to point to the smallness of the numbers actually killed by that arm in action. If the same calculation were made regarding artillery, it would be found that the actual loss it inflicts upon the enemy is in no proportion to the high value put upon it. Its moral effect is powerful; it frightens more than it kills. Infy. when repulsed must ever be more or less susceptible to the influence of a well-timed charge of Cavly. upon its flanks or rear. The charge of 10 horsemen on the flank, is more effective than that of 50 on the front.

In all Cavly. encounters with Cavly., the side that is able to bring up fresh reserve when his opponent has exhausted all his, will, as a rule, win the day. No body of Cavly., small or great, should ever charge without a reserve; even in the event of a single squadron having to charge, ½ a troop kept in reserve, to charge when the confusion, which is inseparable from charges, was at its height, will turn the scale in your favour if the enemy has neglected to take a similar precaution. It has also become an axiom

the same squadrons can seldom be got together for more than one grand charge in a day ; theoretically this sounds strange, but experience has proved its truth. For this reason a large proportion of the Cavly. should be held in reserve up to the last possible moment ; and, if practicable, kept fresh for the pursuit, to follow up the broken enemy, or else for the final stroke, when it is desired to overwhelm the enemy, who is already supposed to be somewhat unsteady. The moral effect of Cavly. increases in geometrical ratio to its numbers. It should never be frittered away during an action to fulfil objects that could have been attained equally well by the employment of Infy. In the newly-approved organisation for our army, the Cavly. is divided amongst the Divns. and Army Corps ; a Regt. to each of the former, and a Brigd. to each of the latter. The G.Os.C. Divns. and Army Corps will therefore always have at their disposal enough Cavly. to let slip upon an enemy becoming disagreeably adventurous, or whose tactical errors had rendered him open to attack. The opportunities for the employment of Cavly. in small bodies are frequent in even the best regulated battles, but they are very fleeting : it is therefore essential that the O.C. the Divnl. Cavly., &c., should always accompany the G.O.C. the Divn., so that when an opening for the advantageous use of his arm occurs, he may receive his orders at once, and by galloping back, or sending an orderly offr. back at that pace, bring up his men in the nick of time, and catch the enemy *in flagrante delicto*, before he has time to rectify his mistake. The superior speed of Cavly. enables a G.O.C. to cull in this manner fruits from an action which would be beyond his reach if he had but Infy. only under his command.

The O.C. the Cavly. ought to be of a quick, zealous temperament, always eager for a chance to employ the arm under his orders : he ought to be the Prince Rupert of the army ; he should be young, active, a daring rider himself, and always foremost in a charge ; he should pride himself upon his position, and try to make the humblest trooper feel likewise ; he should above all C.Os., 'covet honour' like a true sinner ; he should be a man prompt of decision, and prepared at all times to act upon his own responsibility.

Cavly. should be distributed on the flanks, or at parts of the line where it can act rapidly. The Cavly. in reserve to be in rear or at places where it could be most efficaciously used, remembering that it takes from 300 to 400 yds. from its starting-point to that of collision to acquire the swing required for a telling charge. Cavly. can only fight in line ; to charge in column is to expose a deep formation to fire, whilst its value is only in proportion to its actual front. The sooner we arrive at the formation of rank entire the better.

In charging Infy., the distance between the 1st and 2nd lines should be about 200 yds., and the same between the 2nd and 3rd. In charging

Cavly., these distances should be about 450 yds. In all cavalry charges it is of the first consequence that the horses at the moment of impact should be in good wind and fresh enough to pursue. Von Schmidt laid down the following distances for charging Cavly.:

Against Cavalry						Against Infantry.					
Trot	1000 paces	=	3	mins.	20 secs.	Trot	800 paces	=	2	mins.	40 secs.
Gallop	600 ,,	=	1	,,	12 ,,	Gallop	800 ,,	=	1	,,	36 ,,
Charge	150 ,,	=	0	,,	9 ,,	Charge	150 ,,	=	0	,,	9 ,,
	1750		4		41		1750		4		25

The preliminary movements of all arms, before the actual collision with an enemy, should be made well out of fire; this applies more forcibly to Cavly. than to the other arms, for having no fire, and its only action being the charge, if charged whilst performing any change of formation, it will certainly be dispersed. A daring leader will under such circumstances charge at the head of any body that may be at hand, no matter how small, and by so doing, help and give time to the main body to form and charge also. Like Infy., the weak part of Cavly. is the flank. For the employment of Cavly. after an action, see Article on "PURSUITS."

The employment of Cavly. to obtain information, to guard the flanks and rear from surprise during an action, to make raids upon railways, &c., is treated of in the Articles on Scouting, Outposts, Patrols, Advd. Gds. &c. In conclusion, it should be instilled into the mind of every Cavly. soldier that his arm of the service is invincible, and more than a match under all circumstances for Infy. or Artillery, either singly or in masses. If he thinks otherwise, the sooner he exchanges into the Infy. the better. Every Cavly. officer should be a fanatic upon this subject. All should remember the old Cavly. proverb, "Commend your soul to God, and charge home."

There is no excuse for Cavly. soldiers being made prisoners as long as their horses can gallop. The first and most important duty of a Cavly. soldier is to take good care of his horse at all times.

Employment of Infantry in Action.— Infantry is the backbone of an army. Campaigns can be carried on without Cavly. or R.A. but nothing serious can be effected without the aid of men fighting on foot. At the end of a war it will be found that, putting sieges out of the question, the actual damage done has been by Infy. It is its fire that kills and wounds, and it is charges that win and defend positions. If it is very good, it can compensate for inferiority in the quality and numbers of the Cavly. or R.A. If bad, and you are opposed to a good steady Infy., make it a war of marches and manœuvres, engaging in daily little affairs until you have brought your Infy. up to a fair standard of excellence. Infantry should, when stationary, always lie down, both for the purpose of concealment and of shelter from fire.

Musketry Fire. should be kept under control by the company officer as much as possible. There should be very little independent firing over 500 or 600 yds. Beyond that, vollies should be used by word of command. So used in vollies it is very effective up to 2000 yds. This long range fire must now be regarded as a recognized power possessed by all Infy. that know how to use it effectively.

The 4 ways in which our Infy have been hitherto accustomed to fight are :—

1st. As skirmishers, both in attack and defence.
2nd. In position in line, with their fire, for defensive purposes.
3rd. An advance in line to attack an enemy, such attack ending by a bayonet charge.
4th. In square to receive cavalry.

Skirmishing.—Formerly specially instructed men were required for this work, but now no Infy. is of any value in the field unless it can skirmish well. It was a noble trade that of the Lt. Infy. soldier, and an army that had really good light troops was indeed happy : it could sleep at night in security, and could march at its ease, safe from surprise at all times. In action, the enemy's sharpshooters were kept by it at a respectful distance, whilst his gunners were harassed at their guns, their horses shot, every joint of his armour tried, and the weak places thoroughly probed by a searching fire ; his plans discovered, the position of his reserves made known, and all his columns approaching to attack riddled with bullets. Formerly a line of skirmishers was used in action to clear the way for the attacking lines or columns in its rear, but henceforth it must be itself the most important part of the attacking line, and upon it will fall the brunt of every battle. Skirmishers must learn to forget the old lessons they were taught as to their special functions in action ; they must rely to a very great extent upon themselves to capture positions, and not look entirely to a formed line in their rear to do so. The days when a stiff deployed line of men, shoulder to shoulder, could advance under fire, full as they are of glorious memories for our army, can never come again, and the offr. who would now dare to attempt such an operation under the fire of breach-loading rifles should either be tried for murder or lodged for life in a lunatic asylum. The normal formation of Infy. for battle used to be in 3 lines, 1st line, 2nd line, and reserves, the front being covered by a line of skirmishers, with their attendant supports and reserves, the 1st line and the 2nd being of equal strength. Henceforth the 1st line, of the same relative strength will be divided at the beginning of an action into at least three formations, the front one being the fight in line, that behind it being supports to be sent forward to reinforce it from time to time as required, and the 3rd being the main body of the first line. In order to prevent confusion as far as possible, it is most desirable that, when the supports have been blended into the

skirmishing line, battalions and even companies, should be as little mixed up as possible. This is a tactical problem to be worked out by those skilled in drill. A certain amount of confusion must ever be attendant upon an operation of this nature. In reading of the advance in line of the English Infy. during our most celebrated battles, we hear much of its steadiness, and but little or nothing of the great disorder that accompanied it; but all soldiers who have taken part in such an operation know well that disorder is inseparable from it when attempted under fire. In confessing that we shall have to grapple with disorder in the manœuvre by which alone it is contended we can in future successfully assail an enemy's position, we do not therefore admit any new element in the operation, although we may have to deal with it under somewhat less advantageous circumstances than formerly. In an army, the less there is of harmony existing between its regulation tactics and the tactical requirements of the age, the greater will ever be the confusion attending its infantry attacks. Having recognised that disorder will be the never-failing attendant upon an attack made by skirmishers, let us set to work to practise our men in the operation until we have reduced that disorder to a well-understood system, until order is evolved from it. To practise men in nothing but 'steady drill.' where noise and confusion is impossible, is not the best way to prepare them for the disorder in which they will most certainly find themselves, even after the most successful charge that is made under fire. Men who have been drilled only in charges made with mathematical precision and death-like silence are prone to be appalled by the din, uproar, and confusion of a real onslaught. Never having been taught to contend against it, or even to realise it, they are dismayed by its unexpected presence. A ringing cheer is inseparable from charging—I do not believe it possible to get a line in action to charge in silence—and, were it possible, the general who would deprive himself of the moral assistance it gives the assailants must be ignorant of human nature. It encourages lends nerve and confidence to an assailant: its very clamour makes men feel their strength as they realise the numbers that are charging with them. Nothing serves more to strike terror into a force that is charged than a lond ringing cheer, bespeaking confidence. As it is impossible to charge in action without noise, our mimic charges at Aldershot cannot have too much an accompaniment, for they would then be all the better practice for officers and men to reform in good order amidst great confusion. The introduction of B.L. rifled small-arms, and of rifled B.L. guns firing shrapnel at great ranges, have altered the tactical formations of Infy., especially for offensive operations; so much so, that for an army to attempt what we did not lately even as at the Alma, would be to insure its annihilation. I shall dot down here a few general ideas on the subject, assuming that every one now considers as obsolete the fighting tactics of Frederick the Great which, improved by the Duke of Wellington to suit the arms of his day

served us so well in the great French war. In those days the fire of the individual soldier was not a factor of importance in the problem to be worked out; the effect of men fighting in a formed body, shoulder to shoulder, was alone considered of value; and the tendency of all drill and tactical instruction was to make men rely upon their united strength as a highly disciplined body. Now, the great object of all military teaching is to develop the power of each B.L. rifle, and the independent action of the soldier who carries it, to the fullest possible extent.

In defensive operations the influence of the new arms is not felt very much beyond the fact that 100 men holding 100 yds. of front in any position now, make it far stronger and more difficult of approach for an enemy than if it were occupied by 342 men armed with the old musket, in 2 ranks, each file covering 21″ of frontage. The effect of our Infy. fire at present is so great, that it has reversed the relative defensive value of ground; for whereas formerly, the close ground that most abounded in cover was generally regarded as very strong, whilst the open portions of a position that were easy of access were looked upon as weak, the very reverse is now the rule. Large open down-like spaces free from woods and hedges, that can be swept from both flanks by a heavy musketry and shell fire, require but few men to occupy them, as no troops could live to cross them; on the other hand, the close country abounding in copses, banks, and covers of all sorts, that was formerly considered so strong that it required but few defenders, is now the locality where an attack is most likely to succeed. It is not that it has lost one whit of its actual strength by the new order of things, but open ground being now almost tabooed to the assailant, he is forced to attack those points where alone his troops in skirmishing order can hope to approach their enemy without being mowed down by a fire delivered from troops sheltered from injury either naturally or by means of rifle trenches. The use of a strong force of skirmishers in front of the actual line selected for defence is not now required, and might only lead to the loss of the men so employed. A small number of the very best shots should alone be employed in advance of the actual position, and unless under some very peculiar formation of ground, even these few men should rejoin the main line, when the enemy had reached within 500 or 600 yds. of it, lest they should hamper its fire. A passive resistance can lead to no conclusive or even telling results; the O.C. a position to be defended, who does not largely provide for assuming the offensive at many places, and during many phases of the action, is ignorant of war.

The normal formation for troops occupying that portion of a defensive position from which it was intended to assume the offensive as soon as the attacking troops had reached from within about 50 to 100 yds. of it should be, I think, a 1st. line consisting of one man to every yd., each company

deployed for this purpose keeping a section about 20 yds. in rear, or as near the 1st line as cover could be procured or provided for it. These supporting sections are merely for the purpose of supplying men to fill up gaps in the 1st line caused by casualties. Behind this again, if possible not more than 50 yds. from the 1st line, but well covered from fire, should be a line two deep, with bayonets fixed, and ready at any moment to jump up, and running over the 1st line to charge the attacking enemy. I know that it is the opinion of the best German authors at present, that the side acting on the offensive has the best of it, but I humbly submit, that with a British Battn. distributed as described above, 4 companies having 3 sections each in the front line under cover (occupying a frontage of 300 yds.), and with 4 companies behind them again, ready to charge as soon as the enemy reached within charging distance, that twice, nay thrice its number of the very best troops in the world would be easily destroyed by it. Picture to yourself the shattered condition in which 2 or even 3 Battns. advancing to the attack would reach within charging distance of the 1st. line that from behind good cover had been firing on them at ranges that had been previously measured and marked on the ground. Of course, this manœuvre is easier to describe than to carry out satisfactorily in an action, but the same is the case to my mind ten times over as regards the operation of carrying a line of skirmishers over open ground by successive rushes to within charging distance of the enemy's position. I do not believe it possible for a man who has never himself led skirmishers in action to dogmatise upon what they are capable of doing, or to lay down rules for manœuvring them under fire as if they were so many pawns on a chessboard. It is not enough for a man, say as a S.O., to have seen the operation, he must himself have led men up 'the deadly breach' to enable him to realise what men will and what men will not do, or even attempt. It is not intended to assert that such an offensive movement is impossible, especially if the space to be traversed affords plenty of cover, but all who have led men in a charge when exposed to heavy fire, will I think agree with me in saying, that the operation can never be successfully carried out, unless the defenders have been demoralised and beaten into that most unhappy state of stomach that invariably precedes a general stampede.

In the distribution above given, the troops in the 1st. and 2nd. line should be under the same C.Os.; the reserves, to be detailed either by Divns. or Army Corps (according to circumstances), should be about 600 or 800 yds. in rear of 1st line, and posted so as to be as much as possible under cover and out of sight. The one great difficulty in carrying out these defensive tactics is for the general to choose the right moment for charging, as the success of the operation depends greatly upon the offensive being assumed exactly at the right time. To await in the open an advancing enemy, and depend upon driving him back by your fire, is to court danger

The writer is aware of the Hythe theories, that go to prove how an advancing line would be annihilated; but firing at a target is a very different affair from firing at a thick line of skirmishers advancing steadily towards you, who keep up a heavy fire all the time. In all such attacks there is a moment when the defendant must charge, or be defeated. Experience in war teaches the general to feel, as it were, from the pulse of his men when that moment has arrived. Happy is the man who knows when to say, 'Up, Guards, and at them!' There is no salvation for him who cannot do so. The opportunity passes in the twinkling of an eye, and if not seized on at the right moment cannot be expected to return. In the foregoing argument it is assumed that the artillery fire is equal on both sides; for although the assailant may have most guns, still they will have to come into action under a heavy fire from those of the defensive side, they will be firing at unknown ranges and without cover, all of which circumstances will be reserved in favour of the artillery of the defence.

For offensive operations, the great problem to be solved is, how can you get within Infy. charging distance of your enemy without being destroyed, or so reduced by losses that any attempt to charge home would be folly. Upon this problem all the great military minds of Europe are now intent. In general features, it may be safely said that the system that all will adopt will be similar, although of course the peculiarities of race and of military traditions will naturally impart a national individuality to each.

It is unnecessary to give figures illustrating the destructiveness of breech-loading fire delivered from behind cover to prove that it would be impossible for Infy. in line, two deep, each file occupying 24 inches of front, to march by daylight up to any position, no matter how brave that Infy. might be; the proposition is self-evident to all who will give the subject a moment's thought. The result of the Prussian attack upon St. Privat, and of other similar operations at the beginning of the 1870 war, proved that an Infy. attack over open ground is a useless waste of life, until the defenders have had their courage crushed out of them by an overwhelming fire of artillery and musketry. To attempt such an operation nowadays in line or in columns would be madness: the only other formation is in open order. Much nonsense has been written in endeavouring to throw odium upon this formation, because it is described as 'loose.' It is only the best-drilled soldiers who can advance well in open or loose formations. To teach a man to march past as if he were part of a wall is comparatively easy when compared with teaching one to manœuvre in this loose order. Most men will admit that henceforward our manœuvres under fire must be made in open order. Does it not therefore behove us officers of all ranks to work hard until our men can really manœuvre in open or loose formations better than the soldiers of any other army in the world? We have them far longer with us, and it is a disgrace to us if in the seven years they remain

with the colors they are not better soldiers in every way than the Prussian soldier who is never more than about 2½ years in the ranks. Are we doing so? If not, are we not preparing for ourselves and for the nation a great disaster when next we have to meet a European enemy in the field?

I shall not attempt here to go into the vexed question of the manner in which our fighting line is to be formed; but my advice is, let all C.O.'s spare no time or trouble in making their men learn to move with order, quickness and precision in open or loose order; in impressing upon them their real strength, and how little even the smallest knot of men or the thinnest skirmishing line has now to fear from Cavly. They should be taught by their captains the art of advancing by rushes in open order at full running speed for about 50 yards at a time, these advances to be made by echelon of companies or of subdivisions. The men should be practised by Battns. in charging when in a fighting, and therefore a loose line that had been successively reinforced, until there was about a man (not a file) per yd.: these charges to be practised over the roughest ground, and through woods when possible, being invariably accompanied by a ringing cheer. The men should have their arms at the trail, for of all the devices to prevent men from charging well and with enthusiasm, that of making a man bring his left hand across his stomach to help the right, in clutching the rifle, is most ridiculous. My own belief is that the time has arrived when Infy. should work in single rank, and that each man should have at least 30 in. of frontage allotted to him at all times in line. It would teach our men self-confidence, and wean each from that system of always leaning for support upon a man behind him: it would also allow of all our manœuvres and drill formations being performed with much greater ease to the individual soldier. Drill is now more essential than ever in the formation of an army; but instead of teaching a man complicated evolutions that may have a fine theatrical effect in Hyde Park, but which are about as useful to a soldier in action as a knowledge of the hornpipe would be, let us drill him day after day, and if necessary all day, in the manœuvres of battle, until he is proficient in them. The disorder that resulted upon Infy. attacks during the wars of 1866 and 1870 arose mainly from a want of harmony between the "Regulation" tactics of the armies concerned and the tactical requirements of this age of breech-loading rifles.

In the distribution into lines of an Infy. force, whether a Brigd., Division or Army Corps, for an attack upon an enemy in position, I would recommend the proportions to be about ½ for 1st line, ⅓ for 2nd line, and ⅙ for reserve, i.e., in the respective proportion of 3, 2, and 1. The Battns. in the 1st line at the opening of an action should be again re-divided into three lines, viz., the Firing Line, the Line of Supports, and the Main Body. The Firing Line, to be in strength at first, about ¼ of the 1st line, will be thrown forward, covering a space about as wide in yards as the whole Bat-

would occupy if deployed in the usual 2-deep formation: thus the Firing line of a battalion of 900 Rk. and F. would cove a front of from about 250 to 300 yds., and would consist of about 225 men, with a similar number about 300 yds. behind it, as the Line of Supports, the Main Body of about 450 men being again about 500 or 600 yds. in rear of the Supports. Both Supports and Main Body being in small columns, or at places in fours, or in line according to the nature of the ground: artillery fire aimed at the Firing line is not likely to hurt the Supports at that distance in rear of them; the nearer the Supports can be kept to the Firing line, however, as long as there is good cover, the better. The deployment of Infy. from column of route into attack order should be carried out before it can be injured by the enemy's artillery fire: the distance therefore depends greatly upon the nature of the country, for if quite open, the deployment ought to be effected at about 3000 yds. from the enemy's position. The Os.C. companies in all these 3 lines must lead their men in the formation best suited to obtain from the ground the utmost amount of protection from fire that it is capable of affording, the F.Os. seeing that a general alignment is roughly kept by all. This system of forming the companies according to the ground they are moving over is a necessity, especially from the moment that each successive line reaches the supposed limit of what is now commonly known as "the zone of unaimed musketry fire," namely, at about 1000 or 1200 yds. from the enemy's position. At this distance it will be necessary for all offrs. on horseback to dismount and leave their horses behind. It is a moot question whether the supports should be composed of a portion of the companies in their front, or be whole companies; it is, I think, better to keep each company at all times together, and when one is sent forward to strengthen the firing line, the casualties which up to that moment will have there occurred will enable the reinforcing company to find some gaps where it can find ample room, and come into action with great advantage under its own officers, and without any mixing with the companies to its right or left.

The Infy. fire of the defensive side begins to tell most seriously when the firing line reach within about 600 or 700 yds. of the enemy's position (the extreme limit of what is commonly known as "the zone of aimed musketry fire"). Thenceforward the advance must be made by rushes of about 50 or 60 yds. at a time from one cover to another, or if the ground is devoid of cover, the men must throw themselves on their faces at the end of the rush; this should be done by alternate companies. At this phase of the action the serious losses begin, and the Os.C. the Supports must use their own discretion in supplying the places of those knocked over in the Firing line.

The Firing line should continue to advance quickly, those who are lying down firing as quickly as possible whilst the others are making their rush forwards, and this must be continued until they reach from about 60 to 200

or even 300 yds. of the enemy, that distance depending very much upon the amount of cover to be obtained. Whilst the Firing line is thus advancing, the Main Body of the 1st line keeps steadily pushing on, as best it can, in line when such is possible, or by independent companies in whatever formation their Captns. may consider best, when the fire is too heavy for a line. By the time the Firing line has reached the required distance from the enemy, all the Supports will have been merged into it, and the Main Body of the 1st line ought to be within about 100 yds. of the Firing line: it will then be for the O.C. to decide whether he will at once make his charge there and then, or wait until he has succeeded in bringing up the Main Body within a few yards of the Firing line, taking care not to allow the Main Body to mingle with it, as it is essential to keep the Main Body from firing. It is to be hoped that when this phase of the action has been reached, the heavy fire of the Firing line may have made an impression on the enemy, and as soon as this impression has been effected, every bugle should sound the "charge," and the offrs. rushing to the front, should carry the Main Body on with them over the men of the Firing line (who will be lying down): as soon as the Main Body has passed, the Firing line will rise and join in the charge. When a line lying down or under cover is engaged in independent firing, it is most difficult to stop the firing, and get the men to charge unanimously, it is therefore essential that the Main Body of the 1st line should not be allowed to fire previous to the charge. In many cases it may not be perhaps necessary to use this Main Body, as the Firing line upon being reinforced by the Supports, may be impelled forward by its own weight, especially as it is always possible in a long line of attack that the Firing line may find some chink in the enemy's armour, some weak point from which he has a tendency to recede, and taking advantage thereof, may carry it with a rush. From first to last use volleys as much as possible in preference to individual firing, over which latter it is so very difficult to exercise any effective control. The combined action of the three arms in such an operation has been sketched out in the Article on "DISPOSITIONS FOR THE ATTACK OF POSITIONS," the foregoing being but a general rough outline of what is now almost universally accepted as the proper formation of Infy. detailed for an offensive movement.

The formation of Battalion Squares to resist Cavly. may be almost regarded as a thing of the past, for with the long-ranging arms of the day to put your Battn. into such a formation would be to give it over to destruction: small company squares, or groups of men standing shoulder to shoulder, and availing themselves of any hedges, trees, or any other obstacle there may be at hand, can now hold their own well against a large number of Cavly., and very rarely will Cavly. be found to charge Infy. in line who are armed with the murderous breechloader.

General Remarks regarding Infantry in Action.—Above all things, never

allow your men to fall out to pick up wounded men: that duty must be performed by the ambulance corps, aided by the bandsmen of Regts., who for this purpose should follow close in the track of the attacking lines. At any rate, the wounded must take their chance till the operation is finished; they should remember that the wounded of those who win are generally well looked after, whereas those of the vanquished side generally fare badly. As every man who falls out to look after the wounded reduces the chances of success, it is especially their interest to prevent men from doing so. The issue of every fight depends upon the behaviour of the Infy., and their conduct depends upon the company offrs. who are of all others the most important body of men in an army. In that final moment of actual conflict, the result is in their hands. Drawn from the gentry of England, their courage has never been impugned, not even by the most radical of newspapers. Hence, in a great measure, our unvarying success in Infy. and Cavly. charges. It is at such times that a man's mettle is shown. The company offrs. have a busy time of it in action. They must be careful to exercise control over the "fire" of their men. Immediately after charges it is most essential that they should re-form their men at once, and not permit them to go beyond the further limit of the wood, village, &c., &c., that formed the objective of their attack.

Our Battns. on war strength are henceforward to be 1000 bayonets: our existing system of drill is based upon the idea that the C.O.'s voice can be heard by every man in the Battn. when deployed: apart from the fact that it is physically impossible for one man's voice to command 1000 men in the bustle of action, the rigidity and consequent slowness of all movements effected by our system of drill when applied to strong Battns. renders it inapplicable to warfare under its newly assumed phase. The one great idea of C.O's has been, hitherto, "*to keep their men well in hand*," and that all companies should move off at the same moment by word of command from the colonel. Our Cavly. drill has always been in advance of that laid down for our Infy. in this respect, inasmuch as it was left to the s.C. troops and squadrons to place their men in the new position of formation they had been ordered to take up. Our rigidity of movement looks very pretty in Hyde Park, but is unsuited for war: it was copied from the Russians, who used it, as we did also, to excellent purpose where the effective and destructive range of musketry did not extend beyond what a soldier could run over in charging, and when not more than 1 or at most 2 rounds, could be delivered by the defenders during the time occupied in such a charge. I think we shall again have to follow that nation in their system of tactics, adapting them to the peculiarities of our soldiery, but letting our men "*go*," instead of always endeavouring to keep them "*in hand*." It used to be said of us that we were the only nation that could fight in a two-deep line. In such a formation we charged and overthrew Napoleon's

finest troops. We have now to go a step farther, and to teach our men to charge with the bayonet in open order, trusting that the same pluck which enabled us during many consecutive years to annihilate by our line charges the best European troops, may enable us henceforth to do the same by means of our superior skill as marksmen, and by the irresistible dash of our men in open order.

EMPLOYMENT OF ARTILLERY IN ACTION.—The introduction of rifled guns into the service has increased the range of artillery; but as the limit of vision still remains unchanged, this alteration has not increased the distance at which artillery can be used effectively to the extent that is supposed by many. To open fire beyond the limit at which the effect of your fire can be ascertained by good sight, aided by telescopes, is merely to waste valuable ammunition; that limit is about 3000 yds. as an effective maximum, although, of course, our Fd. guns will range up to 5000 yds. The maximum of effective range in yds. for the undermentioned guns is as follows:—

	At Columns.		At a Line.
40-pr. B.L. guns (Armstrong's)	2800	..	2500
9-pr. M.L. ,,	2500	..	2000
12-pr. B.L. ,,	2500	..	2000
9-pr. B.L. ,,	2000	..	1500

From the experience of recent wars we learn that fire cannot be maintained from a batty. exposed to Infy. fire, so guns, unless screened from view by either parapets or the natural configuration of the ground, should not be placed within 900 yds. of the enemy's Infy.; if during the course of an action the enemy's Infy. succeeds in reaching to within that distance of a batty. the gunners of which are not screened from view, it should retire beyond that range. The duties of artillery in action are, to begin the fight, to maintain a heavy fire upon the enemy's troops whilst yours are taking up the positions assigned to them; to overwhelm with its fire the portion of the enemy's position that has been selected as the point of attack, so as to shake the courage of its defenders, and facilitate the advance of your Infy.; to extricate any portions of your force that may have become temporarily compromised; to co-operate in pursuit, and to protect the retreat of beaten troops. Formerly, when guns were taken up to within a few hundred yds. of the enemy's position, it was easy to lay them with precision for short distances; but to do so at long ranges is a different matter, requiring time and very great nicety, as the exact distance has to be ascertained. The fewer the movements executed by a batty. the longer it will be in a position to inflict damage upon the enemy, for it is a recognised axiom, that guns are useless when limbered up. It is therefore of great consequence that good positions should be found for guns before the action begins, and that when posted there, it should not be moved unless the enemy succeeds

bringing a musketry fire to bear upon it, or that in being driven back, he retreats beyond its range. A few hundred yds. either backwards or forwards makes but little difference in the effectiveness of fire from rifled guns. In selecting these positions for your guns, it is desirable that the ground in its immediate front should be as unfavourable as possible to the enemy's artillery fire; for this reason, soft cultivated land, marshes, precipices, or any steep escarpment, such as the banks of a canal or the side of a railway cutting immediately in front of the guns, is a great protection to them. Although it is a mistake to place the guns on such a high position that their shot strikes the ground below at so great an angle as to lodge there, instead of ricochetting, yet it is essential that they should have sufficient command over the space by which an enemy can approach to see clearly all his movements, whilst they from being on high ground present only their muzzles to his view, their waggons and horses being entirely screened from his observation. It is absolutely necessary that every portion of the ground in front of your position should be raked by batts. to the right and left, as well as swept by a direct fire. The effect of artillery fire is more moral than actual: it kills but few, but its appalling noise, the way it tears down trees, knocks houses into small pieces, and mutilates the human frame when it does hit, strikes terror into all but the stoutest hearts. Artillery should be used either in very large batts. or the fire of many batts. placed at intervals should be brought to bear upon one point at a time; previous to attack, a concentrated fire from all the available guns should be brought to bear upon the spot selected as the objective point. At the battle of Gravelotte, where the Prussians were the assailants, over 90 per cent. of their killed and wounded had been hit by the chassepot bullet, whilst only 6 per cent. were hit by artillery fire. This should be constantly impressed upon the minds of your Infy. soldiers.

In defensive operations it is desirable to place batteries in those parts of your position that may happen to be naturally strong, the flanks of which particularly are secured by existing obstacles from Cavly. attacks. If the fire of Infy. and artillery is to be effective at one and the same moment, commanding positions must be selected for the latter, from whence its rifled guns can play with accuracy and safety over the heads of the Infy. moving below them. Except from the attack of Infy. skirmishers, the front of artillery may be considered secured by its own fire, but its flanks are especially weak. When it is necessary to have an escort with a batty. it should take up its position on the most exposed flank, keeping well to the rear under cover; when the batty. moves, its escort moves with it. If there is near a batty., any cover in which the enemy's skirmishers could lodge themselves, it should be occupied by the escort. When obliged to change position, batts. should move as rapidly as possible. Fd. Batts. now carry 5 men on the gun and limber, and have one mounted N.C.O. with each gun.

They can therefore, on an emergency, take at a gallop sufficient men into action to commence the service of their guns. It is hoped that the off horse of every gun team may carry a gunner, as was always the practice in the Bengal H.A. If this were done, Fd. Batteries might change positions in action at as fast a pace as the ground would permit, and have their full complement of men available. The quicker such changes are executed the shorter is the time that the guns are useless. For this reason, when H.A. are retreating with Cavly. before an enemy, the changes of position to the rear should be executed by the guns at the fastest possible pace, the Cavly. retiring, as laid down in Regulations, at a walk, but never faster than a trot. The same rule should be followed in Cavly. advances; the H.A. should gallop forward and unlimber within easy range of the enemy, the Cavly. not moving until the guns had opened fire, or unless it was found that they were getting nearer the enemy than they were to their own Cavly. In order to reap the greatest possible benefit from the H.A., the Cavly. should keep as far to the rear of the guns as possible with due regard to their safety, until their fire having told upon the enemy, it should charge to take advantage of the disorder and confusion they have occasioned. The artillery fire should be kept up as long as it is possible to do so without danger to the advancing Cavly., and when obliged to stop, the guns should remain unlimbered, ready to re-open should our charge be repulsed; if it has been successful, they should limber up and gallop forward to seek for some fresh position from whence to pound the retreating enemy.

It is laid down by the best modern writers upon Artillery, that at each phase of an action some one particular arm should most receive attention from your batteries. At one moment it may be the enemy's Cavly.: at another his artillery, and so on; but whichever it may be that you have most dread most at the time, upon it your artillery fire should be concentrated. Before Infy. were armed as at present, artillery in action was chiefly used by both sides in counter-battering, as it was supposed that if the enemy's artillery fire could be reduced and kept under, your Infy. might advance with comparative safety to try its strength against that opposed to it. It is the fire of the Infy. which is now to be dreaded most: so, as a general rule, it is upon it that artillery fire should be brought to bear most. This rule applies with greater strictness to offensive than defensive operations: in the former, the one great object is to annihilate and strike terror into the Infy.; in defending a position by the loss inflicted upon it by your guns; in the latter, as the Infy. may be safely left to take care of itself, and may be relied upon to drive back from its front all assailants, the bulk of your guns may be most profitably employed in pounding the enemy's artillery so as to distract its fire from your Infy. Of course, if it is found that the enemy's columns are pressing on, and that he is massing troops for an advance, his attacking forces assuming then the most promi-

importance, should receive most attention from your artillery, as already laid down. It is sometimes necessary to commence an action by opening fire from all the guns available at the moment, in order to keep the enemy at a distance whilst the lines are being deployed, and the troops are getting into their positions. It is sometimes used also in changes of front or position during an action to cover the movement.

If by any unfortunate circumstance a gap occurs in the line, and the enemy seems intent upon taking advantage of it, a large number of guns deployed to fill it up may save the army from disaster. To cover the retreat of lines or columns that have attacked and been repulsed, the fire from a large number of concentrated guns is the best protection. Artillery in action should always have the greatest possible front. When batteries are charged by Cavly., the gunners should stand to their guns to the last possible moment, taking refuge, when driven from them, as best they can by lying down close to any Infy. that may be formed near them, or under their own guns. It is a pity that all men of gun detachments have not revolvers; with them they might easily hold their own against Cavly. from under their guns, the limbers having retreated for protection to the nearest Infy. Swords are a useless encumbrance to artillerymen. In offensive operations, the ground in the vicinity of the point to be attacked must be swept by a heavy cannonade from a mass of batts., previous to the attacking force being launched forward on its mission. The heaviest possible fire should be maintained up to the last moment possible, and when at last the attacking forces have advanced into such a position as to impede the fire, the batts. should, if possible, be advanced into other positions from whence they can reopen. It is at such moments that the devoted gallantry of artillery is truly tried, for in some instances it is necessary to sacrifice a battery to insure success. Surely there never has been a more noble feat of arms than that performed by a troop of French horse artillery on the 8th of September, 1855, when at a gallop it took up a position on what might be termed the glacis between the Malakoff and Little Redan, from whence it maintained a heavy fire upon the Russian columns endeavouring to retake the Malakoff, until the troop was actually annihilated.

In fine, the efficient employment of artillery in action depends upon that employment being well timed. Six H.A. guns opening fire at exactly the proper moment will be of greater use, and have a greater effect upon the final result, than twice that number merely pounding away, without any special object.

Gassendi says, in writing on artillery in action, "Les derniers coups sont les plus décisifs, ils feront votre salut peut-être, mais votre gloire surement."

Night Attacks.—The precision and rapidity of rifle fire is now so great,

that to attack any well selected and well defended position by daylight, is to run the risk of being swept away as the Prussian Guard was in its attack on 16th of August, 1870. The destructive nature of aimed rifle fire is so great that I believe the Army that will first be able to manœuvre at night will achieve brilliant victories. If the Egyptian position at Tel-el-Kebir had been stormed by day our losses would have been about five times as great as they were. Night attacks can only be attempted on any large scale when the attacking army is highly disciplined, and well led by tactically well instructed officers.

The attacking troops should, as a rule, not fire a shot: their work must be done with the bayonet: a steady advance in silence up to charging distance, and then the loudest of cheers, all drums beating and bugles sounding. Unless the enemy is covered by some serious obstacle, in nine times out of ten, his men will break and bolt, shooting one another, blocking up roads and preventing the escape of guns, &c., &c. If you can trust your men to make such an attack, do so by all means. If possible the attack should be timed so that the final charge should be delivered just at the first streak of day. It is being charged in the dark that will destroy your enemy. Your pursuit will be helped by the dawn, and it is in the first half hour of daylight you must make your prisoners and capture artillery.

By dawn your own guns must be in position to cover your retreat in case your attack fails. Each Brigadier, indeed every Commanding, if not every Regtl. Offr., should clearly understand the compass direction in which he is to march during the night. If there are stars to be seen, it is a good plan to instruct Brigadiers to direct their march by them.

If attacked by night, make your men fall in silently, and then lie down: confine your firing to volleys and use your machine guns. Until the enemy is within 400 yards of your position, your artillery on a dark night can do him no harm, but when within canister range give him plenty of it. In articles on fighting barbarous people, I have dwelt upon the precautions to be taken against surprise by night. It is very essential that the distribution and position of your troops be so arranged that as they fire straight to their front when either lying or kneeling down, no risk should be run of their firing into one another. When attack threatens, extinguish every fire and light. If your piquets in retiring can set fire to a few houses or hay or straw ricks about 1000 yds. in advance of your position, the light will help you very much. In the Soudan in 1884–5, I had our guns provided with star shells to fire in the event of the enemy attacking by night. Light balls either fired from a small $5\frac{1}{2}''$ mortar or from a gun so as to fall a little behind the advancing enemy enables you to direct your fire upon them and disconcerts him seriously. During daylight all offrs. should carefully examine the ground in front of their bivouac and fix the distance of all large objects that are likely to be seen from it by night.

Passage of Rivers.—To cross a wide and unfordable river with a large army, even when unopposed, is a tedious operation, requiring nicety of detail. It is almost needless to say that every exertion should be made to have as many bridges as possible. In drawing up the memorandum for general orders, the C. of the S. should go into minutiæ, stating the hour at which each corps is to pass, and the manner in which it is to do so, also the position it is to take up at the far side. A staff officer will remain in charge at each end of each bridge, having a small guard under his orders. No collection of men, carts, or animals to be allowed within 200 yds. of the bridge-heads on the far side, and no crowding on the bridge to be permitted. No one but Generals and S.Os. to be allowed to go back over the bridge until all are over. The men to be cautioned not to keep step in crossing temporary bridges. To cross a river whilst an active enemy is on the other bank demands a well-designed plan, ably carried out in all its details by an efficient staff. Stratagems should always be resorted to, and the enemy deceived as to the point of crossing, in such a manner that a strong Brigd. or Divn. should be across before any organised resistance of large numbers can be offered to it. Much depends upon the breadth of the river. If it is not wider than about 300 yds., and a re-entering angle, with the banks higher on yours than on the enemy's side, has been chosen as the point of passage, the front and flanks of the force first thrown over the river can be so protected by musketry fire that nothing can prevent you from crossing. The first thing to determine is the most advantageous position for the passage; the configuration of the river to be such that batteries established on the near bank can command the ground on the opposite side. Long re-entering loops, that are frequently to be found upon sluggish rivers, are invaluable for this purpose, as it stands to reason that no enemy in force could remain in them under the cross fire that would be brought to bear on him. A small river flowing into the large one on your side, some short distance above where it is intended to cross, is of great use, as in it the rafts to form the bridge—and indeed, if the current is not rapid, the greater part of the bridge itself—can be put together without creating any alarm, and floated down to its position. Long wooded islands, with the main channel between them and you, leaving the channel to be passed over from them to the enemy's bank a very narrow one, are of great advantage in enabling you to lay your bridge and cross over in considerable numbers before the enemy can concentrate. At the point selected the banks should be free from marshes, so that wheeled carriages can get down to the river, and if possible there should be deep water close to the banks. If not, arrangements must be made beforehand for laying out trestle piers to such a distance that the boats or pontoons will float and not ground when laden. A narrow belt of timber along your bank is a good screen behind which your army may assemble without being

seen. It is desirable that the bridge when laid should be screened by the banks, or by rising ground or woods, from the enemy's view and fire. (See Article on "DISEMBARKING IN FACE OF AN ENEMY.") The two operations are very much alike. The enemy having been deceived by false reports and by demonstrations upon distant points, it is taken for granted that the army is to cross at a point carefully selected and secretly surveyed by a S.O. The width of the river to be carefully measured, and the bottoms examined to see that there is good holding for the anchors. If the enemy has a bridge over the river, defended by a tête-de-pont on your bank, this renders the operation much more difficult, as he can pass over and attack you in rear whilst you are crossing. It will then be necessary to watch his bridge-head with a strong corps, and perhaps make demonstrations as if you intended to assault his works. In framing the orders for the passage of a river, the C. of the S. will see that the head of the column should reach the spot selected as soon as it is dark. The columns intended to make diversions upon other points, in order to draw attention there, should arrive at their destinations a little before, taking care that they are seen by the enemy. When it is dark, a good deal of noise should be made with hammering and talking ; and if it can be done safely, a few men put across to keep up a musketry fire upon the enemy's patrols, piquets, &c. The strictest silence to be maintained where the operation is really being carried on, and the rafts put together. A Battn. of the best Lt. Infy. to be ferried across at such points that it can cut off the enemy's piquets if there are any there, and extend in skirmishing order in a semicircular form, both flanks resting on the river. The troops first over should consider themselves as an Advd. Gd., and be guided by the instructions laid down under that head. They should fire as little as possible during the night, endeavouring rather to take prisoner all patrols or outposts that interfere with them. All available boats should be employed in carrying across reinforcements whilst the bridge is being laid. As soon as one bridge is finished, the others must be commenced as quickly as possible. As soon as one brigd. is over, strong working parties, carrrying their arms and tools should pass over, and, under the direction of R.E. offrs., and as many sappers as can be spared from the bridges, set manfully to work to entrench the position. The R.E. who is to design the works should pass over with the first that cross, having a few sappers with tapes to mark out the lines. Batts. of heavy guns will be placed at points previously fixed upon, to open fire at daybreak, if necessary, along the front and flanks of the position taken up by the forces that had crossed during the night. The extent of ground occupied on the opposite bank should be enlarged every hour as more troops cross. If necessary, the horses of Cavly. and artillery can be swum across. If 100 horses are taken over by the bridge and collected on the opposite bank, others can be driven into the water in flocks, taking care

to allow no gap, but to keep up a continued stream of horses. When this has been established, it is easy to induce them to enter the water and swim across to the others on the farther side. One-half or ⅔rds. of the men of each troop should previously cross in boats or by the bridge, to receive the horses on the far side, each man carrying his arms and valise. When there is a bridge, the horses should be swum over near but below it. When Cavly. pass a floating bridge, they should dismount and lead their horses. The writer was Q.M.G. of a force that had to cross a rapid river in face of the enemy, there being no bridge equipment, and only a few canoes. Some 2000 horses were swum across as described above, with the loss of only an old one, that could not stem the very rapid current. It would have been madness to have allowed British dragoons to attempt swimming their horses over such a river. When the emergency of circumstances require the attempt to be made, the men should undress and hold on by the manes or tails while crossing, never touching their horses' heads, and guiding them by splashing water at their heads on the side from which you wish them to turn. If the enemy concentrates to fight, the baggage and parks, &c., should not be crossed over until he is driven away.

Previous to a force crossing a ford of any size, rows of stakes should be driven in, showing its exact limit. If the current is strong, ropes should be stretched from pole to pole, and mounted men posted along its upper limit, to break the force of the stream. Torches or lanterns should be used at night to mark the line of crossing. When the stream is strong, the men should pass in the broadest possible front, locked arm-in-arm: if also deep, each rank should be several paces from the other, for if a column passes in close order, it serves to dam up the stream, and so deepen it. When the current is rapid, boats should be kept plying about near the dangerous places, to pick up any one who may be swept away.

Defence of Rivers.—If your enemy is as strong as you are, and he has the means of crossing anywhere along a front of 20 or 30 miles, he will do so if he wishes, but you ought to make him pay dearly during the operation. The better your arrangements for defending the river, the more it will cost him. Indeed, if he makes mistakes, you can inflict such injury upon him that he may be only too glad to get safely back. Suppose an unfordable river separates you from your enemy, which he has the means for crossing anywhere for a distance of 30 miles—that is, 15 miles above and 15 below where the main line of communication, whether road or railway, crosses it. Of course, if you had time, the bridge there would be well covered by a strong Bridge-Head. To attempt to guard every point where he can cross would be to render yourself weak everywhere, so the best general plan is to keep your army concentrated in a central position, establishing good lateral communications with your flanks. The entire length of the river must be well watched by your patrols, and arrangements made beforehand, so that when all your

outposts have been driven behind the river you can still have means of communicating with your spies on the opposite bank, and keeping yourself well informed of the enemy's movements. Strong detachments should be posted halfway along the exposed distances on either flanks, the strength of which must depend on the size of your army. Telegraph wires to be laid down from one flank to the other at some distance from the river, so as not to be easily cut by the enemy, and night signals to be established as well to render you independent, even supposing the wires have been destroyed. 3 guns fired at half-minute intervals, to be repeated 3 times, with intervals of 5 minutes between each time, can be heard safely at distances of 3 or 4 miles in ordinary weather. Beacons set fire to upon elevated ground will convey the news that the enemy is crossing at certain points. The offrs. in charge of posts where these signals are to be made should have their instructions regarding them in sealed envelopes, to be opened only when they have positively ascertained that the enemy was crossing. This would prevent any chance of its becoming known what those signals were to be. The commander, from his central position, should be ready at all moments, by means of his transport carriages and bât animals, to convey a strong body of infantry quickly to support his detachments in any direction. The latter should at once proceed to the point of crossing, and vigorously attack the first body of the enemy that crosses over. The crossing will most probably be attempted on a dark night, when such an attack is likely to succeed; for if troops that have just crossed over are attacked in a determined manner they will fancy you are strong, and hesitate to advance over ground they know nothing of. Some time ago it was proposed to use a burning fluid made from some preparation of naphtha, which would burn on the water. If this could be poured on the water a few hundred yds. above where the enemy was making his bridge, and set fire to it, it would not only burn his boats and bridge material, but throw such a light upon his movements that he would have to desist. If this fluid preparation is to be had, it should be experimented on before it is required for use. A commander having recon noitred well beforehand all the ground over which the enemy has to move on the opposite bank, should keep in his memory the advantageous points for crossing, and, putting himself in the enemy's position, consider what he would do were he in his place. Having thought well over the matter in all its phases, he should fix on plans for all contingencies. His chief difficulty will be—when some night he receives notices from his outposts, at several points, that the enemy are preparing to cross in their vicinity—to weigh the several accounts and make up his mind as to the true point of attack. No amount of money paid to spies for secret intelligence should be spared to obtain early notice of the enemy's intentions. Large numbers of boats collected at any one point is an indication of the locality he means to cross at. Strict watch should be kept upon all reconnoitring parties sent out by him

so that the points examined by them should be known. If the inhabitants are friendly, it is half the battle. It is the duty of the troops who first reach the crossing-point to delay the construction of any entrenchments as much as possible, and to hinder that of the bridge. The locality in which it is attempted, and the relative strength and morale of both armies, must decide whether an offensive movement from the Bridge-Head against the enemy's flank, as he attempts to cross, shall or shall not be made. If successful, it is ruin to the enemy; but if not, it is ruin to you. To pass a river in retreat is similar, as a tactical operation, to that of retreating through a defile, for which see Articles on "REAR GUARDS" and "RETREATS."

Fortresses.—The general offr. called upon to plan or to conduct an invasion, has to decide how the enemy's fortresses should be dealt with. A fortified place not actually barring his line of advance may be merely observed by one or more columns of less strength than the garrison, and which are intended to fall back upon reserves if attacked in force: or it may be observed by a force strong enough to warrant its accepting battle at any time if attacked, or by a weaker one occupying a position so strong, either by nature or made so by art, that the garrison would not risk an attack upon it. A corps of observation prepared at all times to accept battle would, within certain limits, neutralise the action of the garrison by preventing it from operating in some particular direction which it was especially desirable to keep free of all hostile troops, such as the flanks of your L. of C., &c.: or, lastly, a fortress may be effectively blockaded by troops occupying positions all round it, as Metz and Paris were in 1870, so that its garrison can have no influence upon the progress of the war beyond occupying the attention of the troops blockading it. A fortress may, however, so block your best line of advance, especially with regard to railway communications, as Metz, for example, in 1870, and Ruschuck in 1877-78; or it may be of such political importance as to constitute the objective point of the campaign, as Pekin did in 1860 and Paris in 1870, that its capture may be deemed absolutely essential to the success of the war. A fortified place may be taken by a coup de main, by open assault after a more or less serious bombardment (as were the Takoo forts in 1860), by a siege more or less regular in the manner it is carried out, depending of course upon the strength of the place, and upon the relative military strength, courage, and scientific knowledge of the combatants, or by being starved out by a close blockade, as Metz and Paris were in 1870. The siege of Delhi, in 1857, and of many of the strong places in India during this century, are good examples of irregular siege operations.

Blockades.—The manner in which Paris and Metz were blockaded in 1870 should be carefully studied for information as to how a great fortress can be effectively blockaded. In those instances the blockading army was of about the same numerical strength as the invested garrison; but then, repeated victory had given the Germans a great moral superiority over

the French. The German lines round Paris were about 46 miles in length; but by a judicious use of the electric telegraph, by the establishment of good and easy lateral communications between the several Brigds. & Divns. employed, and between them and their fortified posts in front, and their base in rear, and by the construction of abatis, entanglements, and other obstacles, and the careful strengthening of all parts of the positions occupied by Fd. works, by a carefully planned system of outposts and patrols, the investment was effectively maintained by less than 200,000 men (the besieged garrison was of about the same strength), or say about 4000 men to each mile of the investing circle. When the garrison is an army, its object will naturally be to break through the blockading circle by a great concentration of troops upon one point, whilst the enemy's attention is drawn, by false or partial attacks, to other localities many miles off. The difficulties of effecting such a concentration without being perceived by a watchful enemy are very great, for in most localities it will be seriously impeded by suburbs, gardens and the enclosures so generally common in the vicinity of large cities. To maintain a good system of corresponding with some one within the place by means of small balloons, carrier pigeons, or trusty messengers, is one of the best methods for counteracting the power of the initiative possessed by an invested army. The concentration necessary for an ordinary sortie can be easily arranged without attracting the besieger's attention, but that required to enable a blockaded army to break out should not be possible if proper watch is kept by the investing army, and if its commander knows his trade and is duly alive to the power which money, properly expended on spies and traitors, gives him for obtaining early information, not only of the enemy's doings, but also of his plans, intentions, and resources. The blockading line of fortified positions is necessarily so far from the invested place that it is now extremely difficult for the army attempting to break-out to avoid exposing one or both of his flanks to a serious counter-stroke. Every arrangement should be made beforehand by the blockading army for the delivery of these counter-attacks on the enemy whilst he is striving to force a way out along all the possible lines for doing so. It is the great retaining power given by B. L. R. arms to troops acting for the time on the defensive in carefully occupied and fortified positions, that enables one army to successfully block another of about equal numbers.

In occupying the line selected for the blockading army, the rules which apply to the occupation of a defensive position should be remembered. There is always a temptation to hold posts in advance of the actual line that it is intended to defend to the last extremity. To give way to this feeling may lead you into serious trouble: as a rule, those advanced positions, although they may be strong in themselves, should only be occupied by weak outposts intended to fall back on the main position in the event of a really serious attack in great force. Divide your line of investment into

zones and sections, each having its allotted force and commander, taking care that the line of division between such sections of defence is not a road or other usual, or even probable, line of approach to the position. The whole question, however, depends upon the blockader's pre-arranged power of concentration upon all the lines along which the blockaded army could possibly deploy and break out. It is of the utmost importance to cut off the invested force from all communication with the outer world. Every effort should be made to capture or destroy all balloons sent off: all pigeons flying from or towards the place should be shot. The beds of rivers or streams from the invested place to be carefully dragged, and every other possible search to be made for sunken or buried telegraph wires.

Sieges.—The operation in connection therewith may be divided into—1st, the investment; 2nd, reconnaissance of the place to decide upon point of attack; 3rd, opening and carrying on the trenches until ready for the (4th) assault.

For small places, the besieging army should be about 3 times the strength of the garrison; but for very large fortified towns, such as Antwerp, Metz, &c., from $1\frac{1}{2}$ to $2\frac{1}{2}$ times the garrison is ample. Much will of course depend upon the relative military value of the opposing troops. The siege of Sebastopol was begun by an army inferior in numbers to the Russians available for its defence.

1st. THE INVESTMENT.—It is of the utmost importance that the commander should keep his intention secret, so that it should be a surprise, and the enemy found unprepared. The movements of the army should apparently tend towards some other object in a totally different direction, when by long forced marches the several corps intended for this operation should appear simultaneously before the place, driving in all outposts at once, and cutting off all detached parties that may be out foraging, &c. All the available Cavly., Mtd. Infy., and H.A., should be used in this operation, and if well handled, the movements of the investing force should be kept concealed from the enemy. It demands the very nicest arrangements as to time (to be made by the C. of the S.); in the routes given to the several columns it must be laid down imperatively, that, come what may, each column is to be in the locality, if not in the exact spot, each evening that is indicated in the route. This route should be copied into the pocket-books of the O.C. each column and his S.O., and this should be done so that, if it fell into other hands, no one could divine it to be an order of march. No other copies of it are to be made. If each day's movements were written upon pages in different parts of the book and lettered, the first day being A, the second B, and so on, any one reading the book would only find at different parts of it descriptions of various places with the best positions for encampment, &c. The true object of the movement should only be known to those 2 offrs., but a false one must be found, and when

within 1 or 2 days' marches of the place, excuses must be found and made the subjects of general conversation for having deviated from the previously announced intention, the true one being denied up to the last day. There is no operation that can test the efficiency of the staff more than this one.

2nd. THE RECONNAISSANCE OF THE PLACE must be effected by driving the garrison well within the works, when a close inspection of them and the ground in their vicinity can be made. There are but few places in Europe of which some plans cannot be had; the roughest will be of the greatest assistance in coming to a decision as to the point or face to be attacked. The C.R.E. having made the minutest possible inspection of the works, will draw up a plan of attack, which he will, if necessary, explain in detail to the commander. The mode of conducting this operation is described under the head of "1ST CLASS RECONNAISSANCES." For all subsequent operations of the siege, it is most important that staff and R.E. offrs. should study the almanack well, and keep before them the hours of sunset, sunrise and of the moon's rising and setting, so that all possible advantage may be reaped of every hour of darkness.

3rd. OPENING AND CARRYING ON THE WORKS.—Soldiers are apt to think that during a siege the engineer should alone be the directing element; it is a great mistake; he can only form the plan, but almost the whole of the details for carrying it out must devolve upon the troops, and consequently the staff, if they do their duty, have lots of work. Apart from their duties in camp, which have already been fully gone into, it is their duty to see that the communications between Divns., and parks, and trenches are properly established, and that the reliefs of the trenches are duly carried out at the hour, and in the manner appointed. A staff officer should conduct each relief to the trenches, and hand it over to the S.O. on duty there. The guard of the trenches should be about $\frac{3}{4}$ths of the strength of the garrison. The camps should be sheltered from view of the place, at about 2 or 3 miles distance from it, according to the nature of the ground. The nearer they can safely be placed to the trenches, the better; as every extra mile to be marched over is of great consequence to hard-worked men. The R.E. and R.A. park must be above all camps screened from its view and fire; their position must depend upon the roads, as it is well to have them near the main line of communication running to the rear and towards the centre of attack. If none exist in the latter direction, one should be laid out as soon as the position is taken up. It is also essential that roads, or at least tracks, marked by a line of large-sized stones, should be laid out from the parade-ground of each Divn. to the spot where the reliefs enter the trenches. It is well sometimes to erect cairns of stones in prominent positions along their track as land-marks.

The magnitude of the siege must decide whether the trenches are to

commanded by a general, brigadier, or colonel, and also as to the staff that should attend; as regards the latter, I am of opinion that the offr. or offrs. required for this service should have no other duties to perform. Say that 3 have been named for this service, 1 to be always in the trenches; I am sure that the army would reap incalculable benefit from this arrangement. A line of electric telegraph should be laid down between army Hd. Qrs. and the parallel nearest but one to the enemy, where ought to be the Hd. Qrs., as it were, of the trenches. The names of all F.Os. to do duty with the guard of the trenches each day and each night, and the exact strength of the latter, with full details, should be notified some hours before they reach the trenches to the S.O. on duty, who, acting under the instructions of the G.O.C. in the trenches for the time being, will detail the C.O. for each parallel and sap, and those that are to command the various working-parties. The senior R.E. offr. should be in the trenches with the general at least an hour before the reliefs arrive, to explain what he wishes done, and the number of men he requires to do it. The working parties must then be told off by this S.O. for the various batts., &c. In fact, every disposition of the men for each tour of duty should be laid down in a pocket-book some time before the relief arrives. The S.O. will meet it, as it enters the trenches, and without halting the men, as they pass down the first boyau or approach, will tell off the several corps. The strictest silence to be maintained by the reliefs going on and coming off duty, any remissness upon this point to be severely punished. It is most essential that every battery should have a signboard erected in it, giving its number in large characters, and if the trenches are extensive, finger-posts should be placed wherever parties could go astray, pointing out the way 'to No. —— battery,' &c. These little but most important things were never attended to before Sebastopol, because there was no organised trench staff. It is the duty of the staff to see that the men have means of obtaining drinking-water. They will supervise generally the duties in the trenches under the general's orders, bringing to his notice all irregularities, &c. To do this well they should make frequent rounds of the trenches during their hours of duty; they must see that the conservancy of the trenches is properly attended to, and that a sufficient number of latrines in safe places are provided. The dispositions for protecting the working party will be made by them. The night that ground is first broken, the outposts of the enemy must be driven in. This will be done everywhere, opposite all positions occupied by the several corps of investment, and as it is taken for granted that it has been done for several previous days, it is to be supposed that the garrison remain in ignorance until the next morning of the exact front opposite which the trenches are to be opened: their attention may be drawn to another direction by a few men being employed here and there along some 1000 yds. making a noise with pick-axes, by occasionally showing a small light for

a moment, and by constantly talking. It is easy in this manner to cause it to be believed that the trenches are to be opened there. When this has been done the 1st parallel will be traced by the R.E. offrs. on duty, (in the twilight) just before it is dark. A covering party of about ⅔rds of the strength of the garrison to protect the working party must be told off, to be partly composed of the troops employed in driving in the enemy's piquets. Strong parties must protect each flank of the working party; they should lie down under the nearest cover; the nature of the ground must determine the position of the covering parties, who should be placed also lying down about 100 yds. in front of the working party, having sentries posted again in front of them about another 100 yds. The reserves should lie down just a few yds in front of the working party. When these distances can be safely increased it is advisable to do so.

The working party to consist of one man for every 2 running yds. of work to be performed. A large number of S.Os. should be employed to conduct this party, and in order that there should be no confusion in placing the men in the positions they should occupy when at work, a rough division of it should be made on paper previously, a S.O. being told off to every 300 or 400 yds., who should accompany the R.E. in tracing it, and make himself well acquanted with the locality, so that when he joins the working party on their division parade-ground, he should have no difficulty in leading it straight to its appointed place. He should have put down some marks, such as a stick or a small pile of stones, to mark the right and left of the portion his party is to execute; previous to conducting them he should have made up his mind exactly as to the precise paths he intends to follow in leading them to their position. All working parties should enter that alignment on the same flank of their portion of the work, to prevent confusion, and then extend regularly towards the other, each man being 6 ft. apart; those to extend to the right should march from the tool depot left in front, and *vice versâ*. It is of the utmost consequence that not a moment should be lost, and that as soon as each man is placed he should at once commence with pick and shovel. These working parties should parade at the R.E. park, 1 or 2 hours before sunset, to receive their tools from the R.E offr. in charge of them, each man taking a pick and shovel. The working party that is to break ground should take no arms with them, as they are well protected by a strong covering party, and the 1st night they are not likely to be disturbed by sorties; all subsequent night working parties should be armed. The usual tour of duty for a working party is 8 hours, but in the formation of the 1st parallel it is advisable to keep the first working party employed until an hour before daylight; say that ground is actually broken at 8 P.M., by 4 A.M. a trench 3′ deep, 5′ wide, and 6′ long should be completed by every man; it is advisable to arrange so that the night-working party should be relieved before daylight. As soon as day begins to break,

covering parties must be withdrawn, their places being taken by a trench guard at the rate of one man to every 2 yds.; for as the working party have their rifles and are distributed in the same proportion, there will be, in case of a sortie, a man to every running yard of trench. Concealed in some undulation of the ground, about 500 or 600 yds. in rear, there should be strong reserves of Infy.; and upon each flank, well under cover, there may be a squadron or two of Cavly., if the ground is favourable for that arm. This is all the more necessary if any Cavly. are shut up in the place. It may sometimes be expedient to keep some H.A. guns with these flanking detachments, or have them ready at a short distance in the rear. The senior S.O. on duty every twelve hours should make a full report of all that takes place, during his tour of duty, to the C. of the S.

4th. THE ASSAULT.—The breaches having been reported practicable, or the fire of the place having been completely reduced and other favourable circumstances presenting themselves, the G.O.C. determines upon assaulting the place. The following are general rules that should not be forgotten in drawing up the order for doing so. Knowing the history of the 8th September, 1855, do almost everything in a manner exactly the reverse of what was then arranged for our assaulting detachments—I cannot call them columns. It is only by pushing on your masses to the point attacked that you can succeed. If your advanced parties capture the work, and are driven out from want of support, it is not the fault of the soldier, but of the offr. who planned the operation. It is no time to talk of loss of life: if you fear, or cannot afford to lose numbers, try something else, but do not in mercy's name attempt an assault. The commander must be in direct communication with the assaulting troops. He should, therefore, be in the parallel nearest the breach, or if trenches have not been opened, he should be under the nearest cover. The attacking forces to be divided into 3 portions: 1st, the storming parties; 2nd, supports; 3rd, reserves. Each of the first 2 to be equal to about $\frac{1}{2}$ the garrison of the work to be assaulted; the reserve to be equal to the whole or certainly $\frac{3}{4}$ of the garrison, and to be well placed for following up the supports. The nature of the work to be assaulted must determine the number of assaulting columns and the manner in which the storming parties are to be divided. It is most essential that attacks should be made upon several places at the same time, one or two only being real ones. The false ones should be at places far away from the others, and large numbers of men should be shown to give them an imposing air. The real ones must have ladders if there are deep ditches, and a certain number told off to carry tools, as many of the latter as possible being R.E. Each column should have as many R.E. offrs. as possible with it, and to be composed of the largest possible organisation, so that battns., and brigds. should be as little cut up as possible. Upon every occasion, have the party that is first to enter the enemy's works composed entirely of volunteers, and

led by volunteer offrs. If the result is a success, all the survivors of these volunteers should be rewarded and petted in every possible manner. If this is done at your 1st. siege, the 2nd made in that war will be an easy affair. When it is possible to do so, keep up the heaviest of artillery fires upon all parts of the work where it can be done without danger to your troops. A firing party should be thrown out right and left of the stormers, who should join the support when the place had been entered. Cram on your reserves close on the heels of the supports; remember that the slightest check costs many lives, and that of all the reckless operations in war, a feeble assault, feebly supported, is the worst. If, as I said before, the advanced parties force their way in, and remaining there some time are subsequently turned out, it is a blot on the commander's escutcheon which should never be forgiven. The manner in which the garrison does its work must determine the hour of assault. The configuration of the ground and the size of your trenches will also influence it, for if you can get no other cover for your supports and reserves, you must assault at daybreak, so as to be able to get them in their proper places under cover of the night.

Escalades.—It is a rash operation to attempt to escalade an escarp over 25′ in height; the ladders when placed in position should always project at least 3′ above the ditch; 2 sets of ladders are required, one for the descent into the ditch, the other for the ascent of the escarp. When placed in position, the slope of the ladders should not be greater than ¼. Our scaling ladders are made in lengths of 6′ and 12′ each; 4 men can carry an 18′ ladder (about 100 lbs.) and 6 men a 24′ ladder (about 135 lbs.). Excellent scaling ladders can be made of common bamboo. The tips of ladders to be used for night surprises should be muffled; troops to be employed in an escalade should be drilled to the work beforehand.

Siege Trains.—Counting the enemy's guns at 1 to every 15 yds. of those works whose batteries can bear upon you, the besieger should have 3 to every 2 guns of the enemy, and from 10 to 15 p.-c. spare to provide against contingencies. We have 2 sorts of units from which siege trains are made up. (See page 47.)

Our guns are not yet fitted with overbank carriages; if we attempt to carry on a siege with our present carriages we must lose heavily at our guns in consequence. To begin the siege, 500 rds. per gun is wanted, but at least 3 times that number will be required for a siege of ordinary duration.

Defence of Places.—The duties of an offr. appointed to command a fortified place are to make himself thoroughly acquainted with every inch of ground within 2 or 3 miles of the glacis (this is a duty equally binding upon all staff and R.E. offrs. under him), and to have fully detailed lists made out of all the warlike material. The C.R.E. to report upon the defences and of the work that should be done. The heads of all departments

send in reports as to their wants, and the means at hand of supplying them in case of a siege. Steps to be taken at once for remedying all defects complained of, and for supplying all their wants. As long as the enemy is still distant more than 3 marches, the troops ought to be encamped outside the works, the main body to be some miles off. This is a good precaution on the score of health. The commandant and his staff should study the weak parts of the line of defence and endeavour to rectify them.

If there is a civil population, the police service should be most strictly carried out, and lists made of those that are to be turned out as soon as there is any prospect of attack. All allowed to remain to be forced to lay in provisions for the same length of time that the garrison is prepared for. The necessary sanitary arrangements can be carefully gone into, and an organised system established for putting out fires by a body of the civil population. The fire-engines to be inspected, and repaired if necessary. The best buildings to be prepared as hospitals. The water supply to be looked to, and measures taken for increasing it if there is any chance of its being interfered with by the besiegers. The provision of bomb-proof accommodation for the garrison to be reported upon by the C.R.E. Supplies of rough timber for this and other purposes to be collected from the country. All cover within a mile of the works to be destroyed. All suburbs and houses without the fortifications to be levelled. The civil population to be forced to assist in all these works up to the time when it shall be deemed necessary to force them to leave the place. Spare your soldiers up to the last moment, and get as much work as possible done by the non-combatants. The internal communication to be improved, and measures taken for destroying all those outside the place that can be of use to the enemy. As to gain time is the one great object of the defence, every little bridge destroyed that the enemy must repair adds so many days or hours to the existence of the place. If the provisions collected are in grain, preparations must be made for grinding it. If biscuit is to be had, it should be kept as the last stand-by. Every endeavour should be made to draw upon the resources of the surrounding country up to the last moment, and to leave as little as possible there for the enemy. If there is no time or opportunity for collecting supplies from outside, all those in possession of the inhabitants and private individuals should be seized, so that equal distributions may be made to every one during the siege: unless this is done, some may be living luxuriously whilst others are in want if not starving. If this had been attended to, Metz might have held out longer, and the garrison of Lucknow would have been better fed. Distribute your magazines of powder and provisions as much as possible, looking to the eventuality of fires as regards the safe custody of both. The outpost duty should be well organised, as also the means of obtaining information of the enemy's movements by spies, &c. If the inhabitants are hostile,

they must be disarmed, and the most careful watch maintained over their movements. The garrisons for all parts of the works and outworks to be detailed most accurately, and provisions made for sorties. As soon as the enemy penetrates to within 3 days' march of the place, his movements must be carefully watched by a small force, so lightly equipped that it should have no *impedimenta*, so that it can harass his advance as much as possible, and learn his intentions by a well-organised system of patrols. The best marksmen of the garrison to be employed in constant skirmishing with the enemy. The morale of the defenders to be maintained by every possible means; their honour and patriotism to be appealed to; their belief in succour from without to be instilled into their minds. When the enemy approaches, every advantageous position of ground to be obstinately contested, as long as it can be done without compromising either the safety or morale of the troops, the main body of whom are to be kept outside the works as long as it can be done with safety, and the efforts made to drive you inside them resisted in every possible way. When forced to retire within them, endeavour to ascertain from prisoners the enemy's intentions, to find out the number of guns and their calibre in his siege trains; is he provided with scaling ladders: has he large stores of sandbags, gabions, &c.; what is his strength; what face he means to attack, and where he has encamped. Small reconnoitring parties can do much in this way. Every night an offr. with a few men, knowing the localities—the very hedges even—can creep up near him. When the trenches are opened, the amount of energy to be displayed in sorties must depend upon circumstances such as the probabilities of being relieved, and the strength and spirit that animates the garrisons. If the siege is to be a long one, the energies of the defenders ought to be husbanded, lest from always in these sorties having in the end to give way, the besieged should become disheartened. However, the longer a bold front can be shown, and the longer you can maintain yourself beyond the glacis, the longer will you be respected by your adversary, and give confidence to your people, and the longer you will be able to annoy the enemy. A few well-directed sorties that strike terror are of more avail than a series of partial ones which kill but few. As soon as the enemy's intentions are pronounced, the face attacked should be retrenched. The governor should remember that as long as resistance can be offered, he is bound to show it, and that if he fail to do so, he is no longer worthy to be called an Englishman; indeed, he deserves to be shot if he exhibits any weakness in this respect. When all hope is past, then, and not till then, is he justified in making terms, which he can generally secure upon fair conditions if his defence has been determined, and if he can show that he still has the means of holding out longer. Even at the last moment, if he still commands a disciplined body of men who are in good heart, he may perhaps hope to cut his way out and join his armies in the field. In doing so, if he

carry off ⅔rds of the garrison that remained to him, it is well worth trying. The heroic defence of Genoa in 1800, and of Jellalabad should be read and remembered. These memoranda are only intended for use when the besiegers are of a civilised nation. When they are Asiatics, or indeed any barbarous people, never surrender as long as you have supplies sufficient to support life; when they fail, then the last act of the drama must be to cut your way out. Never surrender your arms and ammunition to such an enemy. As long as you are armed and keep together, you can manage to keep any number of Asiatics at a distance. The story of the faint-hearted and ill-advised garrisons of Cawnpore and Cabul should never be forgotten. In attacking and defending places, all soldiers employed at night as sentries near the enemy, and the small parties or chains of skirmishers thrown forward to watch the enemy, should wear their grey greatcoats. Our coats, when new, are a little too dark, but when some time in use they are, next to the Indian Karkee and the Russian light brown, the best of all colours for night work.

Convoys.—The nature of the country and the width and character of its roads, the disposition of the inhabitants, the distance that the enemy is from the L. of C. and the degree of enterprise that he may be given credit for, will decide the difficult question as to the strength and composition of the force to be detailed as guards for convoys of stores, provisions, or prisoners. If the waggoners' loyalty is doubtful, additional force will be required. If the country is open and the inhabitants hostile, it is a difficult operation to conduct safely a large number of waggons for a number of consecutive marches, for if the enemy is strong in Cavly. or Mtd. Infy., he will cut in upon your convoy at some weak point. Under all circumstances, the arrangements for the march and the halt at night should be made as if the enemy were known to be near. Attacks upon convoys should be made on a flank whilst the head, delayed by some prepared obstacle, such as a broken bridge, trees fallen across a hollow road, &c. &c., is also engaged. No matter what may be the force detailed, the O.C. it will, before starting, examine the carts, waggons, and animals, to see that they are in good working order. He should have from 2 to 5 per cent. spare waggons, according to the distance to be marched, and a supply of spare wheels, poles, shafts, traces, ropes, &c. The total number of carts should be divided into divisions of about 100 each, those being again subdivided into 4 sections of about 25. Each divn., and if possible each section, to be in charge of a transport offr., who will have in his pocket-book an accurate list of the waggons and their contents, of the driven horses, &c., in it. The carts carrying the most valuable stores to be always at the head of the leading division. If there are any pack animals, such as camels, mules, elephants, &c., they should also be divided into divisions and sections, and should precede the wheeled conveyances, or if the nature of

the country will permit, they should march on one or both flanks, leaving the road clear for the waggons. All should march upon the largest possible front. On most roads waggons can go two abreast ; they should have 4 ft. between them. In South Africa the waggons marched at times 4 and 5 abreast. To calculate the length of road your convoy will occupy, see Table in article on "MARCHES." The average breadth of waggons may be taken at 5 ft. In an ordinary country the rate of march is 2 miles an hour. The distribution of the force must greatly depend upon the length of the line of waggons ; but under all circumstances the O.C. it must especially avoid frittering away his strength with a view to protecting every part of the convoy, as by so doing he is strong nowhere : he must endeavour to keep his men together. It is a good rule, applicable to most circumstances, to divide your force into 3 equal portions : ⅓rd being in the centre as main body and reserves ; ⅓rd furnishing the Advd. Gd. and all detachments required between it and the main body ; and the other doing the same as regards the rear. Infy. is more especially required with the Advd. and Rr. Gds. as the main body of the Cavly. and Mtd. Infy., being with the main body so that reinforcements can be rapidly sent from it to any point that is attacked. If the country is open, it may be advisable to divide the main body into two, one to march on each flank at about 200 yds. or 300 yds. from its ordinary position in the line of march. The same disposition would equally apply to all other bodies placed anywhere along the line of waggons when the country admits of it. If there is any suspicion as to the hostile disposition of the drivers, a strict watch must be kept over them by small parties of 3 or 4 mounted men told off to every couple of hundred yds. The front, flanks, and rear should be well watched by small patrols of well mounted dragoons, to a distance of from 2 to 3 miles. The Advd. Gd. composed of all three arms, should be about 1 or 2 miles in front. With it there should be a small party of pioneers or R.E. carrying tools. The Rr. Gd. should be close to the rear waggons. The O.C. the whole, as well as of the various parts, must remember that the object is to get the convoy over a certain extent of country without losing a cart or animal, and that they must only fight when they cannot accomplish their object without doing so. He may sometimes have to act offensively, to gain time for the convoy to pass a river or some other obstacle, or he may find it necessary to drive off small parties that annoy him with long-range fire ; but having secured his object, he must not be led away by success to follow the enemy up. It is of great importance, that whatever fighting be undertaken, whether in attack or defence, that the march of the convoy should not be delayed thereby. If attacked in force beyond his power of resistance it will be for the commander to decide whether he cannot save a portion by sacrificing the rest. If he is overpowered, nothing remains but to concentrate all his force, and mounting his infantry on the horses taken from the waggons

make good his retreat, or in that manner cut a way through the enemy. All waggons breaking down on the line of march should have their loads distributed amongst the others, and should then themselves be set on fire.

The selection of good defensible positions close to water for the animals, and on firm, good ground that is easily accessible from the road you are marching on, in which to park the convoy for the night, is of great consequence. Whatever may be the form which circumstances may require the park to assume, the guns should be at the angles, so as to sweep the faces. Natural obstacles, such as streams, should be selected to protect at least one of the faces. Strict watch to be kept at night over the animals and drivers, when there is the slightest chance of the latter being in the enemy's interests.

Convoys, especially of provisions, are but little required now in European wars, for the main lines of communication are along railroads, or rivers navigable by steamboats. However, in India, many years must elapse ere similar facilities can be expected. During the mutiny the writer took part in convoys where the carts alone extended 5 or 6 miles along the road, from which the enemy's cavalry was only kept at a distance by the great range of our arms, which told so much in our favour in an open level country.

The Laager.—In South Africa every defensive work is styled a "Laager," but here I refer exclusively to the waggon laager so commonly formed during operations in that country. In trace it is either square or oblong, almost always the latter. When each ox is allowed 36 sq. ft. the smallest sized laager that will hold the oxen, is that formed with 60 waggons; if the space per ox be reduced to 27 sq. ft., 48 waggons will suffice. The waggons are formed in single rank in a hollow square, the axles touching, and with their poles outwards: the most common formation is shown in diagram: they are then in a position to march quickly when the animals are hooked in. It is a good plan to lock the wheels, and fasten the wheels of each waggon to those next to it. The men and animals to be inside the square; a shelter trench should be formed along the outside, close to the waggons, so that with men in or on the waggons, a double line of Infy. fire can be obtained. If time and circumstances permit, the best form for the bivouac of a very large convoy of waggons, when attack is possible, is a large square laager with the waggons formed as described, to contain the animals, drivers and all non-combatants, having two small redoubts or works formed of shelter trenches at opposite corners, as shown in diagram. The faces of the laager are thus protected by a strong flanking fire. When the convoy consists of camels, they should at night be formed into a close column, their legs tethered, their heads inwards, and their saddles and loads piled up round the column as a sort of rude parapet. If trees or bushes are to be had, the strongest possible fence should be formed all round both the square containing the animals, carts,

&c., and also round the protecting works at the diagonal corners. It was s
in this fashion that our zerebahs were formed at our various desert posts in n

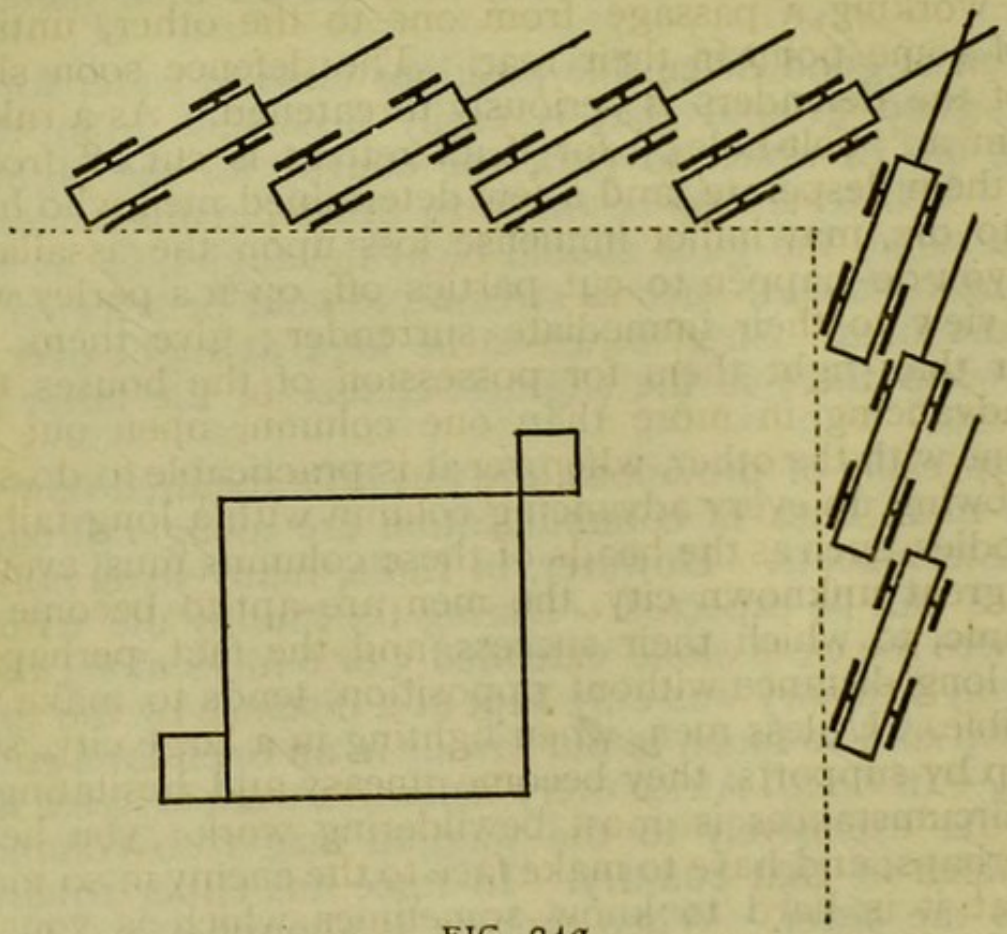


FIG. 24*a*.

the Soudan. If your enemy is a determined savage like the Soudan Arab
each column should carry with it plenty of entanglement wire.

STREET FIGHTING.—To be considered under two heads: 1st, fighting to
obtain complete possession of a city or town into which you have forced
your way, but where the defenders are still prepared to resist; 2ndly, the
suppression of city riots or of insurrection in a city which you hold with a
garrison, but where the population is hostile.

The fighting at Lucknow during the mutiny presented examples of both

1st. It is of great importance to obtain a plan, no matter how rough
showing the streets and the position of the public buildings, and of a
squares, or other open spaces where large numbers of the enemy ca
assemble. If possible, find out from spies where his main positions are
and the quarter of the town or the buildings that he has especially fortifie
as an interior keep, &c. To open out one or more roads to this centra
position, or to some commanding point in its immediate vicinity, so as,
possible, to cut his forces into two or several parts, and prevent them fro
assisting one another, is the first great object to be attained. Havin
selected the route or routes by which you mean to force your way, begin b

seizing the houses on both sides. When a column finds its progress barred by barricades and the fire from the adjacent houses, every endeavour must be made to turn such positions, by using by-lanes, breaking through houses, and working a passage from one to the other, until you obtain possession of some point in their rear. The defence soon slackens when the retreat of the defenders is seriously threatened. As a rule, it is better to allow them a "bolt-hole;" for if all retreat is cut off from them, it is apt to make them desperate, and a few determined men who have made up their minds to die, may inflict immense loss upon the assailants in street warfare. If you do happen to cut parties off, open a parley with them at once with a view to their immediate surrender; give them any possible terms, sooner than fight them for possession of the houses they occupy. If you are advancing in more than one column, open out lateral communication one with the other, wherever it is practicable to do so. Be most careful in following up every advancing column with a long tail of supports, for if small bodies, such as the heads of these columns must ever be, become isolated in a great unknown city, the men are apt to become uneasy and subject to panic, to which their success, and the fact, perhaps, of having penetrated a long distance without opposition, tends to make them all the more susceptible. Unless men, when fighting in a large city, see their rear well closed up by supports, they become uneasy and hesitating. Fighting under such circumstances is most bewildering work: you hear firing all round you, perhaps, and have to make face to the enemy in so many different directions, that it is hard to know sometimes which is your true front. With the head of each column there should be a party of R.E., provided with hatchets, crowbars, and powder bags. A very strong door can be blown open by 10 lbs. of powder, even if barred and bolted. A rifle bullet fired into a lock will generally destroy it. If the roofs are flat or double, it is essential to make a way along them, when the houses are held by the enemy: if the roofs cannot be used, openings must be made with crowbars, from one house to the other in the uppermost story. In this manner a passage may be opened into the centre of a city without great loss; whereas if the columns are pushed through the streets without obtaining possession of the houses on each side, the losses are sure to be very great, and the operation has a demoralising effect upon the men.

2ndly. *City Riots.*—To suppress a city riot or the insurrection in a town in which you are garrisoned, it is essential to occupy such positions within it as will enable you to isolate the quarter which is the main stronghold of the insurgents. Having done so, endeavour to divide it up into sections isolating them one from the other as much as possible. Never attack barricades, or positions, in cities with brute force, but by seizing upon houses or posts in their rear, or on their flanks, force the enemy to become the assailant. Much may in some cases be done towards bringing a hostile

population to reason, by cutting off their supply of provisions and water. Confine the mobs as much as possible to the streets by holding the squares and open places. A mob if allowed to assemble in an open place, soon realises its strength, which it cannot well do when confined to narrow streets where it is easily controlled by small bodies of troops. Make flank attacks on the mob as it moves along the chief highways, and so break their columns up. A couple of heavy waggons or omnibuses driven from a cross street into such a column and then halted and its wheels taken off, is an admirable plan for breaking up a column and retarding a mob's movements. Keep your troops out of sight as much as possible until the moment arrives for them to act; the police, and at home the special constables, should be the first line, and the soldiers should only put in an appearance when the first line had failed to accomplish the object in view. Troops should hold the railway stations and all the other important points so as not to have any great distance to force their way to any threatened locality; it is very important to have all your posts connected by telephone or telegraphs, and if possible by underground wires.

WARS WITH SAVAGE NATIONS.—As wars like those in Zulu-land, New Zealand, Ashantee, and in the Soudan, may have frequently to be undertaken by our army, a few lines on the subject of bush fighting may not be out of place here.

To carry out successfully and quickly a war against a savage nation, something in addition to ordinary strategy in the general, and more than mere drill-book knowledge in the company offrs. and private soldiers is necessary; you must to a great extent adopt the enemy's mode of fighting, which is invariably well suited to the country they occupy; their tactics carried out by highly-disciplined, well-armed soldiers will generally be successful, but you must strike hard and strike quickly. They never expect Europeans to venture into their fastnesses, and become demoralised if they find their enemy as well able as they are to get through their bush, or to climb their steep and rugged mountains. Zulu and Maori wars are to a great extent wars of stratagem and constantly varying tactics: surprises, ruses and treachery are the savage's most powerful weapons, and with some races night attacks are very common. It is, therefore, most desirable that their habits, customs and mode of fighting should be well known to every offr engaged. In grassy countries like Natal, the American prairies, &c., beware of being burnt out; as a precaution against such a disaster, encamp on the banks of rivers, which protect you against fire from at least one direction, or halt only on the ground over which fire has already swept, or you can burn a strip yourself with care round your position. Against night surprises your best protection, next to a most watchful look-out, are obstacles, either natural ones, such as rivers, streams, marshes, precipices, &c., or artificial ones, such as entanglements made with wire, or Abatis made of prickly pear

thorny bushes, &c., if there is time, planted like hedges. All parties thrown out to the front and all sentries in front of them again, must be similarly protected. Broken bottles are very good as an obstacle against unshod savages. When attacked at night your men should lie down and fire volleys by word of command, but no individual file firing should be allowed; indeed, to reserve your fire as much as possible has an awe-striking effect frequently upon the night assailant, he does not know what you are at, and your cool indifference at his approach tends to frighten him, whereas if your camp is all noise and bustle, your evident confusion gives him pluck, and encourages him to attack boldly.

Always distrust Eastern and savage nations in war; allow no assurances on their part to cause you to relax your precautions in the least. This rule was found to be essential in the China war of 1860, and the ignoring of it in the first Afghan war, and at Cawnpore in 1857, led to disaster. Savages who have any knowledge of British soldiers will not as a rule attack or fight them in the open; they fly to mountains, forests or difficult country with the instinct of the wild animal. You can best meet their tactics by sudden, secretly-planned and rapidly-executed movements, if your troops are well disciplined and well in hand; such movements if executed during the night are doubly efficacious, but even if it be thought expedient only to attack by daylight, the operation up to the actual onslaught should be carried out under cover of night. Rapidity of movement and sudden unexpected attacks demoralise an undisciplined enemy. If you wish to fall upon him unawares, your marches must be made at night, in perfect silence, by little frequented paths, no fires to be allowed during temporary halts, and in some instances smoking even to be forbidden when in his vicinity. In marching at night through forests or difficult ground, the head of the column should go at a slow pace, with halts every $\frac{1}{4}$ or $\frac{1}{2}$ hour, to allow of closing up, for in the dark the tail of even a very small force is very likely to lose the touch with the head unless the pace is leisurely, and the halts are frequent. Never omit to have one of your best officers in rear of the column.

As savage, uncivilised nations generally occupy uncultivated territory, where but few or no supplies can be obtained, the enemy having most probably driven away his cattle to distant places of security, the commissariat question will generally be your greatest difficulty. Every one, offrs. included, employed upon short expeditions, in healthy and temperate climates, should therefore carry 4 or 5 days' biscuit and groceries, slaughter cattle being driven. No spirit ration to be allowed. In hot and in very mountainous countries, where it is essential that the English soldier should be laden as little as possible, 1 day's biscuit should only be carried, the commissariat supplies being carried on mules, which can practically be taken wherever infantry can go.

In planning a war against an uncivilised nation who have perhaps no

capital, your first object should be the capture of whatever they prize most, and the destruction or deprivation of which will probably bring the war most rapidly to a conclusion. Thus the capture of their cattle and the destruction of their crops, and of the grain stored in their kraals or villages, in depriving them of food is most efficacious. Our expeditions into the hills on our N.W. frontier in India frequently result only in the burning of villages containing nothing valuable, and which are easily and quickly rebuilt: this is bad policy, for it enrages without seriously punishing them, whereas a raid into the territory of a hostile tribe just at the season when their crops are ripe can inflict serious loss by the destruction of their standing corn, &c. In the same way the capture of a Kaffir tribe's cattle soon brings that tribe to reason. With all savages to kill its warriors is, however, invariably the most efficacious policy, and it should therefore be regarded as of primary importance. In savage wars, making provision for your wounded is one of your greatest administrative and tactical difficulties. The savage takes no trouble about his wounded: if he thinks of them at all, it is to chuckle over the fact, that they will be well treated when they fall into our hands whilst he sharpens his knife with which he means to torture and kill any of our wounded that may have the misfortune to be left behind unprotected. Fighting against a Christian and civilized people you can drop your wounded anywhere, either on the march, or in an attack upon the enemy's position. Not so in the Soudan for example, for there, as each man fell wounded he had to be carried for protection inside that movable and living redoubt, the "Square." This impedes anything like rapid movement during an action, and has a demoralizing influence upon our men, for their horror of being wounded is increased by this knowledge whilst the immediate presence amongst them of mutilated comrades, many of them in extreme agony from their wounds, is not calculated to improve their spirits. In marching through a savage country where the disposition of the inhabitants is uncertain, if the women and children have not been removed, you may generally assume that no attack upon you is contemplated; but if, on the contrary, none are to be seen, you must be doubly cautious.

It is not wise to send ordinary battns. organised such as ours are to such wars. The savage in the bush has many advantages over the English soldier, and it is therefore necessary before entering upon a bush war to reduce them as much as possible. He has lived his life in the bush, and its loneliness, its dim light, and its being without paths does not startle him. Take him into the open, and brave as he may be individually, he often becomes as scared as our men most certainly are when they find themselves in the bush under fire from a hidden enemy. Of all things I therefore consider it to be essential that the very best men in our army should alone be employed in such a war. Call for volunteers, and take 100, or perhaps 50 men out of as many battns. as may be necessary to make up the number

men required, select the best offrs. from each battn. to command their own men, and then select from the army generally the best F.Os. and regtl. staff. With battns. formed in his manner, your loss will be much less than if so many battns. are taken because they are 1st. on the roster, and the war will be brought to an end in a much shorter space of time. (See article on "THE ORGANIZATION OF LITTLE ARMIES.") As fighting in the bush ever resolves itself into a number of little battles between small parties of men, I would recommend that the proportion of company offrs. to N.-C.Os., Rk. and Fl. should be 1 to 20. The men should be armed with breech-loading carbines, and the Elcho sword-bayonet or the naval cutlass, made to fit the carbine, as in the navy. The men should be clothed in very dark grey or khaki (the colour of the uniform used in the Ashantee War was too light for a dense forest), and in other respects equipped as were the troops that marched to Coomassie. All offrs. and sergeants should be provided with pocket-compasses: before each action it should be stated in orders what the compass-bearing of the line of advance was to be. All fighting must be by section, 3 sections of each company being deployed and one kept in reserve. No crowding together must ever be allowed, and when the enemy is approached sufficiently near, he must be rushed at with a ringing cheer, if it is possible to get through the bush to do so. Most brave savages will hold their ground in a bush for ever, if you content yourself with firing at them from behind trees, but the savage knows well that when the white man runs in on him that it is time for him to bolt. When fighting in the bush upon any large scale (as at the engagements of Amoaful and of Ordahsu), where the fighting extends over a large area, and rages not only in front but on the flanks and in the rear, a great difficulty to be avoided is to prevent your men from occasionally firing in a direction that must hurt their own friends. The offrs. with their compasses in hand, should be able as a rule to tell whether it was safe or not to fire in any proposed direction. Be most careful to guard your reserves of ammunition and other *impedimenta* well, keeping parties on its flanks in the bush, and having a strong Rr. Gd. to help those parties when required.

Our attempts to carry on Kaffir wars with Lancers, Dragoon Guards, Fd. Artillery and Infy., dressed and equipped as they would be for a march past at home and commanded in a sort of slow, barrack-yard, field-day fashion, although strictly according to regulation, have never been satisfactory, and have more than once led to disaster. One of the ablest men who ever commanded against Kaffirs, once told me that he was accustomed thus to estimate the enemies he had to contend against in the Cape Colony; the first and most serious difficulty was his own Artillery, then his own regular Cavly. and lastly, the Kaffirs.

The effect of artillery is absurdly small upon an enemy who does not fight in large or even in formed bodies, and whose fighting line is a thin line of skirmishers without either supports or reserves. Guns hamper

your movements considerably by forcing you to manœuvre only on ground where they can operate, and by the difficulty which their necessary protection presents, when moving through wooded gorges, forests, &c., &c. In all these sort of wars, but especially in a bush country, I regard it as essential that every gunner employed should be armed with a revolver. In a thick bush or forest country, like Burmah or Ashantee, rockets are likely to be as demoralising to your own men as to the enemy, owing to the eccentricity of their flight when they strike trees. This is not the case if you are moving over an open, and especially a level, district from which you can discharge your rockets into thickets or large patches of wood, which you wish to clear of the enemy. Hale's rockets, with shell attached, can be used in tolerably level and open countries with good effect, especially against horsemen. War rockets are no longer included amongst our warlike stores and their manufacture has been abandoned. If the bush tracks are good there is nothing better than the 5½-inch howitzer, but if the piece has to be carried by men or mules, the 7-pounder steel gun is far the best weapon, or if long range is required, the 2·5" screw gun of 400 lbs.

Considerable method is required by all C.Os. in bush-fighting; if there is hurry, your force gets cut up into several parts without any connection between them, and it is difficult to collect them again for any concerted action. In no sort of warfare is it more essential to have a small reserve kept intact up to the last moment, for it is impossible to see what your enemy is about, or to know where he is until his attacks have actually developed themselves, and panics are more probable in a dense forest than in an open country. Teach your men to go into the bush: there is no use in lying down and firing; the savage is perhaps better at that game than you are, your only safety is to go straight at your enemy whenever and wherever you see him; this demoralises the savage, and although you may lose a few men in the rush, your loss will be less in the long run than if you endeavoured to turn him out of his position by a heavy fire. As the result of all actions in a dense forest depends upon the company officers, and on their fertility of resource, they must to a very great extent rely upon themselves and act upon their own responsibility: it is therefore most essential that all officers to be employed in bush-fighting should be carefully selected for that duty. The conveyance and protection of your baggage on the march is a serious difficulty in all irregular warfare. To capture an enemy's baggage is one of the first objects of the savage warrior. Its quantity must be reduced to a minimum, by foregoing the use of tents and everything beyond the bare necessaries of life.

In drawing up schemes for small wars against an undisciplined or barbarous enemy, the arrangements for feeding your men will generally be your greatest difficulty. If you have at any period of the operations to halt for some time in order to bring up provisions, you give such renewed cour-

to the enemy as to make him often forget the success you had perhaps already achieved; he imagines you halt from fear. It is much better to postpone beginning the campaign to a late period, so that you may be able to complete all your supply arrangements beforehand, and so be able to carry it through to the end without any subsequent halt, than to rush into it at an early date before everything had been prepared for carrying it out to the end without any pause during its progress. Nothing will demoralise the undisciplined enemy more than rapidity of movement and an unhesitating display of energy and a constantly renewed and prolonged effort on your part. If he on his part obtain a victory, its very success seems to exhaust him and render his subsequent movements slow. He halts to plunder or to rejoice over his victory, and is correspondingly dazed and panic-stricken if when you obtain a success it operates upon you in a different fashion, and quickens your movements and gives increased energy to the blows you follow it up with.

Hill expeditions in India.—It is scarcely necessary to say that the smaller the amount of your *impedimenta*, the easier will be the operation: the season of the year, condition of the crops, scarcity or abundance of water, the distance it is intended to penetrate beyond our frontier, and the probable length of time it is intended to stay in the enemy's country, will all influence the amount of stores you must carry with you. It has been calculated by the ablest of our offrs. skilled in these expeditions that the minimum proportion of native followers to fighting men (English and native) is 1 to 2½ for an operation calculated to extend over from 10 to 30 days; these followers would be chiefly muleteers and dhooly bearers. All the native followers, bheesties included, should be given a military organisation, being divided into squads of about 25 men each under a havildar, there being a jemadar to every 4 of these squads. All, including offrs.' servants, should be armed with their native weapons of sword and shield, a proportion of the best being given pistols. In the hills the pack animals must, as a rule, march in Indian file, and in such order they require 1 muleteer to every 3 animals. For short expeditions no tents should be taken, but if any are considered necessary for the sick and wounded, the bell tent only should be used. In order that the men should be able to move easily in the hills, from 40 to 60 rds. only should be carried in the pouches, the greatcoats should be carried on mules, 30 coats packed in a bed saleeta being a fair load for each mule. A towel and a piece of soap carried in the greatcoat being the only kit required by the English soldier, whilst the coat alone is all the sepoy wants. Woollen clothing, fitting loosely to allow full freedom of action to the body should alone be worn by all ranks of Europeans. A regtl. reserve of 100 rds. per rifle will be ample for most of these hill forays, if all are armed with the same weapon; if not, the reserve should be increased to 125 or 150 rds. per rifle. In many instances it may be

desirable to divide this into a Regtl. and a General Reserve in proportion of 1 to 2.

All offrs., gunners, S.Segts. and others not carrying rifles to be armed with regulation revolvers. Many of our expeditions into the hills of India have failed to accomplish all that was aimed at: 1st, because the use of picked men was ignored; every Tommy Atkins from Whitechapel, Ram Bux from the Benares bazaar, because he had been taught the goose-step, and dressed in the conventional garb of a soldier, being regarded as fully competent to face the Afridee or other hillman, who, a warrior by birth, was engaged in defending his own native hills, and fighting for all he held dear on earth; 2ndly, because the object aimed at was rather the capture and burning of villages instead of the killing of these hill warriors and the destruction of their crops and stores of food; and 3rdly, owing to the inordinate amount of baggage and native followers taken with each column. The Indian offr. who has never carried on war outside of our Indian Empire is apt to imagine that the British soldier is an exotic that must be tended like a sickly school-girl, and that he must therefore have a ration daily, have tents and native servants to wait on him, being unable to "rough it" and bear the fatigues inseparable from hill warfare. The conveyance of rum on mules is very troublesome and difficult, and none should in my opinion be taken, the offrs. being forbidden to take wine; tea easily carried, and that men can do the hardest work without any spirits ration is fully attested by the success of the Red River Expedition. No but S.Os. should be allowed to ride, so that one native servant for every offrs. or for the offrs. of each company of European Infy., should be ample. For some considerable time during the mutiny I had only one native servant for myself as a captain and for my 3 subalterns, and we did very well; our baggage consisted merely of one change of clothes, and the one servant cooked for all four of us. In most of the best-conducted hill expeditions I find that each regt. was allowed 2 servants for the mess, and that for the conveyance of baggage 1 mule was allowed to every 2 staff, or every 3 regtl. offrs. In my opinion this is excessive, and that 15 lbs. per regtl. and 25 lbs. per S.O., with a cooking canteen of about 22 lbs. for the officers of each company, or for every 3 or 4 other offrs., should be ample. For men's cooking utensils, 1 mule per company of British troops, 6 mules per Goorkha battn. and 4 mules per battn. of all other native troops are necessary: the pots, &c., are carried in *kajawahs* (wicker-work panniers covered with leather), or in rope nets. For the conveyance of water from the valleys to the men manœuvring or bivouacking on the hills (in addition to the number of bheesties allowed in the plains by regulation), 4 *pukals* (cow-hide water-bags carried on mules or oxen) are allowed to each British company and 1 per battn. for hospital purposes, and 2 per native company are required: they hold from 15 to 20 galls. For expeditions of about 400

5000 fighting men 2 hospitals only should be allowed, 1 for Europeans and 1 for natives: the system of having a hospital for each battn. is not only foolish and extravagant, but by greatly increasing the amount of *impedimenta* to be carried and protected, it seriously hampers the movements and increases the difficulties to be overcome. The *dandy* is the only kind of ambulance suited to the hills in the opinion of Indian offrs., but it is thought that in many instances cacolets might be used with advantage if mules of sufficient size could be obtained. The pole of the dandy should be of bamboo; each dandy requires 4 bearers (*kahars*). The proportion of dandies allowed is generally 10 per cent. for Europeans, and 12 to each native battn., i.e., about 2 per cent. Axes, billhooks, and other necessary tools should be carried regimentally, one mule per battn. being allowed for their conveyance. When operating in the hills against border tribes, the initiative of attack should always be with us. When actually in presence of the enemy, all delays before attacking, even those entailed by making preparatory dispositions, they attribute to fear, and are emboldened in consequence: the Umbeyla expedition of 1863 is a good illustration of this. Mountain guns and small mortars can be used with good effect when the enemy takes up positions behind *sangas*. In all such expeditions the real fighting unit will be the company: our handy little companies give us a great advantage in this respect, which we shall lose if ever we are induced by the seductive tendency of imitation to adopt the system of large companies which many years ago was introduced for economical reasons into the Prussian army. Captains of companies must use every endeavour to keep their men together, which, even with our small companies of about 100 men each, is no easy matter in a rugged, mountainous district; above all things, do not press or hurry your men, for men out of breath are useless for the final charge; this charge, when made, should be accompanied by loud cheering, sounding of bugles, &c. In all such operations endeavour to impress your savage enemy with the conviction that you despise him as an adversary, and that you are always only too glad to come to close quarters with him; at the same time, you must never omit to take every possible precaution against surprise, and always have a reserve in hand to meet any unforeseen contingency that may arise, for remember you are dealing with a courageous people who are born soldiers. I do not think that night turning movements with a view to surprises, and to getting behind the enemy so as to inflict really heavy losses upon him, have been tried as often as they should have been in our hill warfare in India. The hillmen themselves are much given to night attacks, so when you halt in the evening, your first care should be to make your position quite secure for the night; no precautions should be omitted; a force may be overpowered by numbers and destroyed without incurring dishonour, but if it be surprised, the commander should never be forgiven.

PART IV.

MILITARY BRIDGES.—It would be impossible to give in this little book a article on this subject that would be sufficiently explicit for an officer e tirely ignorant of mechanical contrivances and the art of bridge-makin Every officer should read again and again the works of Haupt and Sir H Douglas. With an army there will always be engineers whose business is to understand bridge-making. All offrs. are, however, at times liable be placed in positions where it may be necessary to cross streams or rive when no R.E. are at hand. There are but few countries that do not affo materials that can supply the place of pontoons, provided only there some one who has the talent to avail himself of them. It is then that "staff officer possessed of resource, with the energy necessary to use properly, may be of more value to an army than the addition of an ar corps." In countries where pine woods abound, the repair or constructi of bridges is comparatively easy, as the straight poles of the "spruce," & are quickly cut and converted into trestles, &c. Engineers who have h experience in colonies or new countries are more useful on service th those whose knowledge is chiefly theoretical, and whose practice is confi to old countries.

When large bodies of troops have to pass a river, and circumstances perm three bridges at least should be made, one for Infy., one for Cavly., an third for R.A., ammunition columns, and the train.* Columns of Infy. R.A., of waggons, and of Cavly. should not be mixed together in pass a bridge. Bridges should always be constructed at right angles to the strea

Superstructure.—That in use with our new pontoon equipment for roadway 9′ wide in the clear, and may be reckoned as weighing 80 lbs. running foot of bridge. It is composed thus: 5 *baulks* (B B in sketch red Canada pine, 15′ 9″ long, $3\frac{1}{4}$″ wide, and 6″ deep: wt. of each 73 l the ends are halved and strengthened with iron plates. Nine of t baulks are used when the bridge is intended for the passage of s artillery. The *ribands* (R R in sketch) are of the same scantling as baulks. They are placed longitudinally over the ends of the chesse keep them in their places, and are secured to the outer baulks by r lashings applied at every 4′ or 5′. The *chesses* (C C in sketch) are planks forming the roadway: they are of pine, 10′ by 12″ by $1\frac{1}{2}$″, weigh when new 50 lbs., when old about 45 lbs. each. In calculating buoyancy of floating bridges the wt. of the superstructure must be care

* This does not necessarily apply to Regtl. Transport.

estimated, for when rough, green material is used, it will frequently weigh as much as 200 lbs. per running foot.

A roadway of 8′ wide in the clear will admit the passage of Infy. in "fours," of Cavly. 2 abreast, and of all description of military waggons in file. 9′ in the clear is, however, a much better and safer width, especially when there is any likelihood of a sway on the bridge. A width of 10′ or 11′ will admit of mounted offrs. or orderlies passing in the opposite direction whilst a column of troops is crossing. To allow for a cross stream of traffic, the width in the clear should not be less than 16′. The width of roadway should not be less than 10′ for the passage of loaded camels, nor less than 12′ if loaded elephants have to cross; 6′ will suffice for Infy. in file, for Cavly. in single file, and for field guns if passed over by hand; 1½′ will admit of Infy. passing in single file. Planks for the roadway (technically called chesses) of 1½″ thick are sufficient for ordinary traffic. For heavy or continuous wheeled traffic, additional planks should be laid longitudinally over the roadway where the wheels pass. In bridges where there are trusses joined transversely overhead, a clear space of 9′ in height is required for waggons and Cavly., of 11′ for camels, and 15′ for elephants. Ramps at the end of a bridge intended for R.A. should not have a greater slope than ¼th. If the ramp is long, the slope for ordinary traffic should not exceed ⅓th. A handrail should always be provided, especially for horse traffic; a single rope on each side will generally suffice.

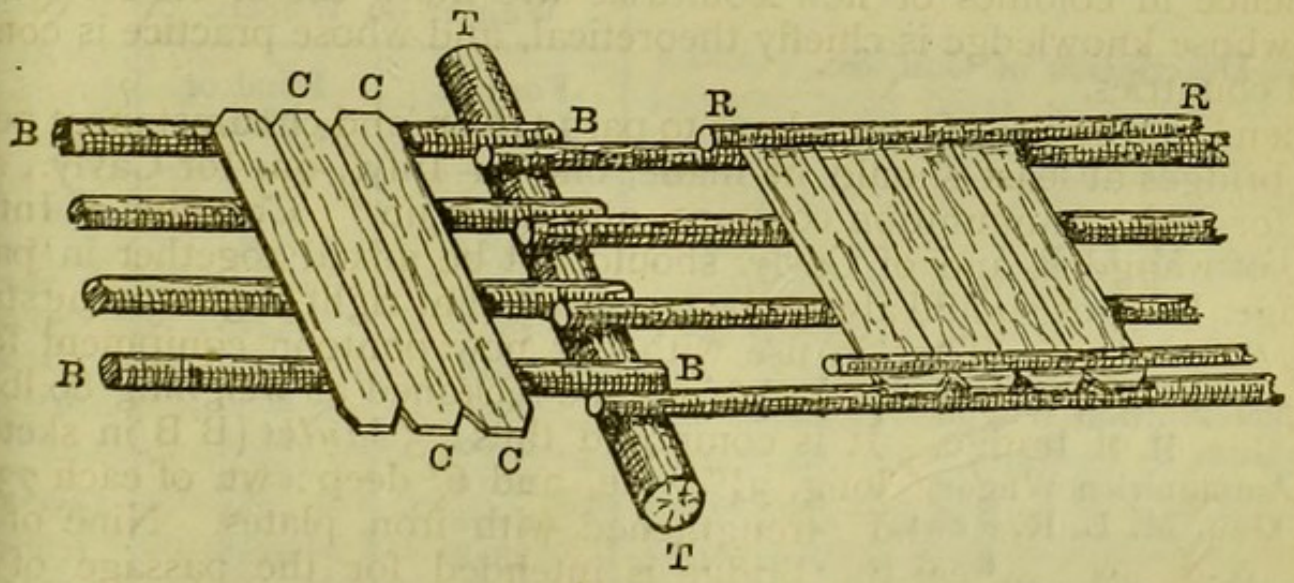


Fig. 25.

In this sketch the superstructure, except the planking of roadway, is shown as made with round unhewn timber. The baulks (B B) must always be close enough together to support the chesses: they should have a fair overlap, and be lashed together on both sides of the *transom* (T T) where they meet. In a bridge of more than 1 bay, if tapering spars are used for baulks, they must be arranged on each transom or saddle so as to be all "tips" or all "butts." The distance bridged by one set of baulks, i.e., the

distance between any 2 transoms, or *saddles*, in boat or pontoon bridges, is called a *bay*. The bays of military bridges are generally from 10 to 15 ft. in length. Five sound deal baulks. 7″ by 3″, or 5 larch spars, 6½″ in diameter, will take Infy. crowded in "fours" across a bay of 15 ft. For such a purpose the transoms, if of a circular section, should have a diameter of not less than 9″. This superstructure can be used with all bridges. The rack lashings are not shown in sketch. If planking is not to be had, straight poles of from 3″ to 6″ in diameter, or two layers of strong hurdles, the ends breaking joint, may be used instead. Bamboos are frequently used most satisfactorily for this purpose in India. In the superstructure for the Blanshard pontoons, the baulks were 14′ 2″ by 4½″ by 3″: the chesses were 11′ 5″ long, by 25″ by 1½″.

Dead weight only produces half the strain due to a moving load. The following weights, *per lineal foot of roadway*, are caused by the passage (live load) of troops in marching order. *Infantry* in file or fours at proper intervals, 224 lbs.: in file crowded at a check, 280 lbs.: in fours crowded at a check, 560 lbs.: *cavalry* in single file, 112 lbs.: in half sections, 22 lbs.; in file crowded at a check, 189 lbs.: and in half sections when crowded at a check, 378 lbs. Average wt. of an unarmed man 155 lbs.: an infy. man in marching order 200: armed man and horse 1400 lbs.

The following Table gives the weight of guns and other military carriages:—

Description of Gun, &c.	Weight on Wheels.		A.
	Fore or Limber.	Hind or Gun.	
	lbs.	lbs.	inches.
64-pr. Gun, M. L. R.	2464	9380	124
40-pr. ,, ,,	2632	5292	121
25-pr. ,, ,,	1708	3416	106
16-pr. ,, ,,	1848	2800	108
,, Ammunition Wagon	2016	2660	93·75
13-pr. Gun, B. L. R.	2100	2128	88
,, Ammunition Wagon	2072	2912	96
9-pr. Gun, M. L. R. 6 cwt.	1792	1876	108·5
,, ,, ,, 8 ,,	1848	2128	108·5
,, Ammunition Wagon	1960	2464	93·75
G. S. Forge, or Store Wagon *	3164	3976	74·5
Pontoon Wagon	1680	2688	120
Wire ,,	1764	2548	88
S. A. A. Cart	..	2128	..

The column A gives the length in inches from centre to centre of bearings of f and hind wheels. The width of track is 62 inches for all these carriages, except the pontoon and wire wagons, which have a track of 70 inches.

* Calculated for a load of 30 cwts.

Unarmed men, crowded, averaging 145 lbs. per man, gives a weight of 110 lbs. *per quare foot of roadway*, which is the heaviest weight that can be brought on a bridge nder any circumstances in the field. *Elephants* cannot be made to crowd together. Vhen loaded with baggage an elephant occupies a space of about 99 square ft. (11′ y 9′). Their average wt. (including their load of 13 cwt.) may be taken as 72 cwt., f which $\frac{4}{10}$ is borne on hind legs, which are 6½ ft. from the fore legs. In calculation must be assumed that a weight of 44 cwt. may be brought on to one foot of an lephant. Elephants unloaded occupy a space of about 55 square ft. (11′ by 5′). The eight of an elephant harnessed into the shafts of a gun may be taken at 66 cwt.; is hind legs are 5½′, and those of the leader 22½′ from the axle of the limber.

Camels, when loaded with baggage, occupy a space of about 70 square ft. (10′ by ′). Their average wt. (including their load of 4½ cwt.) may be taken as 15 cwt., of hich ⅓rd is borne on the hind legs, which are about 4½′ from their fore legs. It must e assumed that a weight of 10 cwt. may be brought on to one foot of a camel.

Pack bullocks, such as are used in India, when loaded with baggage, occupy a space f about 13½ square ft. (5′ by 2¾′). Their average wt. (including their load of 5½ cwt.) ay be taken as 11½ cwt., of which ⅓rd is borne on the hind legs, which are about 3½′ om their fore legs. In calculation it must be assumed that a weight of 3½ cwt. may e brought on to one foot of a pack bullock.

Cattle for Commissariat purposes may be assumed to weigh each about 9 cwt., and hen crowded, occupy a space of about 9 square ft. of standing room.

To each running ft. of a 10′ roadway must be added from about 90 to 120 lbs. as wt. f superstructure.

When troops are crossing suspension, military, spar, and floating bridges, the llowing rules should be attended to:—Infantry must break step, and all music ease; and files or sections must not be closed up. Cavalry will, as a rule, cross in le, but never faster than a walk. Wheel carriages of all kinds, including field tillery and artillery of position, up to the 40-pr. rifled B.L., with trained horses, are cross fully horsed; with unsteady horses, carriages must be passed over by hand. aking out the lead horses and crossing with the wheel horses only is strictly for- dden. Halting on a bridge is to be avoided. If it be absolutely necessary to halt a pontoon bridge, gun wheels must rest as near as possible midway between two oats. Artillery should cross at increased intervals. If the bridge sways so as to ecome very unsteady, the column must be halted, and not allowed to resume its ovement till the swaying has ceased. If heavy guns or traction engines have to be assed over pontoon bridges, special arrangements will be adopted. These rules pply to all suspension, military, spar, and floating bridges. Officers will incur grave sponsibility if they cross a bridge otherwise than in the way recommended by the fficer in charge. When any large bodies of men or large trains have to cross mporary bridges, it is essential that there should be a S. O. in charge of each bridge, nd his orders must be implicitly obeyed by all ranks. Cattle being liable to fright hould be driven over in small numbers at a time, the bridge being given up to them ntirely for the time of their passage.

FLOATING BRIDGES can always be easily made over rivers when either

boats or casks are to be had. An offr. will know at once from the abov data the amount of floating power his bridge requires; to it he will add th weight of the superstructure (generally about 80 lbs., for each ft. of roac way 9′ wide), multiply the sum by the number of ft. he intends the piers t be from centre to centre, and divide by the floating power of a cask, boa log of wood, or whatever is to afford the floating power; the quotient wi be the number of them required for each pier. For instance, a number commissariat tierces are available; each contains 37 gallons, and as gallon of distilled water weighs 10 lbs., the displacement may be put dow at 370 lbs., deduct from it 58 lbs., the weight of the cask, and the resu (312 lbs.) will be the floating power of each; allowing $\frac{1}{4}$th surplus buoyanc each cask can support in bridge 278 lbs.

The bridge to be fit for the passage of field artillery must have a floati power of 525 lbs. per running ft.; allowing for superstructure, the floati power required is, say, 625 lbs. a running foot. It is decided to make ea pier of 20 casks placed in two rows, which will give it a length of about 21 the total supporting power of each pier will then be 5560 lbs.; divide th quantity by 625, and it gives 8′ 10″, the distance that each pier must from the other, measuring from centre to centre. With a floating brid there should always be a guard of skilled men on duty under an offr. repair accidents, bale out water, &c. &c. When casks are used, there shou be pumps of tin small enough to be inserted through the bung, by mea of which all leakage can be pumped out. These pumps are eas made.

In selecting the site for a floating bridge it is very desirable to choose o as near as possible to an existing road, especially if the banks are marshy liable to inundation: to connect your bridge with the nearest hard road often as heavy a piece of work as the construction of the bridge itself. the bridge is to have defensive works thrown up for its protection, t factor must be taken into consideration when selecting the site, as a entering bend of the river is best suited for that purpose. Good holdi ground for anchors is essential: the close proximity of an island, or o rock showing over the water to which the floating piers can be fastened ropes, greatly helps the construction of a floating bridge. The length the piers should be at least twice the width of the roadway to secure stea ness, and they should be connected together at their extremities by *baulks* or lashings. The waterway between the piers should never be l and should if possible be more, than the width of the pier. Whether piers be made of boats, casks, rafts, or of any other extemporized expedie the *baulks or road bearers* (as they are often called) should not, except the case of large heavy barges, be allowed to rest on the gunwales; t should rest on a beam, called the *transom* or *saddle*, which is placed lon tudinally in the centre of the boat, cask, or other sort of pier made use When open boats are used, this saddle can generally be placed on

thwarts, which should be blocked up from underneath to bring the weight directly on the kelson.

Superstructure for floating bridges.—See general remarks on this head at beginning of article on bridges: the same rules apply to all military bridges. For nearly all floating bridges it is necessary to construct piers from each bank, reaching out some distance into the water. To do so, the superstructure of the bridge is simply laid upon horses or trestles; the former have 2 legs, the latter 4 or 6. If the bridge is over a navigable river it may be necessary to make arrangements for the passage of boats through it, by arranging that one or two of the centre piers can be easily detached from the bridge and "dropped-out" when required, or half of the bridge may be arranged to swing to form the necessary opening.

THE PONTOONS used hitherto in our service are of two kinds, known as Blanshard's large pontoon and Blanshard's infantry pontoons. Both are cylinders of tin. The former is 19′ 2″ long and 2′ 8″ in diam., and has hemispherical ends of 1′ 6½″, making the total length of pontoon 22′ 3″; it weighs 476 lbs.; the displacement is 6735 lbs. The weight of superstructure for one bay is 986 lbs., 1023 lbs., or 1120 lbs., according as the interval between pontoons are either 8′ 4″, 10′ 5″, or 12′ 6″, and the respective power of support per running ft. of bridge is 581 lbs., 456 lbs., or 373 lbs. Two pontoons with their allotted superstructure, form a raft. A raft with superstructure for it, and the bay between it and another raft, is carried on one waggon (1560 lbs.); the whole weighing 4800 lbs., intended to be drawn by 4 horses, but requiring at least 6. The Infy. pontoon is a tin cylinder of 1′ 7″ in diameter; 12′ long with conical ends, making the total length 15′ 5″; wt., 141 lbs,; displacement, 1640 lbs.; the superstructure for one bay 200 lbs., making the supporting power of each pontoon 1300 lbs,, or 200 lbs. per running ft. of bridge. Five pontoons, with superstructure for 5 bays, are carried on 1 waggon (1008 lbs.), the total wt. of which with load is 2976 lbs.

Our new regulation poontoon is scow-shaped, and can be used either as a pontoon or as a row-boat; it is partly decked over: its length over all is 21′ 7″: width is 63″: depth, including coamings, 32″: wt. about 900 lbs.: total buoyancy 13,000 lbs.: and tonnage for shipment, 9·685 tons. Each pontoon gives roughly 500 lbs. of buoyancy for each inch of immersion. They are placed in bridge at central intervals of 15′. Each is fitted with 4 rowlocks a side, and with 1 at each end for a steering oar. As a boat it can convey 16 men in marching order besides the crew of 4 (2 rowers, 1 bowman, and 1 coxwain). These 16 men should pack, 10 in the stern-well, and 6 forward: 4 minutes required to pack thus, and 3 to unload. A raft made of 2 pontoons can carry 60 soldiers across a river, either by warping or rowing: 6 men required for its crew. The *Superstructure* has been already described. The new *Pontoon train* is in units of 20 pontoons and trestles, with which a river 120 yds. wide can be bridged. (The establish-

ment of a pontoon Troop is given at page 49.) Waggons up to a weight of 5½ tons can be safely taken over such a bridge. Each pontoon waggon carries 1 pontoon and 15′ feet of roadway: each trestle waggon carries 1 trestle and 15′ of roadway. The newest pattern of these waggons weighs when empty 1828 lbs. each: tonnage for shipment without pontoon, but with superstructure, 7·502 tons. All the R.E. waggons are fitted with springs; the tract of all their latest pattern waggons is 62″: of the old pattern and newest pattern pontoon waggon it is 70″. The pontooners can travel in the pontoons when loaded on the waggons.

The Berthon collapsible boat is now used for light Infy. bridges: it can be used either as a boat or as a pontoon. The pattern adopted is, when open, 9′ long and 4′ wide: with each there are a pair of ash oars, 4 thole pins, 1 bottom and a removable thwart or seat: when folded up, these stores are fastened together and to the boat by 3 leather straps: the boat with the above-mentioned stores weighs about 109 lbs. and can be carried, slung to a bamboo or pole, by 2 men. The superstructure for 1 bay can also be carried in a similar manner by 2 men: its total wt. is about 97 lbs.: it consists of, 1 composite plank, 49 lbs.: 1 trestle-saddle, 9½ lbs.: 1 anchor of galvanized iron, 15½ lbs.: 2 hemp 1½″ cables 20 fathoms in length each, 20½ lbs.; 4 copper guys (to hold the trestle-saddle in its upright position in the boat), 1½ lbs.; and 3 straps, 1 lb. (to lash all these stores together into one bundle for convenience of carriage). *The composite plank* which forms the roadway, is 8′ long and 18″ wide: it will support a weight of 10 cwt. at centre without breaking. This bridge equipment is in units of 12 boats each: each unit can bridge a stream 100′ in width *Waterproof Mixture*. The canvas skins of the boats are waterproofed as follows: 1½ lbs. hard yellow soap, cut into thin shreds and boiled in 6 pints of water till well dissolved: mix in by degrees while the soap solution is hot, 20 lbs. of English spruce ground yellow ochre, add 2 lbs. of patent driers, and 2½ lbs. of best boiled linseed oil. Another good waterproof composition for cotton or canvas is: bees-wax, tallow and pitch in proportion of 2 parts by weight of bees-wax, 2 of tallow and 8 of pitch: melted over a slow fire, not allowed to boil, and kept stirred.

CASKS, RAFTS, AND BRIDGES.—The buoyancy of casks is ascertained by the following rule formula, $5\ C^2\ l - W$. where c is the circumference of the cask in ft. half way between the bung and the extreme end: l is the length in ft., exclusive of projections, measured along a stave: and W is the weight of the cask. Or add together the area of the head, the area of a circle on the bung diam., and the geometrical means between those areas: multiply the sum by ⅓rd of the length of the cask (all these measurements to be in inches), and the result is the number of cubic in. of water displaced: divide by 1728, and it is in cub. ft.; multiply that by 62·5 (number of lbs. in a cubic ft. of water) and the result is the wt. in lbs. of the water displaced: subtract the wt. of cask and you have its buoyancy. For

example, a cask whose bung diameter is 25 in., head diameter 21 in., and length $31\frac{1}{2}$ in. ; the area of the head is $21^2 \times .7854$, that of the bung section $25^2 \times .7854$, and the geometrical mean between those areas is $21 \times 25 \times .7854$. The formula will therefore be

$$\frac{(21^2 \times 25^2 \times (21 \times 25))\ .7854 \times 31.5}{3} = \frac{(441 \times 625 \times 525) \times .7854 \times 31.5}{3} =$$

$\frac{1591 \times 24.74}{3} = 3120.4$ cubic in. of water displaced, and $\frac{13120.4 \times 62.5}{1728}$ = 474.5 lbs. wt. of water displaced. In many instances the number of gallons that a cask holds is known : the buoyancy is then easily ascertained by multiplying that number by 10 (the number of lbs. wt. in a gallon of water). The available buoyancy should only be calculated as $\frac{9}{10}$ths of the actual buoyancy, $\frac{1}{10}$th being allowed for leakage. It is seldom that one can obtain on service sufficient casks for the formation of a bridge across a wide river, but they are excellent adjuncts when the number of pontoons or boats is insufficient ; they form admirable rafts. and are so easily and safely transported, that for all wild expeditions, where transport is a matter of great difficulty, they are very commonly used by us. The larger the cask the better, as the wt. will be smaller in proportion to the buoyancy than when small ones are used. Casks bear grounding on mud better than boats, few of which will stand the wt. of a movable load when grounded. The following Table gives the dimensions, weight, and buoyancy of the casks most commonly in use in England :—

Name of Cask.	Gallons.	Bung Diameter.	Length along the cask.	Circumference at ¼ length.	Weight empty.	Actual Buoyancy.
		In.	Ft.	Ft.	lbs.	lbs.
Leager	170	38·5	4·52	9·33	252	1736
Butt	108	33·3	3·97	8·09	174	1125
Puncheon	72	30·7	3·20	7·57	140	773
Hogshead	54	28·6	2·76	7·05	119	567
Barrel	36	25·3	2·42	6·23	88	382
Half Hogshead	26	22·7	2·12	5.61	65	269
Kilderkin	18	20·3	1·18	5·02	49	185
Small Cask	14	18·3	1·76	4·49	32	146
" "	6	13·8	1·37	3·40	20	60
Powder barrels (Whole barrel	..	17·5	1·58	4.26	28·5	115
Powder barrels (Quarter "	..	14	1·07	2·99	8·5	39
Commissariat Vats. Ton	..	40	3·2	9·96	95	1477
Commissariat Vats. ¾ ton	..	32	3·2	8·69	74	1134
Commissariat Vats. ½ "	..	31	3·3	7·75	67	903
Commissariat Vats. ¼ "	..	27	2.5	6·61	51	499
Water Cask	..	..	..	..	..	50

Piers of casks should never be less than 20' in length. They are formed in two ways; either placing the casks on their sides or on end, the casks fastened together either by lashing, or by spikes of wood or iron. Whenever

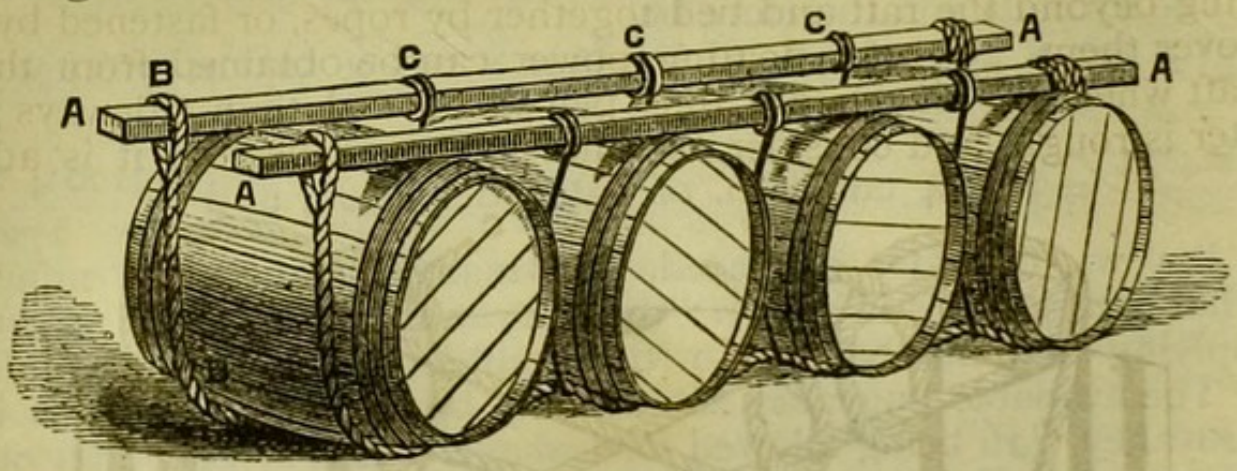


Fig. 26.

rope is to be had, it is much the best mode of fastening. For the 1st method, the casks are placed in a row side by side with the bungs up, pieces of wood (about 4" or 5" × 5") called gunnels (A,A) are laid alon them about 4" from each end. Slings (B,B), of 2½" rope are passed und the casks from end to end of the gunnels; one end of the sling should ha an eye-splice, or should have a loop large enough for the end of the gunn to pass through it (to be made as shown by knot 5 at the end of this article The other end, being drawn as tight as possible, is given a round turn ov the gunnel and fastened by two hitches, as shown in knot 7. Between eve cask there are lashings called braces (C,C,C) of 1½" rope, 18' long: the should be an eye-splice at one of the ends, by passing the other end of t brace through which it is fastened to the sling. If there is no time to ma this eye-splice, the brace must be fastened to the sling by a comm running knot, taking care to have a common single knot on the end befo making the running one. At about 1' 5" from the sling a common figure 8 knot, D,D., single knot is to be made. The accompanying sketches sh how these braces (C,C,C) are then applied to bind together the gunnels (A casks and slings (B,B). When enough rope is not to be had, the gunn must be nailed or spiked to the barrels, poles or scantling being plac below the barrels in the same way as the gunnels are above them, a spiked into the casks; the ends allowed to project a little, and faste with rope to the ends of the gunnels above. The use of spikes or nails floating bridges s always to be avoided if possible, as they do not admit sufficient play. The hoops should be frequently examined to prev leakage, and small tin pumps should be made to go through the bung ho to pump out all leakages.

It frequently happens that large numbers of casks are to be had from t commissariat, the heads of which have been destroyed, used as firewood, & These have no bungs, and can be used for rafts or pier of bridges

placing them on end in rows side by side, and nailing them together where they touch, clinching the nails well ; stout poles or pieces of scantling should be nailed along between the rows of casks both above and below, their ends projecting beyond the raft and tied together by ropes, or fastened by planks nailed over them. Greater floating power can be obtained from the same sized raft when the barrels are thus placed on end than sideways ; but if the water is rough, and considerable immersion is expected, it is advisable

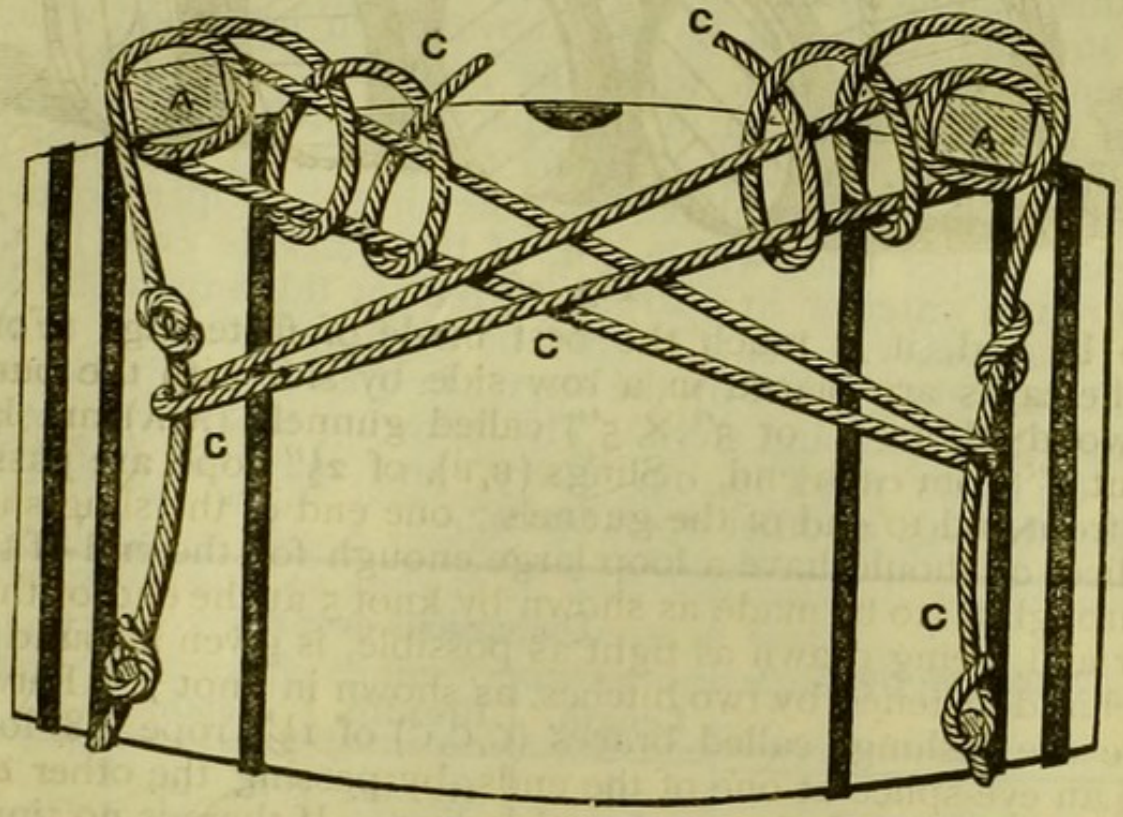


Fig. 27.

to nail planks or canvas over the open tops, to prevent the water washing over. When more than one row of casks are used for a pier, the baulks of the roadway should rest on a sleeper or transom [notched to receive them] placed along the centre of the pier, and supported on short cross-pieces uniting the gunnels of each row of casks. Piers of casks should always have their ends connected to the ends of the next pieces by tie baulks, which must be lashed to both gunnels of each pier to give rigidity to the bridge. The baulks should overlap so as to rest also on both gunnels, and they should be lashed together at their overlap.

BOAT BRIDGES.—The boats available for rafts or bridges should be classed according to their dimensions, and their floating power determined. The tonnage of vessels is found as follows : L = length of keel between perpendiculars in feet—the breadth ; B = breadth in feet of broadest part.

The tonnage $= \frac{L \times B \times \frac{1}{2} B}{83{\cdot}55}$. This only applies to large-decked vessels.

For small craft and open boats, it is better to calculate the area of several

sections of the boat below the *safe-load-line*, to obtain the cubic contents feet of the space you can safely depend upon for buoyancy, upon mul plying which by 62·5 you have the number of lbs. of water displaced, whi result, minus the weight of the boat itself, will give you the availab buoyancy in lbs.

If you can put the boat into the water, the same result is easily obtain by loading it with unarmed men to the depth it is considered safe to do s Multiply this number of men by 150 (the fair average wt. in lbs. of ordina soldiers), and the result will be the buoyancy in lbs. upon which you c safely depend. Or you can, when the boat is afloat, easily calculate t number of cub. ft. contained in the space between the waterline and t safe-load-line, which, multiplied by 62·5 (the wt. in lbs. of a cub. ft. water), will give the safe available buoyancy in lbs. Open boats should n be immersed deeper than within 1 ft. of the gunwale even in the calm water: in rough water or in a strong current or tideway, a still larger lin of safety is necessary. Boats should be anchored stem-on to the curre and should be slightly down-by-the-stern: in tidal rivers the boats should placed alternately stem and stern. The following table gives the dimensic and wts. of boats used in our Navy, and may be useful in roug determining the wts. of other open boats:—

Name of Boat.	Dimensions over all.			Weight in lbs.
	Length.	Breadth.	Depth.	
	ft.	ft. in.	ft. in.	
Launch	42	11 0	4 3	8400
Pinnace	32	9 0	3 3	4088
Do.	26	8 4	2 10	2926
Barge.	34	8 2	2 9	2520
Cutter.	30	8 0	2 8½	2016
Do..	23	6 11	2 6	952
Jolly Boat	25	7 3	2 6½	1092
Gig	30	5 6	2 2	518
Do.	22	5 6	2 2	518
Galley	32	5 6	2 2	1008
Whale Boat.	27	5 2	2 1	728
Dingy.	12	5 2	2 1	378

When the boats are of several sizes, the largest should be used where current is swiftest, so as to allow having the greatest space possible betw the boats there; it is advisable also to have the first and last boats la ones, as they ought to be less liable to great immersion for convenience getting heavy carriages off and on them, to and from the banks or fi portions of the bridge. In laying the flooring, the centre baulk of

roadway should be a little abaft the centre of flotation of the boats, so that their heads may rise a little to the current. In the passage of rivers by floating bridges, it is almost always necessary to construct the shallow portions nearest the bank with trestles, so that the casks or boats may have sufficient depth of water.

For good waterproof compositions, for cotton or canvas, and for the canvas skins of boats, see p. 426.

RAFTS OF TIMBER.—In a wooded country rafts are easily constructed, and can be safely used where the current does not exceed 6′ per second, say 4 miles an hour. The sizes and description of the timber must determine the number of layers there should be. They must be put together in the water, each layer being placed at right angles over the one beneath it, and holes 2″ in diam. bored at the points where they cross; the holes are bored through all the upper layers, and halfway down into the timbers of the lower ones. Pins of some hard wood cut to fit these holes, each having a wedge applied to a split in the end, are then passed through these holes and hammered, so that the wedges on reaching the bottom of the holes are forced into the stake, fixing it securely. If timber used in rafts is not tarred or well coated with paint or varnish at the ends or where branches have been cut off, its wt. will be increased about $\frac{1}{6}$th after a few days' immersion. The cub. contents of round timber is found as follows: G is the means between the girths at both ends in ft. and decimals: L is the length of log in same; $L(G^2 \times \cdot 07958)$ = cubic contents in feet.

The weight per cub. ft. of the following description of timber is:—

	Cubic Feet Green.	Loss per 100 lbs. when Dry.
	lbs.	lbs.
Elm	58·5	37·6
Oak, from	58·74	33·15
Oak, to	69·5	31·1
Spanish Chestnut	54·6	30·6
Walnut	57·5	33
Poplar of Provence	50·96	..
Acacia	51·25	9
Larch, from	42·06	26
Larch, to	53·68	28·5
Spruce	50·2	42
Pine	51·08	47·3
Fir (white pine)	33·2	24
Poplar (American)	49·68	38·2

Any of these wts. deducted from 62·5 (the wt. in lbs. of a cub. ft. water) gives the buoyancy of a cub. ft. of that timber. The floating powe of a log is therefore to be ascertained thus. A spruce log is 30 ft. long and has a mean girth of 2·75 ft. : 30 $(2.75^2 \times .07958) = 30 \times .6 = 18$: number of cub. ft. in log. The wt. of a cub. ft. of that timber whe cut green is 50·2 lbs., which, deducted from 62·5, gives it a buoyancy pp cub. ft. of 12·3 lbs., and that result multiplied by 18 (no. of cub. ft. in lo =369 = its total floating power. The timber for rafts should be floated, possible, to the spot required. Ammunition waggons, with the box taken off, do well for carrying logs when required. It will always be question of time whether in wooded countries it is most advisable to for bridges of logs, which require an immense amount of material, or of rou punts, which require comparatively but little material, but more time make them.

Ferries.—Boats, or rafts made of boats, barrel piers, &c. &c., are oft used to ferry considerable bodies of troops over rivers. I have seen ve good rafts made of chatties for this purpose in India. These punts or ra may be either rowed, poled, hauled across by a rope from bank to ba (this can only be done in narrow rivers of not over 50 or 60 yds. wide, a then only when there is not a strong current) or they may be hauled acr by a hawser passing over the raft on rollers, or through hawse-holes ma for the purpose in its sides or ends. If a wire-rope be stretched across fr bank to bank, so as to be at its lowest point at least 3′ or 4′ above the high flood level, the ferry boat or raft may be fastened to it by a short l secured to a large ring working loose on the wire-rope, or to specially c structed running gear provided with pulleys so as to reduce the frict The raft can then be easily hauled backwards and forwards by a secured to each bank of the river, no matter how swift the current may b

Flying Bridges.—The principle of the flying bridge is the same as tha the schoolboy's kite, or of the fisherman's "otter." Long, narrow, de and heavy boats with vertical sides are most powerfully acted upon by current ; when possible "lee-boards" should be added to increase action of the stream upon the raft ; the raft, if possible, should consis two boats or two barrel piers. The boat or raft must be kept obliquel an angle of 55° (B D E in sketch), to the stream in all sorts of flying brid This is effected by means of a V-shaped line, A C D, like that of the to which the string is fastened ; it should be about three times the bo length, the ends being taken in or let out as required to secure the being always at the required angle with the stream. It is a good pla have a mast fixed in the raft or boat, from the head of which a line exte to the bight on the cable at C, for the purpose of keeping the cable ou the water. One arm A C of the V being nearly twice as long as the o C D, the Apex C being the point of union with the running gear on

overhead wire cable, or with the cable moored in mid stream. The accompanying sketch illustrates the mode of using flying bridges. The velocity of the current must be at least 2 miles an hour to make the raft act successfully, and straight reaches of a river should be selected as most free from irregularities of current. (See page 297 for the mode of calculating the velocity of a river.) Landing-stages on each bank should be constructed of such a length as to secure a sufficient action of the current on the raft immediately when it is "cast off," and to prevent it "hanging" as it nears the bank; it is a good plan, when the force of the current near the bank is not strong enough to move the raft, to buoy out a line from the landing-stage into swift water in the raft's track, by means of which it can be hauled into shore where the action of the current ceases to act upon it. As a precaution, all flying bridges should carry an anchor and cable to let go in the event of moorings giving way.

The principle of the flying bridge can be applied in several ways. A raft attached to an overhead wire cable or to a hawser, as already described in the foregoing remarks upon Ferries, can be propelled across a swiftly-running river if it be kept at the required angle with the current. This method is employed with advantage in India and in South Africa on rivers of 400 yds. and under in width. The method common on the Rhine and other European rivers is to have a swinging cable, the length of which should be about $1\frac{1}{2}$ to 2 times the breadth of the river. When the stream is wide the cable must be supported on intermediate boats or buoys, to prevent it from impeding the motion of the raft by dragging in the water. If the river is wide, boats should be used, the cable being fastened to a mast, proportioned to the size of the boat, placed close to the bow. The boat nearest the up stream end of the cable should be moored with 3 anchors, as shown in sketch, the mooring cables being about 10 times the depth of water in that spot. Heavy anchors should be used if available. When there is a sharp bend, nearly approaching a right angle in the river, the end

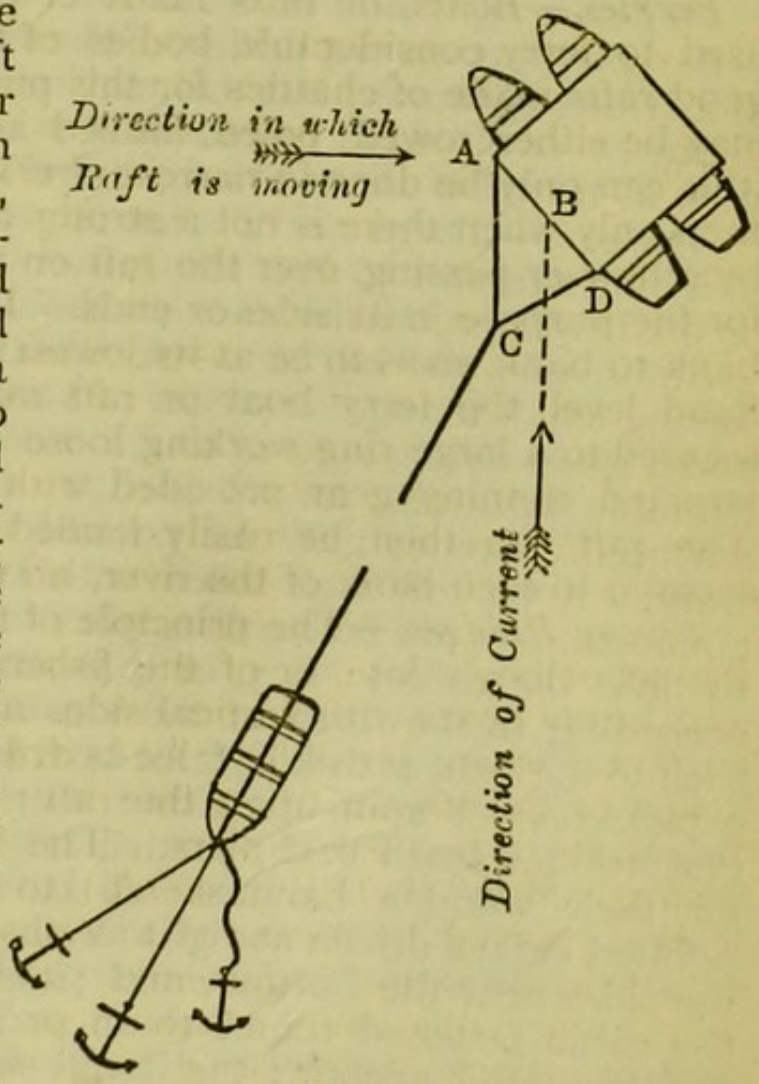


Fig. 28.

of the swinging cable can with advantage be secured to the bank near th angle, in a line with the middle of the stream where the flying bridge plie If 2 cables of the required dimensions are available, and anchors sufficient wt. are not to be had, the up-stream end of each may be secure one on each bank: the raft starting from the right bank swings to th cable fastened to the left bank, carrying over with it the down strea end of that secured to the right bank: having discharged its cargo on t left bank, it is then hauled up 50 or 100 yds., as the case may be, to t landing stage on the left bank opposite that from which it started the right bank, and starts thence to make its return trip, swinging from t cable secured to the right bank and carrying with it the end of the cab secured to the left bank. This method renders necessary the constructi of four landing-stages when there is a cross-traffic from both sides.

To pass a light line across a river is very often necessary as a prelimina to the construction of a bridge. The simplest plan is to send it over by mea of a strong swimmer, but this may be dangerous where there are alligato It can be easily done by means of a large-sized fisherman's otter, made o deep 2″ board of about 6′ long and 1′ wide, weighted so as to float vertica

Anchors.—There are 2 sizes in use with our new pontoon equipme weighing 112 and 56 lbs. respectively. For large barges and in very sw or tidal streams heavier anchors should, if possible, be made use of.

Substitutes for anchors.—A wheel with the tire and felloes taken having small triangular pieces of hard wood nailed to the ends of the spo and a good strong spar of tough wood on the axle forming the shank, tolerable substitute for an anchor; one wheel should be reversed whe are used. Stones must be packed round the shank by means of wic work. A harrow well laden with stones answers fairly. When time circumstances are favourable, piles can be driven obliquely above the bri to hold the cablet: 2, 3, or 4 should be driven in one behind the ot according to the force of the stream; a strut should run from the fo each to the head of that in front of it, which should be notched to hold it; 3 pickaxes set upon the same shank, laden with stones, make admir grapnels for small craft, particularly if an iron crowbar can be substit for their wooden handles. A barrel with the head removed and pointed stakes driven at right angles to one another through holes bore the sides near the bottom, and projecting from them about a foot, ha the cable fastened round these stakes where they cross inside the ba makes a good anchor; the barrel should be filled with stones, and hav head replaced or nailed on, to keep them in. Any strong box ma treated in the same manner. A good anchor can be easily formed t take 2 stout poles 6′ long, pointed at the ends, cross them in the c at right angles, and lash them firmly to the end of the cable; build u this foundation a cone of basket-work with a diameter of 3′ and a h

of about 4′, filling it with stones or gravel as you proceed; at the apex where the cable passes out bind all together. If there are railways near, the rails and other iron available will supply good materials for make-shift anchors. Nets filled with stones are very effective on rocky bottoms.

Cables.—Those supplied for our pontoons are of 3″ hemp, the breaking wt. of which, when new, is 3 tons. The best hempen ropes are said to lose from 25 to 50 per cent. in strength after about 6 months' use. With each of our pontoons there are 2 cables, each 180′ long, and 59 lbs. in wt.

Cables and ropes of all descriptions are distinguished by the number of inches in their circumference. When L is the length in fathoms, and C the circumference, the wt. in lbs. = $(L \times C^2) \cdot 26$. Their breaking strain in tons = $C^2 \times \cdot 28$ for hempen ropes, and for common cables = $C^2 \times \cdot 2$. The safe working strain in cwts. is the product multiplied by 3. The length of cable should always be at least 10 times the depth of the water in which the boat, &c., is anchored, and seldom less than 90′.

Anchoring of floating bridges.—The cable should be attached to the ring of the anchor by *a fisherman's bend:* see article on *Knots* (post). It is very necessary to mark the position of the anchor in the river: this is easily done by fastening a small buoy to it. The buoy supports a small $1\frac{1}{2}$″ rope, or "tripping-line," which is fastened to it by a *fisherman's bend*, and round the flukes of the anchor close to the crown with a *clove hitch* and with two *half-hitches* round the shank. This will enable the anchor to be "tripped," if there should be any difficulty in raising it subsequently. As a rule, there should be an up-stream and a down-stream anchor to every second pier of a floating bridge. If anchors are scarce, one may be made to do for 2 piers, especially on the down-stream side, by attaching the cables from 2 piers to 1 anchor. When regular iron anchors are used, before heaving them overboard see that their stocks are fixed properly. Timber rafts and cask piers bring as a rule a greater strain on anchors than boats or pontoons. The anchor should be taken out on a raft or boat and dropped over at the required place. For short bridges, if rope is plentiful, breast-lines at an angle of not less than 45° with the bridge should be passed both up and down-stream from the rafts to secure objects, such as trees, &c., on shore. If the current is rapid, or the river subject to flushes, too much care cannot be taken in securing floating bridges. If a strong hawser or a wire rope is to be had, it should be stretched across the river above the bridge, and the piers secured to it by cables.

Protection of floating bridges.—An enemy will endeavour to destroy your bridges by fire-boats or heavy rafts, &c.; it is very necessary to have guard boats posted about $\frac{1}{2}$ mile or a mile above them. A sharp bend in the river is a good position for these boats, as floating objects are driven by the current there close to the bank, and can be easily stranded. A boom formed of heavy logs fastened together, placed at angle of about 20° with

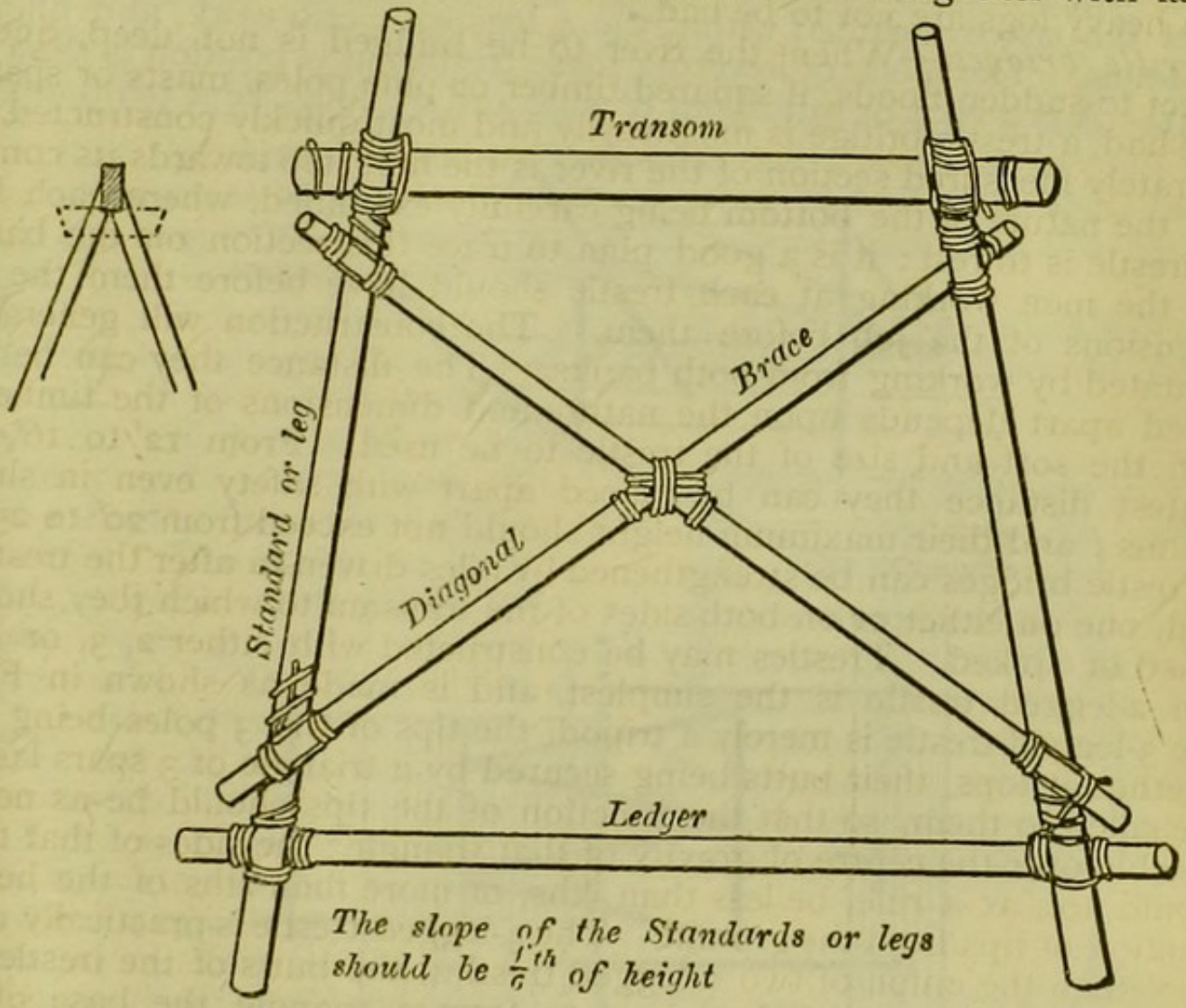
the current, forms the best protection ; the lower end of the boom should b secured to the bank where the water shoals, so that floating objects shoul be driven ashore there by the current acting upon them when checked b the boom. A boom made like a floating chevaux-de-frise can also be use when heavy logs are not to be had.

Trestle bridges.—When the river to be bridged is not deep, and n subject to sudden floods, if squared timber or pine poles, masts or spars a to be had, a trestle bridge is most easily and most quickly constructed. A accurately measured section of the river is the first step towards its constru tion, the nature of the bottom being carefully examined, where each leg the trestle is to rest : it is a good plan to trace this section on the bank that the men working at each trestle should have before them the exa dimensions of the job before them. The construction will generally facilitated by working from both banks. The distance they can be safe placed apart depends upon the nature and dimensions of the timber a upon the sort and size of the trestle to be used. From 12′ to 16′ is t greatest distance they can be placed apart with safety even in slugg streams ; and their maximum height should not exceed from 20′ to 25′.

Trestle bridges can be strengthened by piles driven in after the trestles fixed, one on either or on both sides of the transom to which they should lashed or spiked. Trestles may be constructed with either 2, 3, or 4 le The 2-legged trestle is the simplest, and is made as shown in Fig. The 3-legged trestle is merely a tripod, the tips of the 3 poles being lash together at tops, their butts being secured by a triangle of 3 spars lashe treenailed to them, so that the junction of the tips should be as nearly possible over the centre of gravity of that triangle ; the sides of that trian should not, as a rule, be less than $\frac{3}{7}$ths, or more than $\frac{4}{7}$ths of the heigh junction of tips from the ground. The 4-legged trestle is practically noth more than the union of two 2-legged trestles, the butts of the trestles b kept apart by cross-ledgers, so as to form a triangle, the base of wh should be half its height. This 4-legged trestle is commonly used in Eu for scaffolding and temporary bridges : Fig. 30 is a cross-section thro the transom or cap to show how it is let into the standards or legs ; the dc line is a small piece of wood spiked across the tips of the legs on w the transom or cap rests : it adds much to the solidity of the 4-legged tre

In America, where so many sorts of pines grow to great heights as stra poles, trestles were used during the Confederate war to a consider extent in the bridging of the smaller-sized rivers, and in the repair or struction of railway viaducts, and bridges : in many instances they used in several tiers, one over the other. When several tiers had to b sorted to, the legs of the lower ones should conform to the depth o river, so that when in position the caps or transoms should all be in same horizontal plane. The trestles in each of the tiers above could

be made of exactly equal dimensions, which, in a great undertaking, greatly facilitated and hastened the completion of the work. In almost all instances the Americans used sills to their trestles, which is much the best form when the river-bed is of clay or mud, and the butts of the legs or standards cannot then sink much. In the sketch the trestle is fastened together with lashing



Figs. 29 & 30.

in the manner taught in all our military schools, but the Americans almost invariably used treenails of hard wood of from 1′ to 2′ in diam. according to size of timbers used in the trestles: an axe to cut and drive them and an auger to bore the holes are alone necessary, whereas the rope required for the lashings of even a medium-sized bridge would weigh tons. The *lashings* are of $2\frac{1}{2}''$ rope; those required for a 2-legged trestle are 6 of 30′ and 3 of 15′ long: for the 4-legged trestle, 8 of 30′ and 14 of 15′ long: for the 3-legged trestle, 12 of 30′ and 6 of 15′ long. The Americans often used trestles of 25′ in height, the common form being that of an inverted W, with a horizontal brace across the four legs of that letter. When, however, the bottom is rocky or very uneven, sills must be dispensed with, and 2 strong ledgers used instead, being fastened on each side of the legs as near their butts as the unevenness of the bottom of the river will permit, and so that

these ledgers may rest on the bottom. Trestles can only be used in deep water—particularly if there is much current—by loading them below with stones or other weights. The simplest method of applying these weights is by means of basket or light crib work being constructed round the bottom of each leg, or, when 4-legged trestles are used, by surrounding the lower part of the space included within the 4 legs with crib work, and filling it with stones. The mode of lowering these trestles into position is shown in Fig. 31. A is a boat or raft about 6′ wide and 25′ long, kept temporarily in

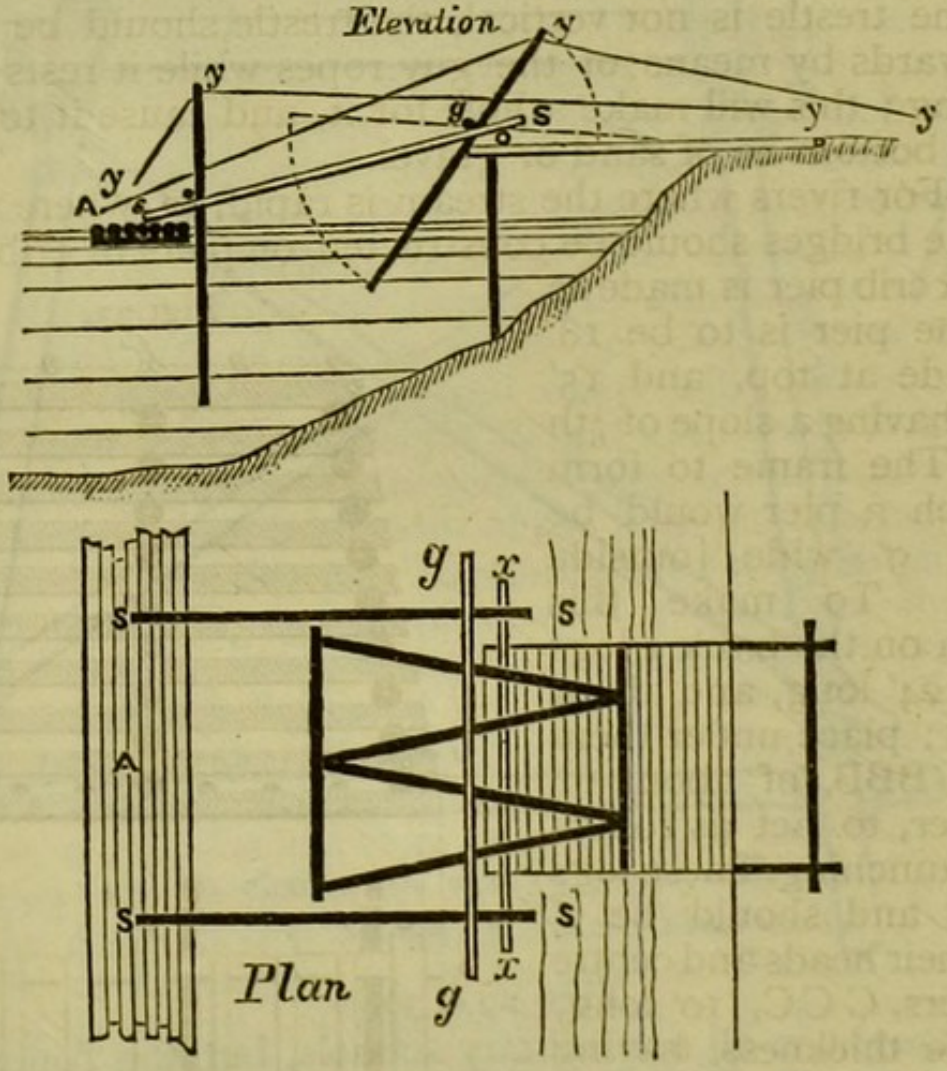


Fig. 31.

position by two poles, *s s*, stretching from it to the bank where they res upon a pole, *x x*, about 5″ in diameter, to which they are pinned or lashe at a sufficient distance apart to allow of the trestle being shoved out an eventually lowered between them ; this distance will of course depend upo the extreme breadth of the trestle to be placed in position.

The trestle nearest the bank being usually a small one in shallow wate we will suppose it placed, and the roadway finished out to it. The trestl to be fixed next, having been put together on the bank, is pushed out o rollers, legs foremost, to the end of the made portion of bridge ; a pol *g g*, about 5″ by 5″, and 25′ long, is temporarily lashed over the outer le

at a distance from the cap of about $\frac{1}{3}$rd of the trestle's height ; a guy rope, *y y*, is fastened at its middle by a clove hitch to the cap, one end to be held on shore, the other on the boat. The trestle is shoved out so that the ends of *g g* shall rest on the poles *e f*, *e f*, at each side until it begins to topple over, when, by means of the guy rope, it is brought into a perpendicular position, as shown in sketch. It can thus be hauled out close to the boat by a rope passed round *g g*, and lowered until the legs rest on the bottom, by gradually loosening off the lashing fastening it to the pole, *g g*, which will then be removed for use with the next trestle. If it is found that the bottom is so uneven that the trestle is not vertical, the trestle should be swayed backwards and forwards by means of the guy ropes while it rests upon the leg which is too long ; this will make a hole for it, and cause it to sink as far as required, if the bottom be of sand or gravel.

Crib piers.—For rivers where the stream is rapid, or where freshets are to be expected, the bridges should be constructed on piers of cribwork, if wood is plentiful. A crib pier is made as follows : Say the pier is to be 18′ long and 4′ wide at top, and 15′ high, the sides having a slope of $\frac{1}{6}$th their height. The frame to form the base of such a pier would be 23′ long and 9′ wide [outside measurements]. To make this frame, lay down on the bank 2 logs or beams, AA, 24′ long, and about 15″ in diameter ; place under them 3 round poles, BBB, of about 6″ or 8″ in diameter, to act as rollers for facilitating launching. These logs form the sides, and should be 7′ apart. Across their heads and centre place three others, C C C, 10′ long, and of the same thickness, having an interval between each of about $1\frac{1}{2}$′. These 5 logs are each notched 6″ to receive one another, and pinned together with 2″ treenails : Fig. 32 is a plan of the frame forming the base of the piece : Fig. 33 is a longitudinal section through pier when finished. Cross-pieces of about 6″ stuff are then pinned on at about $1\frac{1}{2}$′ apart, and covered with about 2″ thickness of brush-wood, which is kept in its place by a few

Fig. 33.

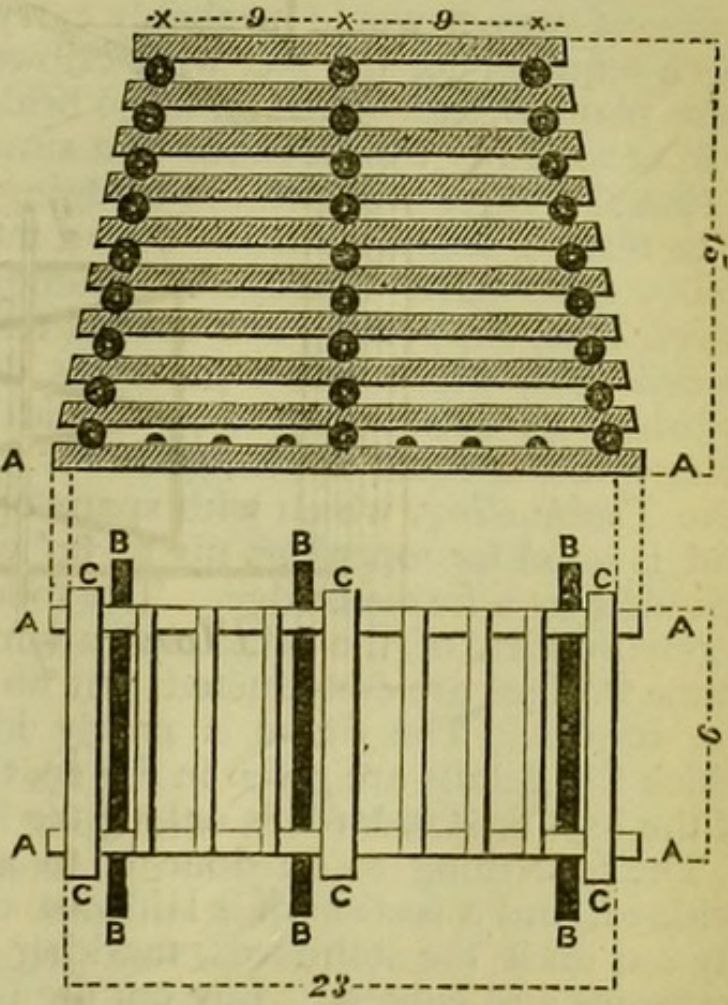


Fig. 32.

heavy stones placed on it. If no stone is to be had, gravel or clay, inclosed in canvas bags—to be tarred if possible—may be used instead. A few courses of timber [if possible not less than 9″ in diameter] to be then added on to the sides, ends, and centre brace, one over the other, all being scored on both sides to a depth of 2″ and pinned to one another, care being taken that a batter of $\frac{1}{6}$th their height is given to the sides and ends.

The pier is then launched, and when in sufficiently deep water laden with stones so as to sink it nearly to a level with the upper course; a few other courses being then added, it will be towed to the position it is to occupy, and sunk by adding more stone, completing the courses of timber until they reached the required height. The inclosed space should be filled with stone up to the highest water mark. A pier of this description will bear any truss, or, if necessary, trestles like those in Fig. 29 may be erected upon them. If stone is not to be had, clay or sand can be used by lining the inside with closely-made hurdles, having a layer of moss or leaves next to them. Wharves or piers can be made by a similar process in places where the action of waves would probably carry away trestles or piles, inclosing the space required for the pier with cribwork and filling it in with stone. All these plans are calculated for large bridges. Smaller ones with a clear width of 8′ of roadway can be made in a similar manner.

Frame bridges are useful in bridging canals or the ditches of large works, or to restore communication over a masonry bridge, one or more of whose arches have been destroyed. Frame bridges are of four sorts:—1. The *Single lock*, supporting one central transom good for a span of 30′: 2. The *Double lock*, which with 2 transoms divides the bridge into 3 spans, good to bridge an opening up to 45′ in width: 3. The *Single sling* dividing the bridge into 4 equal spans, good for an opening up to 60′ in width: and 4. The *Treble sling*, which with spans of 55′ in length makes a 6-span bridge, and is good for openings up to 80′ wide, the extreme limit which can be spanned by a frame bridge. The following sketches, Figs. 34, 35, 36, give a general idea of the principles upon which the 3 first of these 4 sorts of frame bridges are constructed, but no attempt is made to give the details of the frames. The frame is nearly identical with the 2-legged trestle, of which the details are given in Fig 29, the chief difference being that the slope of the legs or standards is only $\frac{20}{8}$ for frames.

The first thing to be done is to accurately measure the opening to be bridged, and a section of it laid out on the ground with lines and pickets: lay out on it the standards, marking on them the proper positions for the transoms and ledgers. Lay out the frames on each bank, butts of standards towards the opening, ledgers lashed on top of standards as they lie thus on the bank about 2′ from butts, or according to the nature of the footing where butts are to rest when in position: the transoms to be lashed underneath the standards. Before lashing the diagonal braces, square the frame

carefully; as in all frame bridges, except the double lock, 1 frame has to rest on the transom of the other within its standards, 1 frame must be 18" narrower throughout than the other; the transom of the narrow frame should be 18" wider than the width of roadway in the clear between ribands. Drive bollards or pickets for guys and foot ropes. Attach fore and back guys and foot ropes to each frame, the latter fastened with a timber hitch round the standards below the ledgers. Cross the fore guys, passing those of the narrow frame between the horns of the broad frame. Whilst the

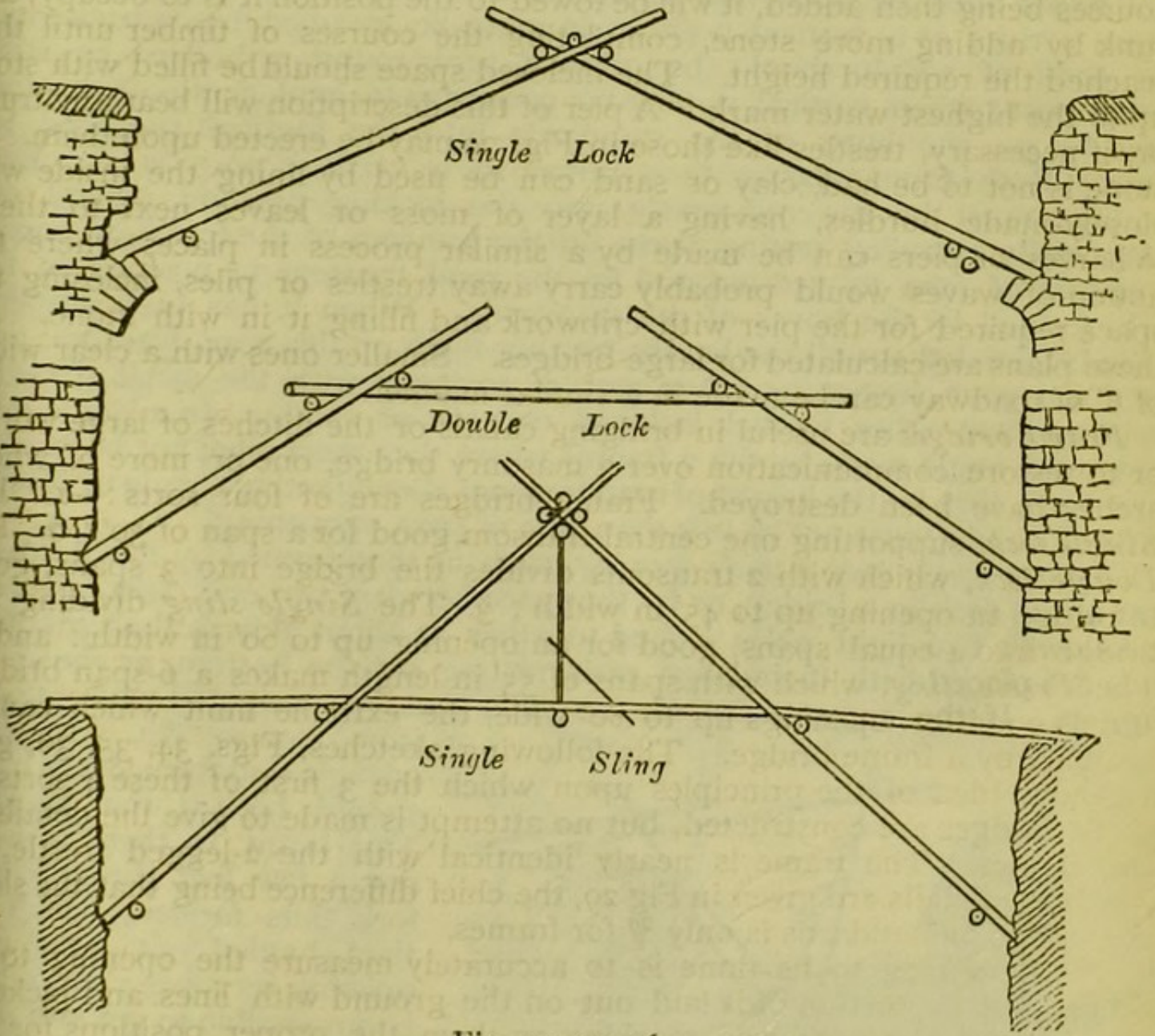


Fig. 34, 35, 36.

frames are being constructed, the places where the butts of the standards are to rest must be carefully prepared; these footings must be correctly square and on the same level throughout on both sides of the opening, or the frames will not lock properly. Great attention must be paid to the various lashings (the strongest lashings being used for the road transoms) and also

to the positions of the transoms, and distances apart of the standards, as on these points depend the strength and stiffness of the bridge. Wedges with well-rounded points are useful for tightening the lashings; they should be driven so that the points may be downwards to prevent their dropping out. The butts of the frames, one at a time, must then be pushed out over the opening nearly as far as the footings prepared for them are below the level of the roadway; then raise the frames, the foot ropes holding them suspended, until the butts of the standards reach these footings, when the foot ropes must be slackened off until the butts are in position; until the frame arrives at a vertical position it must be steadied by its back guys, the ends of which should be given a turn round a bollard or stout picket post; when vertical it may be necessary to haul gently on its four guys to get the butts of the standards into the footings prepared for them. Both frames being thus raised to a vertical position on these footings must be lowered gently into the locking position. Send out temporarily 2 baulks, resting them on the transom of the frame, to enable a couple of men to get out and fix the road transom in position in the forks formed by the horns of the standards. When it has been properly lashed, then lay out all the baulks, resting them on this road transom, and lay down your chesses or other sort of roadway with the usual ribands, securing them either by rack lashings or nails or spikes. In a single-lock bridge the angle made by the 2 frames where they meet must not be greater than 1200, that is, the height of road transom above footings made to receive butts of frames must not be less than $\frac{2}{7}$ths of span of opening.

To place beams over a wide opening, such as that formed by the destruction of the arch in a bridge, or by the space between two crib piers, proceed as follows: two light poles lashed together at about 3′ from their smallest ends are placed with their large ends resting on the bottom, as shown in Fig. 37. If the current is rapid, the ends must be weighted with railway iron, stones, &c. In the triangle thus formed, the base should be $\frac{1}{3}$rd the height. The beam is then shoved out a few feet through the fork thus formed, which is then hauled out over the opening by ropes; should it be impossible to get any one to the other side for this purpose, the beam being temporarily lashed to the fork can be pushed out, until its far end reaches the other side. The dotted lines in the sketch show the

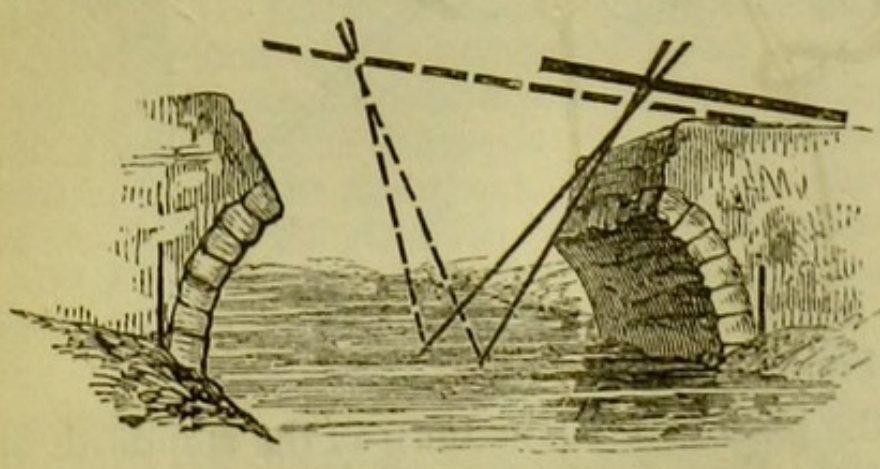


Fig. 37.

beam when nearly over. In this operation it is necessary that the breadth of the opening and the height of the roadway over the bottom where the poles must rest should be accurately computed, so that the beam may be lashed to the fork at the exact place which will insure the end reaching precisely the required spot. A table giving the specific gravity of various trees will be found in the article on "RAFTS." In collecting materials for bridges, the following articles are the most important: tow, tar, pitch, bees-wax, canvas, paint, putty, white-lead, varnish and all other materials for rendering boats waterproof; nails, spikes, crowbars, all iron work that will serve for anchors, rope, barrels, planking, beams, &c.

KNOTS.—All officers should practise making the knots described below: a knowledge of their uses and being able to make them is essential in the construction of bridges.

No. 1.—*Reef knot*, used for lashings when two ropes, or the ends of one rope, have to be fastened so as to be easily undone.

No. 2.—*Single sheet bend*, for joining two ropes, or fastening a rope to a loop; it can be made much more secure by passing the lower rope twice round the loop.

No. 3.—*Sheepshank*, for shortening a rope when both ends are fastened.

No. 4.—*Timber hitch;* as long as strain is maintained it cannot give

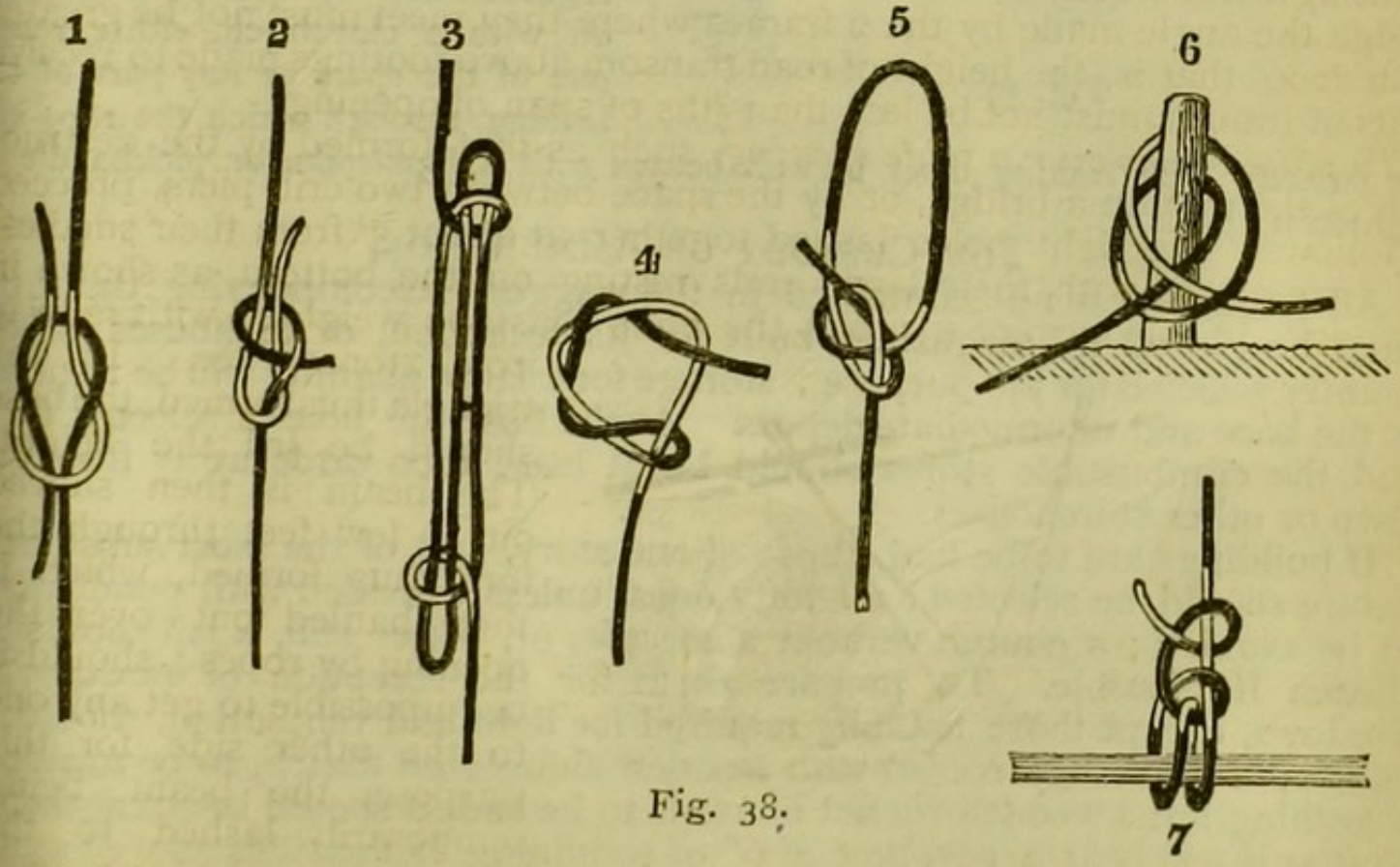


Fig. 38.

way, but immediately it is taken off it comes undone easily; it is useful in dragging material from place to place.

No. 5. *Bowline*, invaluable in making a loop at the end of a line; it is difficult to undo; it is useful for making the drawloop of slip nooses.

No. 6.—*Clovehitch*, for making fast breastlines and painters; it binds with great force.

No. 7.—*Fisherman's-bend*, for making fast cables to anchors or spars.

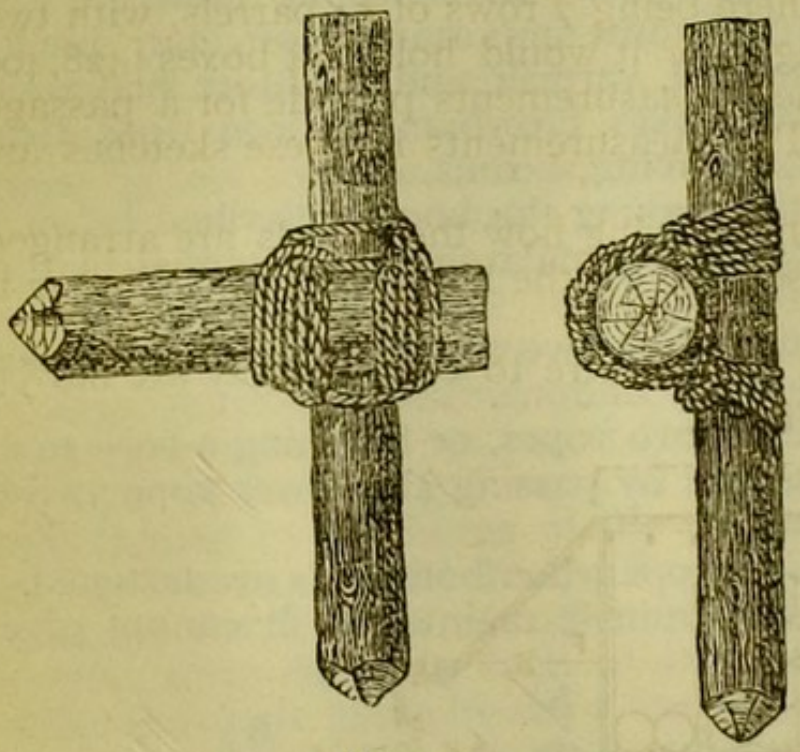


Fig. 39.

To lash a transom to an upright spar, Fig. 39, a clovehitch is made round the upright, below the position of the transom, the lashing brought under the transom, up in front of it, horizontally behind the upright, down in front of the transom, and back behind the upright behind the clove-hitch, and so on, following round, keeping ontside of, and not riding over the turns already made. Six turns or more will be required. A couple of frapping turns are then taken between the spars round the lashing, binding the whole firmly together, and the lashing is finished off with a clovehitch, either round one of the spars or any part of the lashing, through which the rope can be passed. The lashing must be well beaten with a handspike or pickhandle to tighten it up.

THE CUSTODY OF AMMUNITION.

All ammunition not contained in the waggons accompanying the army must be placed in magazines built for its reception, or in houses of the country selected for the purpose; storage for a large quantity will be required at the base and intermediate depots. At the base the houses selected for and the combustible stores should be at least 1000 yards away from any town or other storehouses.

If buildings are to be had, those of one story, and of the most substantial nature should be selected; all lofty ones, unless provided with conductors, to be avoided; a church without a steeple, or, better still, a jail should be chosen if possible. To prepare them for the reception of powder, all windows, except those actually required for light and ventilation, should be built up. Buildings roofed with wooden shingle or thatch, to be avoided if nothing but a wooden-roofed house is to be had, it should be strengthened so that it will bear a covering of 6″ of sodding. If the sides as well as the roof are of wood, an embankment of mud, if possible, faced next the house with stone set in mud should be built up all around it, so that no woodwork

should be visible from the outside. All inflammable substances to be removed as much as possible.

Field Magazines.

When there is good natural drainage, an excavation of $3\frac{1}{2}'$ deep, $7'$ wide and $17'$ long, with a roof constructed over it as shown in sketch on next page, will do well for 100 barrels, there being 7 rows of 14 barrels, with two barrels placed at the end of passage; or it would hold 714 boxes [428,400 rounds] of M.H. ammunition. These measurements provide for a passage of $3'$ leading into the magazine. The measurements in these sketches are given in ft.

Fig. 40 is a plan of the excavation, showing how the barrels are arranged along the floor: Fig. 41 is a cross-section on the line A B C D; Fig. 42 is a longitudinal section along E F.

The rafters are placed 18″ apart from centre to centre; they are halved

Fig. 42.

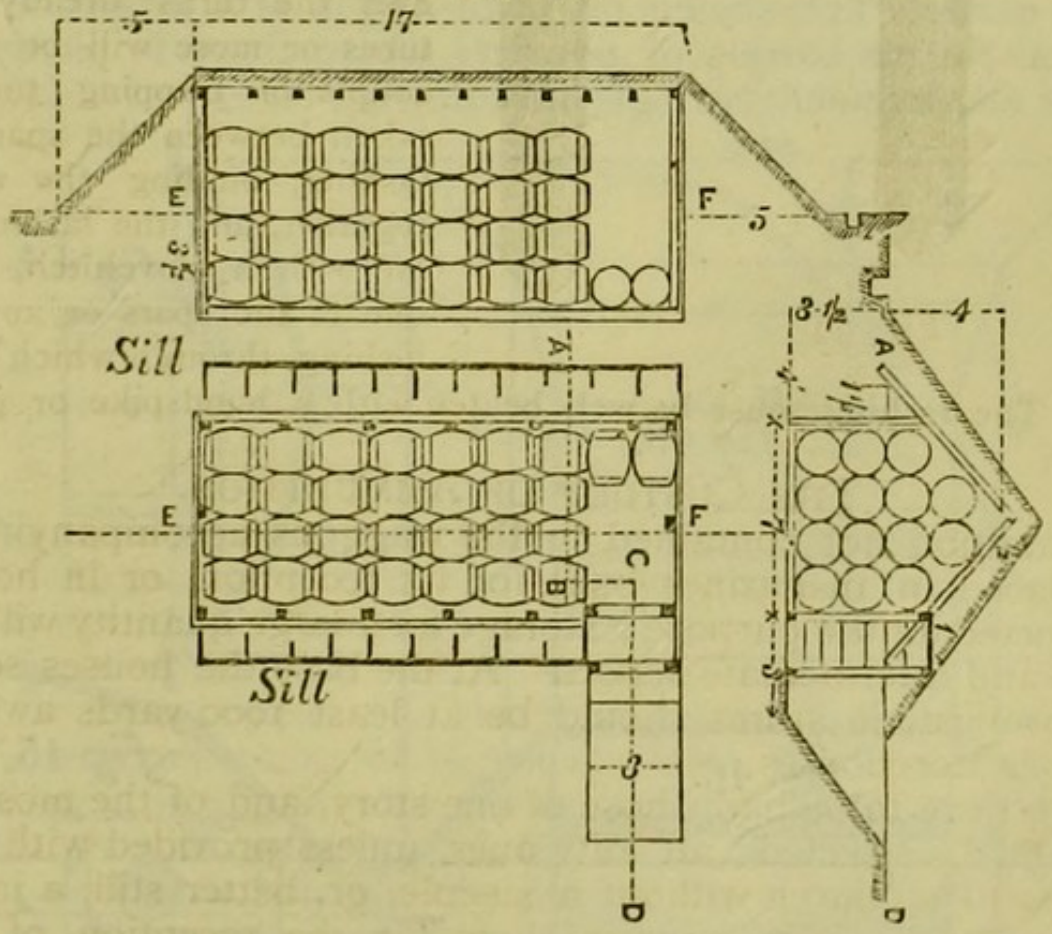


Fig. 40. Fig. 41.

together at top, and fastened with a wooden pin; below, they rest upon a sill into which they are notched, they are then planked over, and a covering of earth 6″ thick at top and 12″ thick at foot of roof laid over all. If sods are to be had, the outer surface should be covered with them; if not, straw should be well mixed up with the earth, which should be put on in the con-

sistence of thick mud. 4 poles are laid transversely across the bottom of the excavation, on which any rough description of planking is laid as flooring for the barrels to rest on—no flooring is necessary for the passage. A surface drain of about 2′ deep should run round 3 sides, and a trench 6 deep should be dug along the 4th side, from which the passage opening into the magazine will be cut at one end ; care to be taken that there should be good drainage from this trench into some neighbouring watercourse. The materials required for this magazine would be 24 rafters 7′ long, not less than 4″ in diam. at smallest end, if made of poles, or 5″ × 2″ if made of scantling ; 11 poles of same dimensions and 2 poles 10′ long, to support planking of inside walls ; 4 poles of 7′ long to lay flooring on ; 580 square ft. of planking not less than 1″ thick ; a door 5′ × 2½′, and 2 door-frames : 1 for the door and 1 to support the planking forming the porch outside. The barrels can be laid on loose stones if scantling and planks are scarce. Magazines that may be exposed to the enemy's fire require a substantial covering of earth. The sketch on page 445 is of a magazine for a field work [to contain 72 barrels of powder] where there is plenty of interior space. The measurements are given in ft.

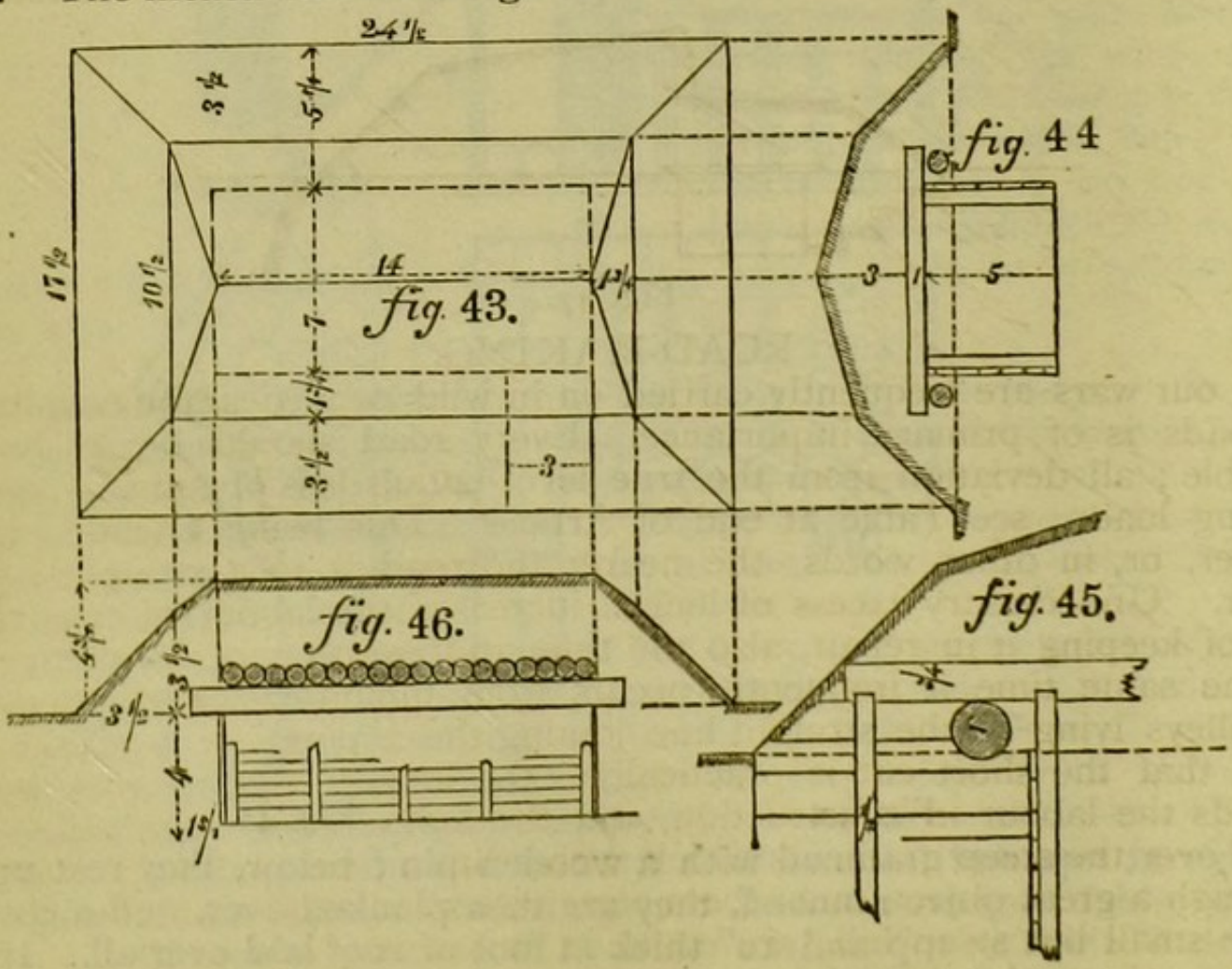


Fig. 43 is the plan, Fig. 44 the cross section, Fig. 45 is an enlarged section showing part of the passage and the uprights retaining the sid

planking ; Fig. 46 is a longitudinal section. The splinter proofs to be of trees, 9 in. in diam. ; they are laid along the long sides of the excavation ; the earth is retained on the inside by planking or hurdles, kept in position by small poles or scantling of about 3″ stuff sunk 1′ in the ground, and let in above 3″ into the splinter proofs, as shown in Fig. 45. The excavation is 14′ long, 7′ wide, and 4′ deep ; including passage, it amounts to 455 cubic ft. The earth required for the covering is 925 cubic ft., the excess would be supplied from the drain of 2′ deep round 3 sides, and from the trench of 6′ deep along the side where the passage leads into the interior.

The materials required would be 5 splinter proofs 9″ × 9″, and 11′ 6″ long for roof of passage and of magazine opposite passage ; 16 splinter proofs 9″ × 9″ and 10′ long ; 2 wall-plates 12″ × 12″ and 16′ long ; 17 uprights to retain planking 4″ × 4″ and 6′ long ; and 330 square ft. of any planking above an inch in thickness. For every additional dozen barrels the length of the magazine must be increased 22″, which will increase the amount of excavation by 61½ cub. ft., and the earth required for covering by 78½ cub. ft. When the interior space is limited in a field-work, the magazine should be placed under the parapet as shown in this section.

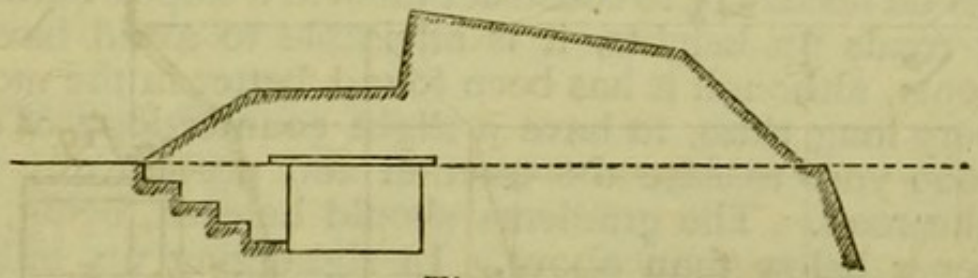


Fig. 47.

ROAD-MAKING.

As our wars are frequently carried on in wild countries, the construction of roads is of primary importance. Every road should be as level as possible ; all deviation from the true level entails loss of animal power in moving loads ; see Table at end of Article. This being attended to, the shorter, or, in other words, the nearer the road is to a straight line the better. Unnecessary excess of length increases the labour of construction and of keeping it in repair, also the time and exertion in travelling on it. At the same time it frequently occurs from mountains, marshes, rivers, or valleys lying in the straight line joining the 2 points to be united by a road, that the short cut is practically "the longest way round," both as regards the labour in construction, and the animal force required to draw loads over the steep gradients which such a line would present. Shortness, although a great object, must therefore give way to levelness. In a country where small but steep hills are common, it is quite possible that a straight road running over their summits may be longer than one winding round them at a constant level, as both may really be straight, one in a vertical,

the other in a horizontal plane. In order to avoid an ascent, a road may be advantageously increased in length by at least 20 times the height which is thus to be saved.

Gradients.—The following Table shows the loss of horse-power for several slopes. It also shows the angles formed by several rates of inclination, and the number of feet ascended in every mile of road of such slopes. There is a vast difference between the duty of an offr. laying out a road during a campaign for immediate use, and of an engineer doing the same for a permanent highway in peace. The latter will, within certain bounds as regards expense, sacrifice everything to keep his gradients as low as possible, say to about 1 in 30, which is generally regarded as the maximum on first-class roads. The offr., on the other hand, dare not commit himself to large cuttings, embankments, or bridges, and must therefore submit to frequent undulations and steep gradients, so long as they do not exceed 1 in 15. It may be necessary, however, at some points to go so far as 1 in 10, as horses for short spurts can quadruple their ordinary power of draft; all such steep slopes, no matter how short, are to be avoided, if by any practicable means it is possible to do so. For ramps leading to bridges, &c., it may at places be necessary to construct them at a slope even as great as $\frac{1}{3}$rd.

In carrying roads up heights, it is advisable to avoid having any considerable descents, although it has been found better in the mountain roads of India, in very long rides, to have a slight counterslope of about 30 yds. every 500 or 600 yds. to ease the traction and prevent any great flow of water down the road. The gradients should be even, being, if necessary, somewhat steeper below than above. In zigzagging up hills, the curves should be on the level, as also a distance of about 50′ at the top of each straight piece, so that with long teams the whole draft may not be thrown on the wheelers at the turns.

The Cross Section on a military road where considerable traffic is expected should show a minimum width of 16′; at particular spots where the labour of construction is excessive, this may even be reduced to 14′ for very short distances. Whenever it is possible to do so without great extra labour, a width of 24′ should be given, 17′ in the centre being macadamised. If, however, the traffic is not to be very great, only 10′ or even 8′ need be metalled. In zigzagging up hill the width should be $\frac{1}{4}$th more at the curves when the zigzags form an angle of from 120° to 90°, and one-half more when the angle is from 90° to 60°. Roads should be raised in the centre; their cross-section should be formed of two straight lines having a rise in the centre of the road of from 4″ to 6″, where the lines meet being rounded off; this fall will suffice for drainage. Those formed along a hill side should be in a single slope of $\frac{1}{8}$ from the outer to the inner edge, where the drain will be, to catch the water from the hills and prevent it from reaching the road.

Drainage is provided for by digging ditches on each side, leaving a space of 24′ for the roadway ; their size must depend upon the humidity of the country. If meant to "intercept the water from the hill sides rising above the road" they must be large, but as a general rule a width at bottom of one foot will suffice ; their side slopes to be 1 to 1. They should lead to the gullies, &c., forming the natural drainage of the country.

To lay out a road.—It being necessary to connect two points, A and B, by a road, it must be remembered that one which will last for a year or two at the utmost is all that is generally required. The highways constructed between Balaclava and Sebastopol plateau remain now as a monument of our ignorance of military requirements in such matters. Although the road may only be wanted for one or two campaigns, yet it will, in most instances, have to sustain an immense and constant traffic, sometimes by night as well as by day. This continual wear must be provided for more by arranging for its frequent repair by gangs of men told off permanently to every 3 or 4 miles, than by the character of its original construction. The time, materials, tools, and number of men available for the work must greatly influence the form of its construction, and therefore the line that is to be selected. The more men, tools, &c., available, the more level the road can be made, but in the field the great art is to make the most of resources at hand.

A map, showing the country between the two points to be united by a road, is of great importance. If one cannot be obtained, a rough, traversed survey must be made of the footpaths following the required line. Rough horizontal sections to be made along them. If there is not time to do so, the heights must be estimated by the eye, or by the means of an aneroid barometer. (See Article on "BAROMETER.") The difference of level between the termini and the highest point to be crossed having been thus ascertained, and divided into the distance between those points, will give the general gradient. If it is too steep, the ratio must be increased by adding to the length of the road by carrying it round instead of directly across hills. Thus if the difference of level is 500′ and the gradient has been fixed at 1 in 20, the road must be at least 10,000′ long. Take the road over gravel as much as possible, for with such a subsoil the drainage is always good, and metalling can be dispensed with.

When the country is hilly or much intersected by rivers, there will generally be certain points between the two places to be united by a road by which it must pass, such as low gaps in hills, fords, or parts of rivers favourable for the construction of bridges. Such points are to be noted at once on the map, and all attention turned towards deciding the line the road is to follow in connecting them. There will also be some obstacles, such as precipices, ponds, marshes, of so self-asserting nature, that if by any possibility they can be avoided, the road must pass round them.

In laying out roads, follow as much as possible the course of streams running in the required direction. In crossing a range of hills or mountains a line of road should be sought for wherever it is found that the sources o streams flowing down the opposite slopes approach nearest one another When time and labour is of great consequence, it is sometimes easier to carr a road by zigzags over a hill than to make one along the course of some strea at its base, where cuttings and considerable blastings would be necessary. I doing this the fewer the zigzags the better. In deciding upon a line of roa through forests, the highest trees should be climbed to obtain a good view : th course selected to be marked by notching the trees with an axe as you g along. In the open, the line should be marked out by small piles of stones stakes at every 50 yds., curves or zigzags being lock-spitted where necessar

Construction of the road.—The centre of the road having been marked o by pegs or small piles of stones, a practicable path, 5′ wide, should be mad along its entire length to facilitate subsequent work. Lines scored with pickaxe, or marked by stones, put 2′ or 3′ apart, should be laid down each side to mark the outer edges and the position of the ditches. In som places the earth from the ditches will be required to raise the road, but general it is advisable to throw the excavated earth on the out-side. T width the road is to be must then be cleared, all large stones broken sma and trees rooted up from it. When it is possible to pull trees down ropes fastened to the uppermost part of their stems it is better to do so, t roots being cut through for that purpose. In levelling the surface for t reception of the broken stone, a common plough can be used with gre advantage in skimming off irregularities of surface. In running roads throu woods, the trees should be cut down for 20′ on each side of the road, t stumps being left in the ground ; the timber can be used in construction burnt.

Metalling.—As soon as the line has been approximately determined up the largest available number of men to be set to work along it, breaki stones or collecting gravel or timber, according to the material it is intend to use. The stone hammers should weigh 1 or 1½ lb., with heads 5″ 6″ long, and 18″ handles for use when sitting, or 3′ long when standi For every 10 of such hammers there should be one weighing 2 or 3 l 6¾″ long in the head, with 3′ handle. The stones to be broken up so t each piece should be about the size of a hen's egg. The best stone is t which is hardest to break up, such as whinstones, basalts, sienite grani and beach pebbles ; soft granites, sandstones, and the ordinary limesto are bad, but for military roads whatever may be the stone at hand, it m be used ; if there are several kinds available, but in limited quantities, hardest description should be reserved for the surface. The slag f furnaces is a good material. A medium labourer can break in a day f 1½ to 2 cub. yds. of soft, or from ½ to ¾ cub. yd. of hard tone. Bro

stone occupies twice as much space as when solid. When the road has been levelled and prepared for metalling, if there are plenty of loose stones about, of 4″ or 6″ in diameter, place them on it so as to form a well-packed covering of about 6″ in thickness. Over this layer lay another of stones broken up to egg size, as already described. Sandbags are useful for collecting stones, a bag of some sort or other should be given to each man of the party told off for that work. Sometimes it is not possible to do more than collect the stones lying about, and throw them on the track prepared for their reception: in such cases, gangs of men provided with long-handled hammers should be employed to break up the largest-sized stones on the surface. When nothing but gravel is to be had, it should, if possible, be mixed with a proportion of loam, to bind the pebbles together.

When the road has to be taken along the side of a hill, it is made half in excavation and half in embankment. The diagram explains itself. The steps *a a a*, are cut to prevent the earth slipping, and the ditch, *b*, is intended to prevent the surface drainage from reaching the road.

Retaining Walls.—The angle at which the soil will stand decides whether retaining walls are necessary or not. Owing to the steepness of a hill round which a road is to be carried, it may be necessary to support the outer slope of the made portion by a revetment wall of dry masonry built with a slope of 3″ in every ft., and having a thickness at top of 2½′. The largest possible stones should be used; those with rounded surfaces must be broken with the hammer before they will bind. There should be a parapet wall of about 2′ above the road. When wood is plentiful it should be used in preference [the larger it is the better], being built up with a slope of 2″ to every ft.; the timbers are kept in position as shown in the diagram. The braces should be 8′ apart, and sunk at least 3′ into the firm unmade ground; they should be notched into the timbers forming the remaining wall, as shown in Fig. 48.

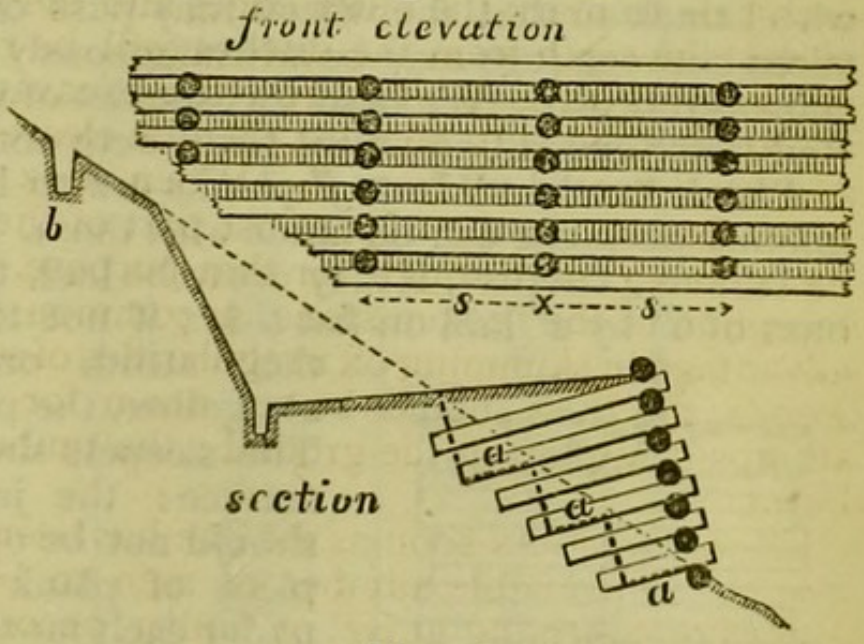


Fig. 48.

Corduroy Roads.—In well-wooded countries, particularly if the drainage is bad, or the country swampy, they are excellent substitutes for macadamised roads. They are made by laying young trees of from 6″ to 12″ diameter side by side, and close together, to form the surface. A pole of about 6″ by 6″ should be pinned with spikes or treenails along their outer

edges to keep them in position, and when possible, it is better to lay the trees forming the roadway with their ends resting on similar poles sunk until their upper surface is level with the ground.

Embankments may be formed easily with timber when it is in abundance as in Canada: the logs being laid at right angles with one another, the upper surface, if it is for a road, being corduroyed over.

Fig. 49 shows such a road in section, Fig. 50 in elevation.

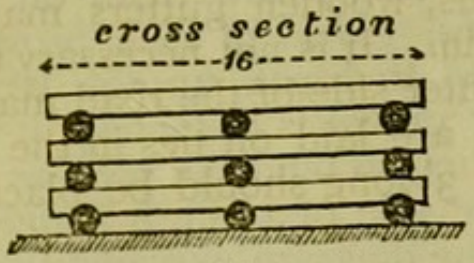


Fig. 49.

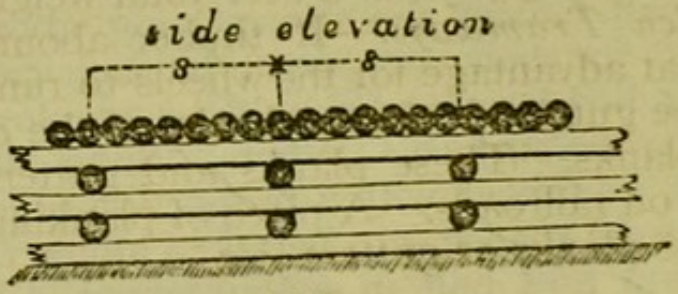


Fig. 50.

In all corduroy work it is most desirable to adze away the logs along the wheel track so that the wheels may pass over an even surface. The interstices between logs may be advantageously filled up with some small boughs, chips, sand, &c. We used this species of road to a great extent during the Red River expedition where pines were abundant.

Plank Roads.—When 3″ planks are to be had, the very best of roads for military purposes can be made with them. For a 16′ road the planks should be laid on 4 sleepers, if they are to be had, the outer ones 5″ by 5″, the inner ones of 6″ by 2″ laid on flat side; if not to be had, planks can be used in their stead, or they can be dispensed with altogether, the planking being laid on the ground. The sleepers should be sunk to a level with the surface: the junction of one row of sleepers should not be opposite that of other rows, and a piece of plank about 2′ long should be placed under each junction. The spikes used should be 5″ long [22 lbs. to the 100 spikes], with chisel-shaped edges, which are to be driven across the fibre; wooden spikes can be used if iron is not to be had. Before laying the planks the road should be brought to a plain surface. If there is plenty of material at hand it is a good plan to spike down a piece of scantling about 5″ by 5″ along the centre, to keep the wheels in their proper places. The planks should be laid as shown in Fig. 51 [the measurements are all shown in inches], for if laid with even sides it is difficult when a wheel gets off the planking to get it on again. An inch-coating of small stone or gravel can be laid over the planking with great advantage. A horse can draw on a plank road from 2½ to 3 times as much as on an ordinary macadamised one.

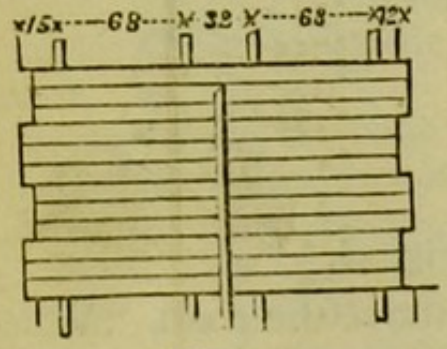


Fig. 51.

Swamps.—In carrying roads over swampy places, strong hurdles, laid on the ground, or fascines, or even loose brushwood [not exceeding 2″ in diameter] laid close together will form a good foundation; they should be covered by 6″ of broken stone or gravel.

Light Iron Tramways were prepared for some of the worst portages during the Nile Expedition of 1884–85, the gauge being 18″: steel rails 14 lbs. per yd. with steel sleepers 3′ long and 9·75 lbs. weight each: the clips for the rails were about 4·5 lbs. a set: total weight per mile from 30 to 32 tons.

Wooden Tramways.—If timber abounds, wooden gutters may be laid with great advantage for the wheels to run in. It is not necessary that there should be gutters for both wheels, as the outer side of the road may run on simple planks. These planks and gutters are laid on ties in the way that rails are on railroads. A piece of planking 3′ long should be placed under where the planks or gutters join.

TABLE OF GRADIENTS.

Inclination.	Angle.	Rise in feet per mile.	A horse can Draw.
	° ′		
1 in 10	5 43	528	·25
1 in 11	5 11	480	·265
1 in 12	4 46	440	·28
1 in 13	4 24	406	·265
1 in 14	4 5	337	·31
1 in 15	3 49	352	·325
1 in 16	3 35	330	·34
1 in 17	3 22	310	·355
1 in 18	3 11	293	·37
1 in 19	3 0	277	·385
1 in 20	2 52	264	·4
1 in 24	2 23	220	·5
1 in 25	2 18	211	·52
1 in 26	2 15	203	·54
1 in 30	1 55	176	·64

In this Table the load which a horse can draw on the level is taken as represented by 1. In ascent, a perfectly smooth road tells more against draught than one of ordinary roughness. Ascents tell more on a horse than on a man: that is, every additional degree added to the gradient causes greater loss of power to a horse than to a man, in proportion to their respective strength.

Repair of Roads.—Roads used as the communications of an army require constant repair, which is best provided for by dividing each road into

sections, the length of which must depend upon circumstances, each being placed under the charge of a N.-C.O., with a few men under him, by whom materials for repair must be prepared, collected, &c. An officer should be told off to so many sections.

RAILWAYS.—In all future wars, the main lines of supply will, in civilised countries, be along railroads. Indeed, when the contest is likely to be a protracted one, and the topography of the country is favourable, it will often be advisable to lay down a railway temporarily, as we did in the Crimea and Abyssinia. We were the first nation that demonstrated how feasible and useful it was to do so. As for such an operation there will always be engineers especially appointed, no attempt will be made here to explain the mode of construction; but it is strongly recommended that all S.Os. should carefully study the construction of railways as practised in America. The English system is more applicable to permanent railways, where everything is well finished, and immense works undertaken to obtain the lowest possible gradients; whereas in America, where lines are run through wildernesses, economy of construction is the first great object aimed at. The influence of railroads is strategical rather than tactical.

Permanent way.—The following statement of weight of rails, sleepers, &c., may be useful.

The railway begun from Suakim towards Berber was of 4′ 8½″ gauge: the steel rails were 56 lbs. per yd., spikes 8 oz. each; fish plates 8 lbs. each; 88 fish plates per mile; bolts, 1 lb. each; 1760 bolts per mile. The rails, fish plates, bolts, and fastenings, &c., complete with due allowance for sidings c a single track line of this description, weigh about 130 tons per mile. F sleepers 9′ × 9″ × 4·5″, wt. 1 cwt. each, were used; 2000 sleepers per mil

For 100 miles the rolling stock supplied was, 6 4-wheel and 12 6-whe locomotives (weight of each full and running about 17 tons; the tend when full, about 13 tons), 8 saloon and 44 3rd class carriages, and break vans.

The permanent way of the 3′ 6″ gauge Soudan railway was as follows: 4 lbs. steel rails, rails and fastenings weighed 75½ tons per mile, fir sleepe (2000 per mile) 55½ tons per mile.

The Rails commonly in use are (1) the *Saddle-back*, requiring no sleepe or chairs; (2) the *Double-headed*, used on all great British lines wi "chairs"; (3) the *Flat-bottomed*, which are spiked directly on the sleepe and (4) the *Bridge* rail. No. 2 is universally used in England and Franc No. 3 in America, Austria and Russia.

Signals.—The semaphore is almost universally in use. Two signals o are used. 1st, the arm of the semaphore raised to an angle of 45° mea "all right," or "proceed." 2nd, this arm raised to a horizontal positi means "danger," or "stop." At night green lamps mean the 1st, and lamps the 2nd.

The Gauge of a railway is the measurement between the inside of the rails. The British standard gauge is 56·5″; the Irish 63″; Egyptian 56·5″; French 56·5″; Belgian 56·5″; German 56·5″; Austrian 56·5″; Russian 60″; Spanish 66″; Portuguese 66″; Soudan 42″; United States 56·5″; Victoria 63″; New South Wales 56·5″; Queensland 42″; *South Australian* main lines 63″; minor 42″; Canadian 56·5″; Cape of Good Hope 42″; Natal 42″; New Zealand 63″; Indian 63″; and the Metre for subsidiary lines.

WORKING OF RAILROADS.—Previous to an army embarking for the theatre of war, every arrangement must be made for working the railroads which are to form the chief Ls. of C.: much will, of course, depend upon whether the existing staff on such lines can be relied on, or to what extent it will be necessary to supplement it, or whether it will have to be replaced altogether. It may be necessary to send out engines and rolling stock; for, if the enemy can obtain any power over the railroads before your arrival, he will destroy the rolling stock, or run it off into his own territory. For the general working of the line, an offr. to be called the "Director of Railways" will be appointed to regulate the traffic: he will be under the orders of the Director of Transport. To each line made use of there should be a Traffic manager, who can be best obtained from some of the large English railroads; he should be well paid, and attached to the Staff of the Q.M.G. with local or high honorary rank. We understand the construction, working and administration of railways better than any nation in Europe; and, from the numbers employed upon our network of iron highways, we can always obtain the very best railway staff of the world: but it is absolutely necessary that that staff should exist on paper in time of peace, and be capable of mobilisation upon the shortest notice. The Director of Railways should be assisted by an efficient staff selected by himself. Under his orders there should be an especially enlisted "Construction Corps" of workmen, for the repair and maintenance of the road, to be organised under military officers. Taking, as a model, the corps established by the Federal Government during their war, the organisation might be into battalions, as follows, their number being according to the necessities of the service; 1 man a mile, or 2 to every 3 miles, will generally be ample to look after the permanent way.

Battalion of Construction Corps.

Battalion.

- Commandant Major, R.E., specially selected for his knowledge of railway work.
- 2nd in command, a Captain R.E., ditto, ditto.
- A Quartermaster.
- A Sergeant-major to act as Clerk.
- A Rodman [to be a staff-sergeant].
- 2 Messengers.

1st Subdivision.

No. of men.	
1	Engineer of bridges. To be an officer of R.E., selected for his knowledge of bridge-making.
1	A Quartermaster.
1	An Assistant-surgeon.
1	Sergeant-major to act as clerk and time-keeper.
1	A Hospital Steward [staff-sergeant].
1	A Quartermaster-sergeant [staff-sergeant].
6	One Sergeant to every 50 men, to act as foreman.
30	One Corporal to every 10 men, to act as sub-foreman.
300	Mechanics and labourers.
2	Blacksmith and helper.
12	Cooks.

Making a total of 3 offrs., 3 s.-sergts., 6 sergts., 30 corps., and 314 private for each subdivison.

The 2nd subdivision to be the same, except that the O. C. and the me under him should be skilled in laying rails.

The 3rd subdivision to consist of a clerk of the works to supervise th water stations, having under him a sergeant as foreman, 12 mechanics an labourers, together with one cook.

The 4th subdivision to consist of a clerk of the works experienced i masonry, with a sergeant [to be a mason] as foreman, 10 masons an helpers, and one cook.

The 5th subdivision to consist of three experienced guards, to be 1s class s. ss., and 3 others to be sergts., at a lower rate of pay, 2 locomoti engineers, to be s. ss., 2 firemen, to be corporals, and one cook.

The strength of the battalion would therefore be—4 officers, 3 Q.Ms 2 M.Os., 17 sergts., 62 corporals, and 655 privates. They should be arme with rifle and sword-bayonet, and drilled to their use, so as to be able t defend themselves, but never should be made use of as combatant soldiers

PROTECTION OF RAILWAYS.—A railroad will always be, more or les open to injury from cavly. raids : it is therefore essential that its protecti should be especially provided for by the Q.M.G., a sufficient force bei placed at his disposal for that duty. The nature of the country, t character of the enemy, the composition of his army, and the disposition the inhabitants, can alone determine what force will be required, and wh is to be the proportion of Cavly. to Infy., &c., &c. The more Mtd. In that can be spared for this work the better. It is folly attempting to gua a line by distributing along it 10 or 12 men to the mile. Central poi must be selected as positions for flying columns, ready at all moments

move out, either by train along the line, or on horses, and in waggons along the country roads, to pounce down by forced marches upon the enemy's columns. The position of these flying columns to be changed constantly. Small cavly. parties should scour the country to the right and left of the line to the greatest possible distances compatible with their safety, telegraph stations being pushed out, and signal stations posted on commanding ground still farther out, so that it should be impossible for any movement to be made by the enemy within the zone thus watched, without its being immediately known to the several flying columns. A good system should be thus established for watching the enemy, the country people being well rewarded for giving correct information. The inhabitants to be informed by proclamation that any of them discovered injuring the railroad or telegraph, or attempting to obstruct the former, will be hanged without mercy. In some countries it may be possible to make the inhabitants living along it responsible for its preservation, and it may sometimes be necessary to make severe examples by burning the houses near to the spot where any injury has been done to it. The most vulnerable points of railroads, as explained in the article upon their destruction, are large tunnels, viaducts, and bridges. In many instances it may therefore be necessary to protect them by block houses containing small garrisons of from 20 to 100 men, each being commanded by an officer. Some should be made proof against field guns, and all should be made as strong as possible by means of all available obstacles. At each of these posts there should be a machine gun, with a good supply of ammunition; it would add greatly to their power of defence. Light balls are useful on dark nights to show what an enemy investing the block house may be about. It is sometimes very necessary that there should be a block house at each end of a viaduct or long bridge, when it is advisable to enclose with palisading some little space all round the bridge, strong gates being arranged for, allowing trains to pass. The object of all such works is merely to protect the bridges until the nearest flying column has had time to arrive, for it is by closely watching the enemy, more than by watching the line itself, that you can alone hope to protect it efficiently.

DESTRUCTION OF RAILWAYS.—Patrols and small reconnoitring parties are not upon any account to destroy railroads without orders emanating from the G. O. C., for it is possible they might paralyse the future movements of an army by doing so. A railroad may be rendered useless to an enemy by destroying the track itself, by destroying or removing the rolling stock, or by destroying the means of supplying fuel and water to the engines. The subject must be considered under two heads.

1st. When from there being no likelihood of a railroad in an enemy's country ever being of use to you, it is advisable to destroy it in the most effectual manner possible.

2nd. When, from its being in your own territory, you do not wish to

destroy great works, such as large bridges, tunnels, &c., &c., or when, from it being likely that you may again, in a short time, require it for your own army, you desire only to render it temporarily useless to the enemy.

1st. In destroying a line when time is of little consequence, the rails, chairs, &c., should be removed to the rear to be made use of as required on the lines in use by your army. In most instances, however, time is a great object, as such duty generally devolves upon bodies of Cavly. who have succeeded in cutting in upon the enemy's L. of C. and who have consequently to make all possible haste to escape being cut off. Our Cavly. pioneers are now supplied with appliances for the hasty demolition of bridges and railways. The chairs can be broken with a sledge hammer. Destroy the signal stations, the water tanks, and all the arrangements for watering the engines. All electric wires to be cut and twisted, and all batteries and their apparatus broken to pieces. The most vulnerable points on a line are large viaducts and bridges, particularly if they are made of wood : if of brick or stone, powder or g. c. must be used to destroy them ; when time permits, the piers of the viaducts should be destroyed as near the ground as possible. (See article on the "DESTRUCTION OF BRIDGES.") In destroying woodwork by fire, whatever oil can be obtained from the neighbouring houses should be poured over it to make it burn quickly ; coal oil is the best. If there are tunnels, to blow one in at several points well within the tunnel where the ground above is of a sandy nature, is the most efficacious means of blocking up a line. It is better to blow down one long tunnel in several places, than several tunnels in only one place. If you have not time to blow in a tunnel, take up some rails in it : make a barricade with them and sleepers, &c., and then run in a heavily loaded train at full speed. If you can do so from both ends, so much the better.

In all deep cuttings where there are retaining walls, a few charges of powder, exploded judiciously behind them, soon fill up the cutting. If telegraph wire and fallen trees are intermingled with the débris, the work of clearing it out is rendered much more difficult. Some countries are so level that railroads running through them present no bridges or embankments for great distances. To destroy the rails and ties, or sleepers, is therefore the only means of rendering them useless. Curves should always be selected, as it is more difficult to repair them than straight pieces of the line. To tear up rails is not so easy as all may think. On railroads, the workmen draw the spikes with clevis bars and claws, and unscrew the nuts and bolts with wrenches, all of which are too heavy to be carried by cavly. soldiers. A good substitute for a wrench can be made with a screw-bolt and two nuts, as shown in Fig 52, the first nut being screwed on to the bolt as far as it will go, and the other screwed on

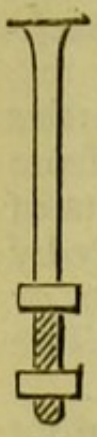


Fig. 52.

just far enough to fit the heads of the screws or nuts to be removed. In all fish joints where there are bolts and nuts made use of, these wrenches can be easily made, the first two nuts being removed by tapping their corners with a stone or hammer until twisted off: when one has been made, more nuts can be removed by it, and any number of others made by them. When time presses, most rails can be destroyed by a charge of 8 oz. of guncotton, placed against them halfway between 2 sleepers, and tied round the rail. When there is plenty of time, the wooden ties or sleepers should be made into long piles and set fire to, the rails being placed across them, and when sufficiently hot in the middle, bent up into the shape of a U, or round a tree or telegraph pole. It is of the greatest consequence that rails should not only be bent, but twisted as well, for if only bent they can easily be straightened, as explained in Article on "RECONSTRUCTION;" but if well twisted, they must be re-rolled before they can be of any use. When well heated in the centre as described, they can be easily twisted by inserting the point of a pick into one of the fish-plate holes at either end, and then bearing in opposite directions.

As, however, time will in most instances be of the utmost consequence, it is desirable that some means be devised for tearing up rails rapidly, and bending and twisting them when cold. The following is a description of a plan invented for that purpose during the late American war.

Two pieces of U-shaped iron or steel about 6½ lbs. each [see *a* in Fig. 53] are placed under the two ends of the rail shown in sketch; levers [*b*], 11 or 12′ long, and 4½″ or 5″ in diameter at the large end, are inserted in the irons, when by pulling on the levers the whole rail is ripped from its fastenings in less than half a minute, and the chairs broken. A detachment intended for the destruction of a railroad should be told off into squads of 10 men; to each should be given before starting 2 of these U-shaped irons, 2 axes, and 2 pieces of stout rope, each 6 yds. long. A supply of the torpedoes described in Article upon the "DESTRUCTION OF BRIDGES" should also be taken upon all such expeditions.

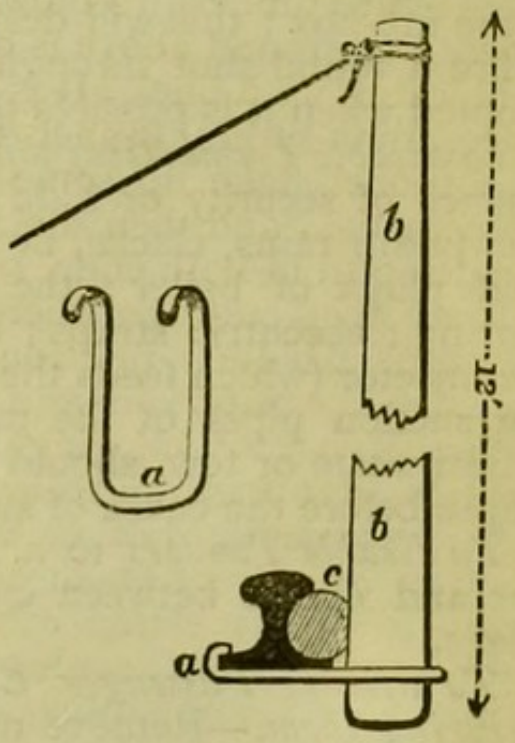


Fig. 53.

Having reached the part of the line selected, each squad should be given 12 rails to remove; suppose the rails to be 20′ long, there would be 45 squads to a mile of road. Say the detachment consisted of 1000 men, there would be 450 to destroy the mile of rails, leaving 550 men to cover the operation.

Each squad should at once provide itself on the spot with 2 wooden levers of the dimensions already given, and 2 wooden wedges or blocks [*c* in sketch] to place between the rail and the levers; the ropes, *d*, to be fastened to the small end of the levers. The 2 U-shaped irons having been forced under one end of a rail near together, and the wedges and levers placed as shown in sketch, one lever is pulled on and bent down to the ground, with the second a further twist is then given as far as it can be moved; a fresh hold is then taken with the first, and the operation continued until the twist is sufficient. The rail can then be bent by pulling on a rope attached to the loose end, and afterwards removed altogether by applying one of the levers to the end which had remained fastened. Five minutes is sufficient time to twist, bend, and remove a rail, so in 1 hour the 12 rails told off to each squad ought to be removed: in fact, 450 men should in that time destroy a mile of road. The ties should then be stacked by each squad, a couple being split up to make them burn the quicker. If coal oil is to be had in any of the neighbouring houses, it should be poured over them with that object.

Rails vary in weight from 40 lbs. to 70 lbs. the yard.

To destroy Locomotives.—It is most desirable that all offrs. should make themselves acquainted with the several parts of the machinery named in the following paragraphs. Draw off the water from the boiler, light a large fire in the fire-box; this will destroy the flues. The most efficacious method is to fire a round shot through the boiler. The latter plan should always be adopted when it is possible to do so.

To disable Locomotives without permanently injuring them.—Remove to a place of security or hide any of the following pieces of the machinery. The pump rams, clacks, or delivery pipes; one or both safety-valves; the mud plugs of boiler; the link connecting the slide valve to the valve gearing; eccentric straps; one or both cylinder tops or covers; unscrew the injector (which feeds the boiler with water) or the steam dome. To fill the suction pipes of the pumps with melted resin or lead, or even with cotton waste or tow, should be temporarily effective, and many hours might elapse before the cause of stoppage was discovered.

To disable Tenders to a similar extent, remove the hose pipes, coupling bar and chains between engine and tender, or the brasses from the axle boxes.

To disable Passenger Carriages, Trucks, &c., without permanently injuring them.—Remove one or both wheels [or in American cars one or both trucks]. Take off the axle guard or the bolts from one or two of the guard plates; the brasses from the axle-boxes, or the draw bars. The two last are most easily effected.

To destroy Passenger Carriages, Trucks, &c., burn them, or wreck them. In fine, all piles of coal or other fuel should be burnt, the water tanks and

the pumps used for filling them destroyed, and all shops for the repair of engines, &c., and everything that will burn, set on fire.

2nd. *To render a line temporarily useless*, so that whilst it would take much time for an enemy to repair it, you could do so quickly yourself, will depend much upon your respective resources. If you know that he cannot provide rails, remove a hundred yards of them at various intervals; if he has no supplies of telegraph wire on hand, remove it. Remove the pistons from all the pumps supplying water to the tanks ; provided that you can easily replace them, you can even go so far as to destroy a bridge ; take care that all rolling stock and fuel is removed within your part of the theatre of war. Railway communication was upon many occasions temporarily intercepted by the Cavly. during the late Southern struggle for independence in the following manner :—A high embankment having been selected, a couple of thousand men were dismounted and formed in single rank along a rail, but outside of it, and facing inwards. The rails at both flanks were disconnected, so that the portion of the line to be torn up occupied by the single rank of men, was not fastened to the rest of the line. Upon a given signal the men stooped down and grasped the rail, and upon another signal, all lifted it up to a vertical position, with the ties fastened to it, and then let it fall over on the other side down the embankment. The rails could not then be replaced without unfastening them from the ties, and relaying the whole superstructure. When the ties or sleepers are very firmly fixed in the ground, the operation of overturning a section as described can be facilitated by using poles or rails as levers under the rails.

Repair of Railroads.—Repair of railroads will be effected by the Reconstruction Corps, its Hd. Qrs. being at some central point, where workshops can be established in safety. All bridges and culverts within possible reach of the enemy should be numbered and classified under a few heads, such as 1st, 2nd, and 3rd class, according to their dimensions ; materials for the complete renewal of each class should be kept ready in the central depôt, so that if information is received at any moment that such or such a bridge or culvert has been destroyed, the Reconstruction Corps, in starting to repair it, can take exactly what is necessary for doing so ; this should be carried out so far, that even trusses of the various sorts to suit the spans of the larger bridges should be kept on hand ready for conveyance to any part of the line. In all secure places there should be an ample supply of rails, spikes, sleepers, and tools necessary for reconstructing the permanent way should it be destroyed. All rails that are only slightly bent into a curve without being twisted, are easily straightened by means of a common jack-screw or jim-crow, or by sledges.

General Haupt, of the Northern army, used the following contrivance for straightening rails that had been simply heated in the centre and bent. 5 blocks of wood, *a*, *b*, *c*, *d*, *e*, about 10′ square, and 5′ long, were placed as

shown in fig. 54, where *x x* is the rail. The top one was notched to the shape of the rail so as to receive it, and prevent it from turning; pressure was applied by from 12 to 16 men at each end by means of two poles, *f f*,

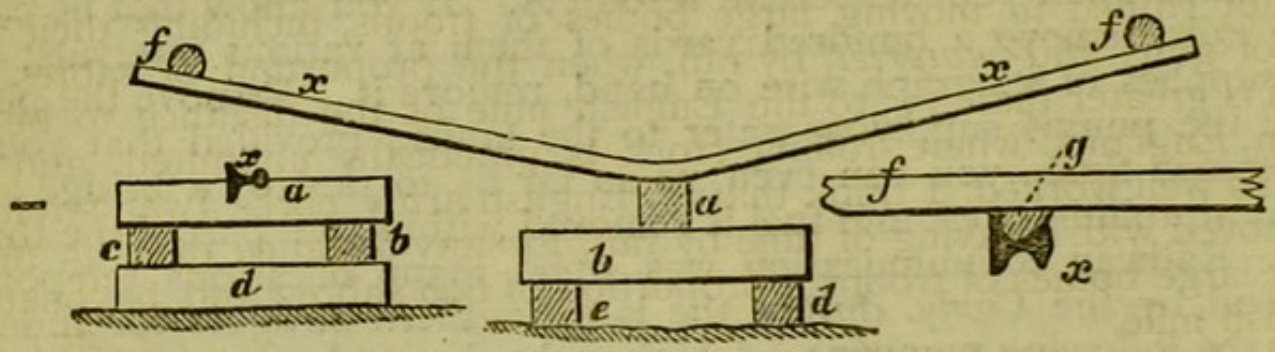


Fig. 54.

about 3″ or 4″ in diameter, a small piece of some hard wood, *g*, being placed along each end of the rail to form an even surface for the poles to rest upon. The men on each side would press down or relieve the pressure at the words "down" or "up," the rail being moved backwards or forwards or turned as required.

After a short drill the negroes employed were able in from 2 to 3 minutes to straighten a rail so that it did not vary from $\frac{1}{4}$″ to $\frac{1}{2}$″ from a straight line, permitting it to be laid in the track and spiked; these short bends could, if necessary, be removed afterwards by the jack-screw apparatus.

As a general rule it was found that those bent with a curve of 1′ or more radius could be thus straightened in from 2 to 4 minutes, while those which had been heated to a high degree and bent at a sharp angle could not be restored without heating and hammering.

No time should be lost in attempting to straighten the latter; when cold, they should be put on one side to be sent, when the new track has been laid, to the place prepared for heating them, &c.

A furnace for doing so can be made with two parallel walls of brick, stone, or even clay, with bars laid across to hold the wood or coal. When heated, the rails are laid upon a straightening table and hammered until the bends are removed. Such a table is made with a piece of timber 12 in. square and as long as a rail, on which two rails are placed, base downwards, with a third between them base upwards, the whole being firmly spiked; the base of the top rails forms the plane surface on which the rails are straightened.

MOVEMENT OF TROOPS BY RAILWAY.

Rail v. Road.—If the civil functionaries of a line are retained to work for war purposes, all movement of men, stores, &c., must be arranged with them, and once made, no interference with them should be allowed; this

all the more necessary when the whole of the ordinary traffic is not stopped. Orders for all trains should emanate from the traffic manager's office, and only from thence. The experience gained in the late Franco-German war proves that, upon double track lines worked upon the continental system, time is not gained in moving large bodies of troops, including their proportion of guns and *matériel*, by rail, when the proportion of sabres and bayonets is greater than 435 to the English mile of the distance to be got over. In England, where rolling stock is practically unlimited, and our railways so well worked, I think that an English army corps (war strength) can be moved with a saving of time by rail, for any distance over 45 miles, being for large bodies of troops a proportion of 600 sabres and bayonets to the English mile.

Engine Runs.—Whilst the carriages of which a train is composed run troops or stores through to their destination, the engine only goes for what is called its "run," the length of which varies from 50 to 100 miles. In England 80 miles is considered a short run, except for the express passenger trains.

Single and Double Lines.—On nearly all English railways there are 2 lines of rails, but in America and on most of the continental lines there is seldom more than one. The rapidity with which troops can be conveyed is greatly affected thereby, and the fewer the places where trains can pass one another on such single lines, the fewer will necessarily be the number of trains that can be at work at the same time upon every 100 miles of road. The length of the *Sidings* at the crossing places, fixes the limit to the number of carriages there can be in a train on that line. The number of carriages that a siding can hold may be calculated thus: An engine with its tender requires 72′ on rails; passenger carriages, horse-box, cattle, and carriage truck 20′, and a break-van 27′. Taking 40 as the maximum number of carriages in England for a military train, all sidings should be about 250 yards long.

Despatch of Trains.—On single lines, trains can only be despatched from the termini at intervals of twice the time it takes a train to run from one crossing place to the next one: thus, if a train takes 35 minutes running between the longest distance between any 2 crossing-places on the line, trains should not be despatched from either terminus at shorter intervals than 70 minutes. In India the lines are single, and the distances between stations often as much as 20 miles. The military trains have 35 carriages, and run 21 miles an hour, including stoppages. On the Scinde, Punjaub, and Delhi line only 11 trains, and on the Lahore and Delhi line only 15 trains a day each way can be run, allowing for stoppages to breakfast and dine. On a double line, in a military point of view,—i.e., remembering the time required to load and unload trains,—the number of trains actually running on the line at the same time is almost without limit; but on a single

line, the total number of trains that can run on it at any one time corresponds with the number of sections between all the several crossing-places and the termini, half of which trains will be running in one direction and half in the other, if the line is being worked up to its greatest working capacity. On the Continent it is generally calculated that not more than 15 trains on single and 30 on double lines can be despatched every 24 hours.

The Railroad Committee, consisting of Traffic Managers and Railway Engineers, calculate upon despatching trains at intervals of 8 minutes. Under such an arrangement the terminus where the troops would be detrained would be in a curious state of confusion after the 1st hour when the troops began to arrive, being crowded with men unable to carry their ammunition, camp equipment or baggage.

Assuming that in England by the most extraordinary efforts you could despatch 4[illegible] trains in the 24 hours (*i.e.* a train on an average of about every 30 minutes), it would take 67½ hours to despatch one of our army corps by any one line of double railroad under the most favourable circumstances. Consider what it would be to work a line for even 3 days and 3 nights under such pressure. It could only be possible by borrowing additional hands from other companies, or by denuding of servants the branch lines or the portions of the main line not comprised in the operation, so as practically to render them, for the time, almost useless to the public. I dwell upon this because men who are more scientific than practical sometimes forget in calculating the maximum carrying capacity of a railroad, that the physical power of the railroad official is an important factor in the sum. Although, saving accidents, and within certain wide limits, a locomotive is capable of sustained exertion as long as you tend it properly with fuel, water, and oil, still the man who drives or stokes it is not so capable. His powers are very limited, and without his proper amount of daily rest and sleep, he soon breaks down altogether. The derangement of everything on a line of railroad over which masses of troops are being sent is so great, that in Germany the rule is to give a railroad terminus a rest of 2 days after the movement of any great force, or after a fortnight's continuous work. This is for the purpose of repairs, and for correcting the irregularities that are inseparable from such great operations.

In making these great railway calculations, it must also be remembered that, even under the pressure of war, it will seldom be possible to completely stop all ordinary traffic. The postal services must be attended to, and large cities, since the introduction of railroads, depend so completely on the provinces for food, that to stop the ordinary traffic would be virtually to starve their inhabitants. A certain number of trains per diem must therefore be allotted for these purposes. I think, therefore, by ordinary calculations, upon English lines, that we should not reckon upon being able to despatch more than about 45 trains in the 24 hours by any one double line of railroad. During the great concentration of the two hostile armies in 1870, the Germans seldom ran more than 14 or 16 military trains during the 24 hours, the

French from 20 to 25 in the same time; but then their trains were about twice as large as ours would be. It has been laid down by us that on a double English line, the steady despatch of military trains at intervals of half an hour was the maximum that could be effected.

In estimating the number of trains you can run in a day, other important facts have to be considered. Have you enough rolling-stock to furnish the required number of trains? In England, the rolling-stock is so very great, that this consideration may be passed over, as, practically, all being of the same gauge, any amount that could possibly be required could be collected on any one line from the other great companies; but if operating abroad, or in an enemy's country, a very limited amount only might be at your disposal. The Germans calculate that carriages despatched loaded during the 1st day's movement, for distances not exceeding 200 English miles, can be back again at the starting-point and again despatched loaded on the 3rd day; for distances between 200 and 400 English miles, on the 4th day; and for distances between 400 and 500 miles, on the 5th day. In England, where the space is greater and the trains smaller, we might, I think, calculate upon having this rolling-stock again available in less time.

Another point to be considered is, can you have a train ready loaded to start every 30 minutes? Admitting that it takes 30 minutes to place half a battalion of infantry, with all its equipments, regimental transport, &c., in a train, and double that time to load each train carrying cavalry, R.A., or stores, it would require several platforms, or separate places where Cavly., Infy., & R.A. could be embarked, so that a train could be despatched every 30 minutes, allowing 10 minutes after the despatch of every loaded train for an empty one to be shunted back to take its place alongside the platform. Platforms unprovided with appliances for placing loaded waggons on the trucks, or for getting horses into the cattle trucks, are unsuited for the embarkation of troops. In some countries the cattle and other trucks are made so that their ends let down. A continuous platform can thus be formed by the portion of the train composed of trucks, those for the reception of horses being placed in rear of the passenger carriages, and the trucks to carry the waggons or guns being placed at the rear of all. The horses are walked from the end of the train (where there is always the means of getting horses and carts on to the end of the hindmost truck) to the most forward cattle truck, the end of each truck being raised, and replaced in its proper position as soon as each has received its proper complement. The same method is pursued with the carts and waggons. This is a much more expeditious mode of embarking them than that of putting them in from the side.

At the London termini of some of our main lines there are great facilities for loading trains, as the platforms are numerous, and their goods stations are well provided with all the appliances necessary for loading cattle and stores. But although you might be able to despatch 6 or 7 trains an hour from London, unless you could unload a similar number in the same time at the point of detraining, your labour will come to naught. Whichever may be the smaller number that can be loaded at one end or be unloaded at the other end of the line in an hour, that must be the number

of trains to be despatched per hour with advantage. It is therefore a great object t increase the facilities for the embarkation and disembarkation of troops to the utmost In a country like England, several lines could always be made available in any grea movement of troops, and the numerous branch lines could be utilised as affordin places for loading and unloading without interfering with the principal stations o the main lines. In an operation that must, from its magnitude, extend over severa days, especially if the movement is for a distance of over 50 miles, Brigds. or Divns might at the outset make one or more day's march, according to the magnitude the operation, so as to reach a station, perhaps on a branch line, but at any rate som place where they could entrain without blocking up the main line.

In the same manner, a great operation can be very much facilitated by sendin some Brigds. or Divns. to points within one or two marches of the point of concentra tion. They should be despatched if not the first, at least early in the operation, that supposing the whole movement was calculated to last 3 or more days, they mig have time to march from the points where they left the railway, to their destination

As much care is required that the troops at the end of their journey do not g jammed into the town where the terminus is situated, and so block up the exits fro it, as is necessary in keeping the approaches to the starting-point clear.

Speed.—It is most essential that a low rate of mean speed should be fixe for military trains, so that if time be lost by any train from any cause, it ma be easily recovered by increasing the pace for a time. The speed to be fixe upon will be influenced by the power of the locomotives, the nature of th gradients, the general working condition of the line, the number of carriag in each train, and the average distances to be run without stopping. Fr their military trains of 50 or 60 carriages the Germans fix the mean speed from $12\frac{1}{2}$ to $15\frac{1}{2}$ British miles the hour; this rate includes all delays c casioned by short halts for watering the engine, slackening speed in passi small stations, &c., &c. These long trains of the Germans are worked 2 engines, one in front, the other behind the train over lines with gent gradients. When the gradient is steep, the trains are reduced to half th size. In France the pace for military trains is from 17 to 20 miles. Aft due consultation with the best railway men in England, it was determin that the speed of military trains should not as a rule exceed 30 miles, or short stoppages included, 25 miles an hour.

Size and Composition of Military Trains.—On the Continent large trai of from 40 to 75 carriages running at low speed are preferred. In Engla our railway authorities prefer small trains of from 30 to a maximum of carriages each, and to run them at a maximum speed of 30 miles an hou There should be a break-van at each end of the train. In America, whe the gradients are steeper than in England, from 10 to 15 passenger carriag or from 16 to 22 freight carriages go to a train, the former being drawn the rate of from 16 to 22 miles, and the latter at from 12 to 15 miles an hou

The gradients on a line will greatly influence the wt. which engines c

draw, as the following Table will show. It is drawn up assuming that the wt. which any engine could draw on the level is represented by 1·00.

Gradient.	Engine will draw.	Gradient.	Engine will draw.
1 in 700	0·75	1 in 60	0·18
,, 500	0·67	,, 50	0·16
,, 250	0·5	,, 40	0·09
,, 100	0·26	,, 30	0·06
,, 80	0·22	,, 20	0·016

Some convenient place, away from the entraining station, should be set part for "making up" the trains. In mixed trains carrying men, horses, waggons, &c., it is advisable to make up the train in sections, so that if for any reason it has subsequently to be broken up into 2 or more trains, the military units and the several arms or departments may be distinct one from the other. If on arrival at the detraining station the platform is found to be too short to accommodate the whole train, then the carriages containing the horses, or whatever was most difficult to unload, could be drawn up alongside the platform, whilst the men got out as best they could without a platform. Abroad one train takes a Battn. ; we send it in 2 trains, and so reduce the rapidity with which we can convey our Infy. by rail by one half.

Rolling Stock.—The experience gained during the American war shows that to supply an army of 100,000 in the field by means of a single line of rails, the proportion of rolling stock should be, engines 0·25 and freight carriages 6·0 to every mile of road : this does not provide for the conveyance of troops. The following Table may be useful as giving a fair idea of the rolling stock possessed by various nations :—

Rolling Stock per Mile of Road.	English.	Irish.	Scotch.	Canadian.	United States generally.	The State of New York.	German.	Indian.
No. of Locomotives . .	·709	·2448	·51	·21	·236	·243	·43	·2027
Ditto Passenger Carriages.	2·244	·86	1·327	·3	·16	·34	·807	·46
Ditto Freight and Goods do.	19·694	4·0	16·8	2·95	4·068	3·364	6·7	4·34

As these calculations include all branch lines, it may safely be assumed that on all main lines there will be about ½ more on foreign and ¼ more on home lines.

In calculating the amount of rolling stock available for use, a deduction of 50 per cent. for locomotives, and from 20 to 30 per cent. for all carriages must be made for those usually undergoing repairs.

Locomotive.—An engine and tender occupy 72′ of rail. The average wt. of an English locomotive is 28 tons when running, or with its tender 46 tons. In India the engine and tender when running weigh together about 35 tons only. An engine drawing a heavy troop train consumes from about 100 cub. ft. or 624 galls. to about 150 cub. ft. or 930 galls. of water, and about 8 cwt. of pit coal per hour. *Tenders* generally carry 3 or 4 tons of coal and from 1500 to 2500 galls. of water. The metre gauge passenger engine when running weighs about 16 tons, its tender when full about 11 tons. An engine can be worked with a relief of firemen for 18 out of the 24 hours, leaving 6 hours for cleaning, &c.

Passenger Carriages.—They occupy on an average, 27′ of rail each. In computing the number of soldiers (armed and equipped) that can be conveyed in any carriage, the usual allowance is 8 soldiers to 10, and 6 soldiers to 8 ordinary passengers. A soldier should have 20 inches of seat as a minimum. Our ordinary 2nd and 3rd class carriages will hold from 32 to 40 soldiers, according to the size of the carriage.

Cattle Trucks, &c., occupy on an average, 20′ of rails each. A covered goods waggon carries 6 tons, and has a capacity of about 500 cub. ft. An ordinary *goods truck* carries 1 ton of straw, 1 ton of hay, 5 to 7 tons of coal, 6 to 9 head of cattle, 30 to 45 sheep, or 1 of any description of gun or waggon (with limber) used in the field. The Midland Rl. Rd. has over 20,000 low-sided open goods waggons, each 16′ 10″ including buffers, width 7′ 9″ with a side 1′ 9″ high, carries 6 tons, and weighs about 5 tons 4 cwt. *A sheep van* with 2 floors will carry 80 sheep or 2000 lbs. of bread (bread for conveyance by rail should not be packed in more than 4 tiers).

A covered Van (*with break*) for luggage varies in capacity from 300 to 5 cub. ft. and carries about 5 tons.

The Carriage Truck is generally 14′ long with ends 10″ high that let down for convenience of loading.

Waggons for horses.—A cattle truck to carry 7 or 8 horses saddled should be 17′ 6″ long and 7′ 4″ wide, the entrance being at least 6′ 2″ high. It should be covered at top and have the ends boarded up. The ordinary English cattle truck is from 14′ 9″ to 16′ 6″ long and 7′ 6″ wide, height to top of arched roof 7′ 3″, the doorway 6′ 2″ high and 5′ 9″ wide, the lower part falling down on a hinge to form a gangway. The floor of truck is 4″ above rails: it carries 8 to 12 head of cattle. For the conveyance of horses the bottoms should be sound, and at least 2″ in thickness. No covers

carriage with a less interior height than 6′ 3″ should be used for conveyance of horses. Open goods waggons may if necessary be used for horses, provided their sides are over 4′ high. The English *horse-box* holds 3 horses. If it is necessary to use goods waggons for the conveyance of men, seats with backs should be roughly fitted up ; in estimating the number they will carry, the space required may be calculated at 4 sqr. ft. per man.

This Table gives the average wt. and carrying capacity of ordinary carriages on British lines.

Carriage.	Weight of Carriage.		Carrying Capacity.		
	Metre Gauge.	(4 ft. 8½ in. Gauge.)	Narrow Gauge, 4 ft. 8½. in.	Broad Gauge.	Metre.
	tons.	tons. cwt.			
1st Class .	3¼	5 18	24 soldiers. . .	. . . . .	18
2nd ,, .	3¼	6 4	*32 to 40 soldiers.	50 to 60 soldiers.	24
3rd ,, .	. . .	6 12	,, ,,	,, ,,	
Truck . .	3	4 0 to 7 0	5 to 7 tons . . .	5 to 10 tons. .	6 tons.

* 4 Men on a seat.

American Rolling Stock.—A first-class car carries 60 passengers, the other passenger cars generally 40 : a box car carries 9 tons of freight, or 10 horses with harness on, or 9 cavalry horses, saddled with coats rolled, valises, &c., on saddle : a cattle car will take the same number of horses. A platform car or flat (29′ long and 9′ wide) will carry a 12-pounder gun, its limber and waggon with its limber, or 3 ordinary farmer's waggons, or 5 one-horsed carts.

Indian Rolling Stock.—The covered goods waggon (18′ long, 8′ 6″ broad and of 10 tons wt.) will carry 20 native soldiers, or 30 to 35 natives squatting on the floor ; inside height 7′, with a door 6′ 3″ high, and 5′ 6″ wide. It carries 8 horses, four at each end, facing one another. The high-sided open goods waggon and the cattle trucks will hold 9 Arabs or 8 large Walers when placed transversely to the rails. The covered goods waggon will carry 12 head of cattle or 50 sheep if well ventilated, or the fd.-service kits of 375 British soldiers ; or 680 Sepoy kits ; or 150 Native Cavly. kits : or 18 E.P. tents : or 36 Sepoy pals : or 24 doolies if dismantled and carefully packed.

PLATFORMS.—For our short military trains they should be 250 yds. long, and 20′ wide, with ramps at each end, and, if possible, also along the reverse side ; they should be 3′ 6″ above the rails, and the inner face towards the line should be 3′ 6″ from the centre of the nearest rail. When sleepers

and timber and rails are plentiful, they can easily be constructed anywhere along a railway.

Watering Troughs for Troops.—These should, if possible, be constructed at every halting place along the line, but they are absolutely necessary in or near the entraining and detraining stations. It is best to have them in the open space near the termini where the troops are collected immediately prior to entrainment or immediately subsequent to detrainment: under any circumstances, they must be clear of the platform to be used. They should be accessible on both sides, so that each company should file past it, one rank on each side. It takes about 3 minutes for a strong company to file along a trough, each man to get a drink and fill his water-bottle, and march clear of the trough.

Broughs.—When moving troops with what I may call tactical objects in view, that is, moving them to the assistance of others already engaged (as, for instance, those pushed on to Frossard's assistance on the 6th of August, 1870), where it is possible it may be necessary to disembark them at any moment, you must carry in each train skids, or some sort of brough for getting the horses, guns, and waggons off the carriages. Although the operation entails labour and requires time, it is a great advantage to be able to disembark at any point you choose, irrespective of railway stations. During the Fenian raids upon Canada, we had every train provided with broughs, and I saw a battery of R.A. disembarked by their assistance in a very short time far from any station. They can be easily improvised with rails or sleepers or a combination of the two. The common double-headed rail makes a good skid for detraining guns or waggons, as when placed on its side, it just takes the ordinary gun wheel.

Every movement of troops by railroad naturally divides itself into five distinct operations.

1st—The march to the station where the embarkation is to be effected.

2nd—The embarkation.

3rd—The journey.

4th—The disembarkation at the end of the journey; and

5th—The march from the station when disembarked to the bivouac or camping-ground.

1st. *The march to the railway station* is a purely military operation, and when the numbers to be conveyed are large, is one requiring the greatest nicety of detail, so that the numerous columns should not cross on the way, and so that all should arrive at the proper station and in proper time. Upon the staff rests the responsibility for making these arrangements. After due consultation with his railroad advisers, it is for the responsible staff officer to fix upon the place where the several arms of the service should embark, and where the Commissariat was to load its stores; in general it is a good arrangement for the Infy. to get into the trains at the passenger stations, reserving the freight stations for the Cavly. and R.A. The time-table for the despatch of the force having been drawn up, and the routes to the various railway

stations having been selected, the troops would be ordered to move so as to reach these points exactly at the hour required: the distances should be nicely calculated to insure this.

The approaches to the stations must be kept clear, and silence strictly enforced when the troops arrive near them. The arrangements to be made by the responsible S.O. require great care, but no matter how ably they may be devised, unless regtl. offrs. enforce discipline most strictly whilst marching through a town to the railway, upon their arrival there, and whilst embarking in the carriages allotted for the reception of their men, all will be of no avail, and disorders, such as those that we find took place in 1870 at Paris, Metz, Amiens, and other great termini, will certainly result. It is during such operations that the discipline of a Regt. is tested, and that one discovers how much better it is in some corps than in others. Partial delays and mistakes are inevitable, entailing more or less discomfort upon all ranks—but these petty inconveniencies are necessarily attendant upon our lot as soldiers, and they should be accepted cheerfully. Grumbling about the delay, and finding fault with the arrangements made, is not the way to further the interest of the service or the ends aimed at by the special operation then in progress, but it is a certain method for causing disorder.

It is very necessary that only the troops for whom the carriages are ready should be allowed to enter the station, and the presence of all sight-seers, or friends with them, should be positively forbidden. Good and distinct approaches to each platform should be prepared. At some termini, such as Euston Square and Victoria Stations, there are inclosures outside where troops could be massed to some small extent previous to entering the station; the public should be strictly prevented from entering such spaces. It is essential, where large numbers have to be embarked at any station, some open space near it should be selected for this purpose. Water troughs should be constructed there where the men can drink and fill their water-bottles. Latrines should also be dug. In a great movement of troops by rail, the very common fault of reaching the station too soon may overturn the best conceived arrangements. The dread of being too late is a bugbear that drives us constantly into the opposite extreme, and both extremes are nearly equally injurious in most military operations, and they certainly are equally so in moving masses of all arms by rail. The smallest possible number of men should be permitted to fall out whilst in the station. In order to prevent the necessity for their doing so, it is very advisable to have a 10 minutes' halt somewhere near the point of entrainment when marching to it.

2nd. *The entrainment of the men.*—The Queen's regulations give very good rules for this, but they only deal with it from what I may call a regimental point of view. Regarding it as a staff question, it is one that embraces so many topics that a volume could easily be filled with instructive information on the subject, as the general working of railways in war is embraced in it. In all movements of troops, whether by land or sea, one great rule is to keep the various military units as complete at all times during the operation as possible. Thus, it is not only essential that with Cavly. the horses and the men to ride them should go by the same

train, but that whatever may be the number of sabres, bayonets, or guns conveyed by any one train, or ship, they may be fit for war, complete in every necessary field equipment, having their transport with them so as to march off without any delay upon leaving the train, or disembarking from the ship. This is a point that civilian traffic managers are prone to forget or to ignore, so much so, that in all the railway problems worked out by order of the Q.M.G. from time to time by the Railroad Committee, I find that in moving troops they are sent forward without any transport.

An Offr. accompanied by a N.-C.O. from each squadron, battery, or company, will precede the troops, and, in concert with the station-master, will label or mark off with a piece of chalk, on the footboard of passenger carriages, and in a conspicuous place on the side of the cattle trucks and horse boxes, the troop, battery, or company allotted to them, and the number of men or horses each will hold. The bottoms of cattle trucks should be carefully inspected before being used for conveyance of horses as accidents might arise from the planks being unsound. One S.O. with 2 or 3 good N-C.Os. should be allotted to each platform. The arrangement of the carriages in trains and all details connected with the movement of troops by rail should be made in consultation with the railway officials, who understand the work far better than any purely military officer does.

The 2nd and 3rd class carriages usually hold 5 on each seat; the simplest plan therefore is to move the men in "fours" closely "locked-up" along the platform holding a section opposite each compartment: the serjeants must fall into the ranks before "fours" are formed, and if possible there should be a N.-C.O. or at least an old soldier in each section. It is found from actual measurement, that, allowing for buffer spaces, from 5′ 6″ to 6′ 6″ represents one compartment in a train. A battalion in line or in "fours" will occupy a front greater by from 25 to 40 per ct. than the length of the carriage to receive them. Cloaks and greatcoats (except when worn) and valises, &c., will be stowed under the seat where each man sits, but as a rule each should retain possession of his rifle or carbine; these arms are never to be placed on the floor of the carriage.

The men once in the carriages, to be kept there, only those required for fatigue being allowed on the platform; the fatigue parties should leave their arms and accoutrements in their carriages whilst at work on the platform. The strictest silence must be maintained in the ranks, from the moment of entering the station until the train with its living freight has fairly left, and is clear of it. When the train is ready to proceed, "attention" will be sounded. Horses should remain harnessed or saddled during railway journeys made as parts of any large movement of troops.

In the movement of supplies, it is a great matter if they can be despatched already loaded in carts or waggons, so as to be merely wheeled off the trucks at the end of the journey, where horses should be in attendance to take them to the front. This might be feasible when feeding an army from a base a few hundred of miles distant by rail, the empty waggons being sent back daily.

Entraining of Infantry.—One sergeant for each company, one for the det

attached to Hd.-Qrs., and one for the guard and prisoners, the whole under an officer, should be sent on to mark the carriages so as to arrive at the railway station 40 minutes before the time named for the departure of the train. The sergeants will previously ascertain with exactness what strength the companies and parties they represent will muster at the station; the guard and prisoners not to be included in the strength of their companies, as separate compartments will be told off for them. The officer in charge of the above-mentioned parties will then give over to the N.-C.O. the compartments for the carriages for the accommodation of their men, &c.; each N.-C.O., as soon as the compartments for the party he represents are handed over to him, will mark on the foot-board of each compartment, with a piece of chalk, the name or letter of his party, and will then place himself opposite that one which is nearest the side from which the troops will approach the carriages. The Battn. will arrive at the railway station 20 minutes before the time named for the departure of the train, and will be halted by the C.O. on ground which will be pointed out by the S.O. superintending the departure; each company will then be told off into sections, according to the size of the compartments into which the carriages are divided, and when this has been done, the battalion will move on to the platform in fours; when the rear of each company arrives at its marker, it will be ordered to halt and turn towards the train, remaining in fours. Each captain will now move along the front of his company, and point out to each section the compartment it is to occupy, and having done so, will give the order "*Quick march*," when the men will move at once into their respective compartments, and then take off their valises. When a Battn. moves with regtl. transport, the latter should be, if possible, at the railway station 30 minutes before the time named for the departure of the train, and it should be entrained in the same manner as R.A. An Infy. train should be loaded in 40 minutes.

Entraining of Cavalry.—On arrival of a Cavly. Regt. at the station, the men will dismount, each man taking nothing but his carbine, except when the cloak is required for wear, and they will then be told off, so many to each carriage. Having deposited their accoutrements on the spot selected, and in the same order in which they stood in the ranks, they will be told off into sections of 7 or 8 horses, according to the capacity of the horse trucks. The sections will be numbered off from the right of the squadron, and they will afterwards file from the most convenient flank, each halting opposite the truck marked with the number of the section. A quiet horse should be selected to go in first, followed by No. 1 of the front rank of each section, and then his rear rank man. Should a horse be very restive, backing him in will generally succeed. As a rule, the first horse is to be led in and secured to the opposite side of the carriage, by the bridoon reins and the head-collar rope, either to a ring placed for the purpose, or to the bars of the truck. The other horses will follow in order, each dragoon taking off the bridle bit, hanging it round the horse's neck, and leaving the truck the moment he has secured his horse. The horses' heads, when it is possible, should be placed facing away from the second line of rails, as the horses are easily frightened by trains and engines passing. The moment the last horse is in, the door

must be at once shut, and the fastenings of the trucks afterwards carefully examined by a railway official.

1 N.-C.O. and a couple of intelligent men from each troop, previously told off for the purpose, will go round and examine the fastenings of all the troop horses, and make such alterations as may be necessary under the personal superintendence of the troop officers. When all the horses of a section have been entrained, the men should at once proceed to the spot where they have left their arms, cloaks, &c., which they will resume and fall in; they will also be desired to remember the number and position of the truck containing their horses, and to fall in, in front of it, when they are ordered to detrain. In a lancer regiment, certain men previously told off will collect the lances, and deposit those of the leading troop in the front luggage van, and those of the other troop in the rear van. The loading and unloading of the officers' chargers from the officers' horse boxes should go on simultaneously with that of the troop horses, but if possible at a different part of the station.

When it is advisable for the Cavly. to unsaddle, one large covered goods waggon for each troop will be required to pack the saddles in; the waggon for the first troop being placed in front, that for the second troop in rear of the cattle trucks. After the men have deposited their arms, &c., as already detailed, they will be ordered to unsaddle, and hold their horses; they will then remove the saddles, bridles, and appointments, and pack them in the corn sacks, laying them on the ground in a regular manner opposite to the waggon which has been told off to their respective troops. 1 N.-C.O. and 2 men, selected for each waggon, will then arrange the corn sacks with their contents in the luggage vans in a convenient manner, so as to take up the least possible space. The same men will be employed to take out and distribute the corn sacks with their contents on arrival at the destination. When the arrangements before detailed are properly carried out, the train can be ready to start in an hour from the time of beginning to load. No hay or straw should under any circumstances be left amongst the horses; all forage required that cannot be obtained on the road should be taken in closed-up waggons. The closer horses are packed together in the carriages the better. During very long journeys such as are common in India, whenever there is a halt exceeding 12 hours in duration, all animals should, if possible, be detrained to rest themselves.

Camels should be carried in high-sided open waggons, 4 or 5 to the waggon; they should be made to kneel down under a crane, have all their legs well tied in this position, and thus hoisted in by the crane, if this can be easily accomplished; not more than about 1 in 12 will walk into a truck, for they are timid as to where they put their feet; blindfolding does not always answer; they should be blindfolded at some little distance from the train, and then marched into the trucks, which should be on a level with the platform; if they are extremely obstinate, a 2″ rope 60′ long placed under the tail, with 6 men to each end can pull forward into a truck refractory camels; when in the truck they must be forced to kneel, and have both fore legs tightly hobbled; the closer they are jammed together in the trucks the better; 1 or 2 native drivers should travel in each truck to look after the animals. Entraining

them is a slow process. The ordinary open truck in Egypt 16′ × 8′ carried 3, 4 or 5 camels according to size of animals.

Entraining of Artillery.—On the arrival of the battery at the station, it should be drawn up in the nearest convenient spot. The men will dismount, and after being permitted to fall out for necessary purposes, will then be formed up two deep, take off their packs (if H.A., their swords), and, some convenient place being selected, will lay them on the ground in the order they stood in the ranks. The horses will then be unhooked, the traces hooked over their backs in the usual manner, and told off in sections according to the capacity of the cattle trucks; each section will then file off to the truck allotted to it, under the direction of the O.C. the division, and be entrained in the same manner as laid down for cavalry. The gunners will assist the drivers in the loading of the horses, and on the conclusion of this duty the whole will proceed to entrain the *matériel*. In loading the guns, waggons, and carriages, trucks loading from a dock are, if possible, to be used; when, as is the case on some railways, the ends of these trucks let down and meet, the carriages of the battery may be run on from one to the other in a few minutes. These trucks, however, are not so convenient when there are no docks or other facilities for unloading, and should in such cases be avoided. Trucks having sides letting down are next in point of convenience; and lastly, low-sided trucks. Most of these take conveniently a gun or waggon with its limber.

Carriages must, when loaded from a dock, be run on to the truck unlimbered. The wheels must be well secured with lashing rope and scotches, the latter being generally procurable at railway stations. Should there be hay on the waggons, it is not to be suffered to remain during the journey, but must be placed in a luggage van. Low-sided trucks are found on most railways; the loading of these requires more manual labour than other trucks, as it is necessary to lift the carriage over the sides by main force. The gun (or waggon) and its limbers are to be placed on the truck with the trail (or perch), and the shafts pointing inward and resting on the floor. There are some trucks on which more than a gun and limber may be placed, reference being always had to the weight which they are calculated to bear. In loading, the gun should first be placed on the truck close to one end, the trail on the floor; then its limber is to be backed upon it as close as possible, the shafts resting on the floor; the waggon limber is then to be placed on the truck the reverse way to the first limber and its shafts elevated. Finally, the waggon-body is to be entrained, perch pointing inwards and resting on the floor.

This mode of conveyance requires much lashing, and these large trucks are not recommended when others can be obtained. When used, they should, if possible, be loaded at the end, as the operation when performed from the platform is most laborious. No projections, whether guns, shafts, or spare wheels, are on any occasion to extend beyond the buffers. The horses and carriages being loaded and secured, the men of the battery will proceed to the place where they have left their swords, which they will resume and fall in two deep, and be told off in squads corresponding to the capacity of the compartments of the railway carriages, care

being taken that one N.-C.O. or an old soldier should be in each compartment. In one hour the train should be ready to steam out of the station.

Entrainment of R.E. and A.S.C.—The instructions given for R.A. apply to troops and fd. Comps. of the R.E. and to the loading of vehicles generally. One truck is required for the conveyance of each waggon. The load on a pontoon waggon will project several ft. beyond one end of the truck it rests on, and it is therefore necessary to run an intermediate truck between each pair of trucks carrying such waggons. Pontoon waggons should be loaded back to back, so that their loads may project over the intermediate truck. As a general rule, waggons can be run on to trucks, the sides of which let down, and be locked round into position. Pontoon and trestle waggons being of exceptional length must, in the first place, be partly unloaded, then lifted sideways by hand on to their trucks, and subsequently reloaded, the operation occupying considerable time, and being very laborious. When the sides of trucks do not let down, all descriptions of waggons must be lifted into position by hand, except in the cases where the ends of the trucks let down and meet, and the waggons must be run on from a dock, when the whole operation of loading is much facilitated. No spare wheels or stores should be allowed to project above the tops of the waggons or beyond either side of the trucks. All shafts should be taken off and stowed beneath the waggons.

No. of carriages required for conveyance of Troops.—An Infy. Battn. on war establishment will be carried in 2 trains as follows:—

Left wing, one train.	For forage, baggage, &c.	1	Luggage-van with break.
	,, 15 Officers	1	First-class carriage.
	,, 533 Men	*15	Second or third ditto ditto
	,, 3 Officers' chargers	1	Horse-box.
	,, 24 Draught-horses	3	Cattle-trucks.
	,, 3 G.S. waggons	3	Carriage-trucks.
	,, 1 S.A.A. cart	1	,, ,,
	,, Baggage, &c.	1	Luggage van with break.
	Total	26	Railway Carriages.
Right wing, one train.	For forage, baggage, &c.	1	Luggage-van with break
	,, 16 Officers	1	First-class carriage.
	,, 533 Men	*15	Second or third ditto ditto
	,, 9 Officers' horses	3	Horse-boxes.
	,, 24 Draught-horses	3	Cattle-trucks.
	,, 2 G.S. waggons	2	Carriage-trucks.
	,, 2 S.A.A. carts	1	,, ,,
	,, Baggage, &c.	1	Luggage van with break
	Total	27	Railway Carriages.

* If all the carriages supplied carried 40 men, then only 14 would be required 533 men.

A regiment of cavalry on war establishment will be carried in 4 trains each as follows :—

One squadron with proportion of regimental head-quarters, one train.

For forage, baggage, &c.	2 Luggage vans with break.
,, 8 Officers*	1 Composite carriage.
,, 155 Men	4 Second or third-class ditto.
,, 3 Chargers	1 Horse-box.
,, 120 Troop-horses	22† Cattle-trucks.¶
,, 11 Draught-horses	
,, 21‡ Second chargers	
,, 2 G.S. and 1 Forge waggons§	3 Carriage-trucks.
Total	33 Railway Carriages.

A battery of R.H.A. on war establishment will be carried in two trains each as follows :—

For forage, baggage, &c.	2 Luggage-vans with break.
,, 4 Officers‖	1 Composite carriage.
,, 87 Men	3 Second or third-class carriages.
,, 8 Carriages	8 Carriage-trucks.
,, 84 Battery horses	12 Cattle-trucks.¶
,, 8 Officers' chargers**	3 Horse-boxes.
Total	29 Railway Carriages.

A 16-pr. battery of fd. artillery on war establishment will be carried in 2 trains each as follows :—

For forage, baggage, &c.	2 Luggage-vans with break.
,, 4 Officers	1 Composite carriage.
,, 97 Men	3 Second or third-class carriages.
,, 8 Carriages	8 Carriage-trucks.
,, 3 Officers' chargers	1 Horse-box.
,, 76 Battery horses	11 Cattle-trucks.
Total	26 Railway Carriages.

* *In one train there will be only 7 officers.*

† *With one train there will be 23 cattle-trucks.*

‡ *With two trains there will only be 20 second chargers.*

§ *With one squadron there will be 2 G.S. waggons and 1 forge waggon, and with another squadron there will only be 2 G.S. waggons, and the S.A.A. cart, and with each of the other two squadrons only 2 G.S. waggons.*

‖ *Only 3 officers with one train.*

¶ *These number of cattle-trucks are fixed at the rate of 7 horses to each, but many of our cattle-trucks will carry 8 horses saddled, or with their harness on. When this is the case the number of carriages in each of these trains will be less than stated.*

** *7 Chargers only with one train.*

A 13-pr. battery of fd. artillery on war establishment will be also carried in 2 trains, the number and description of railway carriages being the same as for a 16-p. battery, except that only 9 cattle trucks for battery horses will be required with each train.

RAILWAY TRAINS REQUIRED FOR THE CONVEYANCE OF AN ENGLISH ARMY CORPS.

Mark.	Contents of Trains.	No. of Trains.
D.	Genrl. Staff	2
1—3	Special for G.O.C.	1
	Total..	3
E.	Cavly. Brigade.	
1	Brigd. Hd. Qrs.	1
2—5	1st Regt.	4
6—9	2nd ,, ...	4
10—13	3rd ,, ...	4
14—15	H.A. Batty.	2
16	½ Bearer Co.	1
17	Commisst. & T.	1
	Total..	17
F	Corps R.A.	
1—6	3 Batteries H.A...	6
7—10	2 ,, 16 pr. & Hd. Qrs. ..	4
11—16	Corps Reserve Amtn.	6
	Total..	16
G.	Corps R.E.	
1—2	Fd. Pk. & Staff	2
3—5	Pontoon Troops	3
6—7	Telegraph ,, ...	2
	Total..	7
H.	Medical Deprt.	
1	½ Bearer Co.	1
2—7	6 Fd. Hospls. & Staff	6
	Total..	7

Mark.	Contents of Trains.	No. of Trains.
J.	C. & T. Depart.	
1—6	T. & Supply	6
7—13	8th T. Co. & Vet. Dep. ..	7
K.		
1—2	Bakery Train	2
	Total ..	15
I.	Ordnance S. Dept.	
1—3		3
A.	1st Division.	
B.	2nd ,,	
C.	3rd ,,	
1	Divisl. Staff	1
2—3	Staff of 2 Brigades	2
4—17	7 Batts. Infantry	14
18—21	Cavalry Regt.	4
22—27	3 Fd. Batts. R.A.	6
28—30	Ammtn. Column..	3
31	Fd. Co. R.E.	1
32—33	1 Bearer Compy...	2
34—35	2 Fd. Hospls.	2
36—39	Commisst. & T...	4
	Total..	39
	Recapitulation.	
	Corps Staff..	3
	Cavly. Brigade	17
	Corps R.A.	16
	,, R.E.	7
	,, Medical	7
	C. & T. & Vety. Dept. ..	15
	O. S. Dept.	3
	3 Divisions of 39 trains each ..	117
	Total No. for 1 Army Corps ..	185

3rd. *The journey.*—The low average speed fixed upon for our military trains renders it possible to make up for "lost time" by increasing it for short distances occasionally; a quarter of an hour lost by any one train through some trifling accident would otherwise make itself felt throughout the whole column of trains, so as to

isturb completely the time-table drawn up for the entire movement. In cases of ccidents the offrs. will proceed at once to their companies' carriages, and see that ne men retain their seats until ordered to descend. It is in such cases above all ecessary to maintain order: no efficient aid can be secured without it, and all must ork under some supreme direction. Every 2 or 3 hours, according to the total ngth of the journey, there should be a short halt of 15 minutes, and every 8 or 9 ours, a long halt of at least an hour, for feeding both men and horses. In drawing p the time-tables, these halts have to be calculated for, and the points selected here they are to take place. Plenty of sidings and good platform accommodation, nd good supply of water and latrines, are the first necessities for these halting-laces, especially for those where it is intended to feed. Protection for the men om inclement weather is also most desirable. The arrangements required for feeding ne men at the selected places during a great movement of troops are considerable. n the manner in which they are designed and carried out much must ever depend. report of the train should in all cases be made by telegraph to the place where the en are to halt for refreshment, giving the numbers in each train. At every such alting-place, a military commandant is necessary, and the higher his rank the etter, but under all circumstances he must be an able man, and carefully selected. Ie would be responsible that the necessary meals were properly provided for all anks halting there. A large force of cooks, butchers, and bakers, organised under a ommissariat offr., would be required, to be told off into reliefs, so that there should e no check in the issue of food to the stream of men and horses passing through the lace. Large cooking-ranges would be required for this purpose if the journey were long one, but under any circumstances, even in moving troops in Great Britain, it ould be necessary to provide the men with hot tea or coffee. In the hot weather India it is often necessary to make the railway journeys by night, selecting large ations where there is good shelter to halt at during the day. At some stations uring the late war, by introducing a jet of steam from a locomotive into the vessels ontaining the water and the coffee, it was prepared in the shortest possible time. ot tea or a hot soup during a long journey is not only very palatable, but is almost necessity for health, and keeps every one in good humour.

On arrival at the place agreed upon for the train to halt, the offrs. will get out nd go to their companies' carriages. Sentries from the quarter-guard will be posted prevent the men from straggling, or getting out at the wrong side of the train. hen these arrangements are completed, the "*Halt*" will be sounded, and those ho require to do so will get out of the train, leaving their arms in the carriages. hen it is intended to water and feed the horses of mounted corps during a halt, the *Feed*" will be sounded, when the men will get out of their carriages and proceed at nce to the trucks containing their horses, water in buckets having been provided by revious arrangement; one man will then get into the truck, and water each horse succession, the buckets being passed to him from the outside. The horses may en be fed with corn from the nose-bag in the usual manner. Horses take a long me to water in railway carriages, as each has to be watered from a bucket

separately. Along each platform where troops are to arrive for a long halt, there should be at least 160 buckets kept always full for this purpose; upon reaching a feeding-station, each offr. having so many carriages under his charge during the journey, will see that this duty is properly carried out. Indeed, during all railway journeys, no matter what may be the arm of the service, the carriages should be divided equally amongst the subaltern offrs., the captains going round to ascertain that everything is correct. During great journeys it is desirable that at each long halting-place there should be a small hospital close to the station with a M. O. always in attendance.

The S.C. at these halting-places should be supreme on the spot, no offr., no matter what may be his rank, passing through having any power to issue him orders, or interfere in any way with his arrangements. He must never leave the station whilst the operation is in progress, and he or his assistant must be present upon the arrival of every train, the O.C. in each train reporting himself to him, and taking orders as to the time when the journey was to be resumed. If through any carelessness on the part of regtl. offrs., every one is not in the train at the exact minute indicated by the S.C., the train must start all the same; if delays are permitted on account of absentees, the whole movement might be compromised. He will receive his orders direct from the G. of C., by whom the arrangements for the operation have been made. He must be in all instances the channel of communication with the railroad officials, to whom no orders are to be given on any subject by the offrs. travelling. Extra latrine accommodation at all important halting-places should be provided. The feeding of the locomotive is nearly as important as the feeding of the troops, and halting-places must be selected with this object in view. The police duties at the halting-places should be carried out under the S.C.'s orders; no intoxicating liquor to be allowed for sale in or near the place. The station to be kept clear of spectators, and the strictest order and regularity to be maintained in it. When it is time to proceed, the "*Close*" will sound, on which the men will all return to their carriages: the offrs. will see that their men are all present, and, having so reported to the C.O., the sergeant of the guard will be ordered to withdraw the sentries and return to his carriage. Lastly, the offrs. will get in, and the C.O. will give directions that the train may proceed.

During the Fenian raids in Canada, troops had to be moved into districts infested by raiders: to prevent accidents to the loaded trains from the possible destruction of the line, a pilot engine carrying a S.O. was kept running ahead of the train so as just to be always within signalling distance: when nearing the enemy's vicinity, all proceeded at a walking pace. With the leading train was a telegraph operator, who carried a portable instrument and sufficient copper wire to connect it with the telegraph wires of the railway; each train was provided with skids to enable guns and horses to be disembarked at any spot. A detachment of railway workmen with 20 or 30 rails, fishplates, &c., should be with leading train, in which there should be a offr. of rank and a railway official of authority of that particular line. These precautions should never be omitted when there is just cause for apprehension.

th. *The detrainment* is very similar, as far as the arrangements required, to the rainment. With infantry, enough men being left as a fatigue party to assist drivers to unload their waggons and horses, the main body should be marched ar of the station, and halted on the nearest available open space on the route to taken, where arms should be piled to await the arrival of the baggage, no ggling upon any pretence whatever to be permitted. As soon as the baggage nes up, the column to march at once for its destination, no halt being again per- ted until well clear of the terminus, and adjoining town or village. The S.C. at nt of arrival should give all C.Os. their orders, as to the mode of detrainment and arrangements to be made until each column gets clear of the place. Any block he place of arrival is more serious even than at the point of departure, for it must up all trains in rear, thereby rendering accidents more liable, and throwing out arrangements made for the operation. The S.C. must see that this is prevented, that no troops are allowed to hang about the station or its approaches. For detrainment of large numbers, it is most desirable to make use of as many ghbouring stations as possible, sending the Infantry forward by rail as far as you , and using local sidings or small stations that may be several miles short of the minus of concentration, for the Cavalry and R.A. A good supply of drinking er to be provided at the open spaces clear of the stations where the troops are to dezvous previous to marching.

here is always during war a tendency on the part of administrative offrs. to ke railroad stations depôts for their stores. Commissaries find railroad carriages y convenient places for their supplies. There is a great temptation to keep stores ught by rail, and not immediately required at the moment of their arrival, in the iages they come in. The zealous Commissariat offr., thinking naturally of his department only, all his thoughts and energies being centred in his important y of supplying the army with food and powder, begs of the S.O. to permit him to p his stores in their railroad carriages, until he has to issue or despatch them to front. Such requests must never be complied with; for to lock up rolling-stock tore-houses at a time when every available carriage is of consequence would be most rudent, and to allow a station to be blocked up by an accumulation of carriages ing military operations, would be the worst of folly. Storehouses for the reception upplies should be obtained at some little distance from the station, and if possible, direction different from that to be taken by troops in their march to the front.

hen the train reaches its destination, the offrs. will get out first, and the halt g sounded, the men will get out and fall in opposite their carriages. Cavly. or A. will be marched to some convenient spot selected by the O.C. at the station to osit their arms, cloaks, or knapsacks. The door of each truck is then let down, a mat or loose straw, if it can be procured, spread upon it; the horse opposite entrance is to be immediately bridled, and led or backed out by the man to whom elongs; the horses to the right and left following it in turn. The troops will then ormed up in the most convenient place, and the horses again held until the arms, are resumed and placed upon the saddle. As it may become necessary to

unload without the aid of a platform of any sort, some strong skids, not less than 15 feet long, and some planks to form a ramp should always be carried. In case of urgent necessity, two lengths of rail may be used for the same purpose; but it is believed that a small temporary platform may be made by the employés of the railway in a sufficiently short time in ordinary cases.

An Infy. train takes 30 minutes, and a Cavly. or R.A. train 40 minutes for detrainment and to get clear of the railway station.

5th. *The march from the point of leaving the train to the camp or bivouac.*—In any great movement it is necessary to run trains by night as well as day. Troops of all arms will thus reach their destination at all hours of the night. As night marches are to be avoided if possible, much will depend upon the nature and objects of the operation in progress, and upon the locality at the point of disembarkation in arranging for the disposal of the troops arriving at night. It is absolutely necessary that they should move away from the station, to prevent a block in the movement in rear, yet to move them any distance, especially if there is no moon, is a difficult operation. During the long days and fine weather of summer, it is easy to provide for the bivouac of the corps arriving; but during the long nights and inclement weather of winter, it is a difficult matter to arrange. Cavly. and R.A. should, as a rule, be despatched so as to reach the point of disembarkation at least 2 hours before dark in the evening, or not earlier in the morning than about an hour before daybreak; the troops arriving in the night between those 2 hours to be Infy. If the weather is all fine, Infy. arriving at night can be marched into any field, ordered to pile arms and lie down, a few drivers standing by the transport horses that are left hooked on if the night is too dark to unhook and picket them to their own waggons. But with Cavly. or R.A. it is hopeless to think of any arrangement except that of every man standing by his horse all night when it is very dark, a duty that is very wearing on strength, trying to the temper, and depressing to the spirits, as all who have seen and tried know full well. The general rule would naturally be in all great strategic movements, to collect each divn., or at least each brigd., together within a few miles of the place of disembarkation, so that it should march complete to the general rendezvous or point of concentration.

Electric Telegraph.—We were the first nation that used it in the theatre of war, a wire having been run down to our trenches before Sebastopol. During the Indian mutiny, the wire uniting us with Calcutta followed close upon our heels, so close that I have seen the workmen when laying it actually under a fire of canister. A careful study of the late wars in America, Bohemia, and in France, will give the student an idea of its immense value in military operations. In future, we shall have with an army in the field an offr. styled, "Director of Telegraphs," who will carry out his duties under the Q.M.G. He will have under him the Telegraph Comps. of R.E. to work, repair, and if necessary, to make the lines. No attempt will therefore be made here to describe the various processes for laying or fixing a line of wires. On level ground 16 poles per mile are sufficient for two wires,

hen many wires are used, 30 and even 40 are used. The wire most ommonly used in Europe for aerial lines is No. 8 B.W.G.* with a diameter f ·17″, weighing 389 lbs. per mile: No. 4 is sometimes used, its diameter eing ·24″, weighing 775 lbs. per mile: in India the standard size is No. ½, with a diameter of ·217″, and weighing about 660 lbs. per mile: in merica, No. 9 is most commonly used, diameter ·158″, weighing about oo lbs. per mile; the diameter of No. 14 is ·08″, and it weighs 90 lbs. to he mile. The wire used in Abyssinia by us was No. 16 B.W.G. copper ire, 64 lbs. to the mile: that used in Ashantee was No. 11 B.W.G. alvanized-iron wire, weighing 2 cwt. per mile. In South Africa several orts of wire were used, but none was more satisfactory than a three-strand alvanized-iron wire of 18 B.W.G., weighing 120 lbs. to the mile. In some nstances, the wire has been used without insulators, and has answered well. he cable used by our telegraph troops has a diameter of ·32 in., and weighs 80 lbs. per mile; but it is now intended to replace it by a cable weighing nly 168 lbs. per mile. At present the troop carries only 60 miles of wire, ut when the proposed changes have been effected in its organization and quipment, 160 miles of wire will be carried by its eight sections (20 miles er section). The overhead wires carried by troops at present is 15 B.W.G. copper, weighing 80 lbs. per mile). In future it is intended to use bamboo oles 15′ long, and about 8 lbs. each.

All Cavly. raids made upon the enemy's communications or into his erritory should be accompanied by a skilled operator, who should be rovided with a pocket instrument and a small supply of copper wire, and hen the enemy's language is different from yours, by a supply of ribbon aper and the instrument for recording the messages on it. Thus provided, n O.C. a Cavly. detachment that has got into the enemy's rear, can, by apping the wires at any place, learn the messages that are going over them, nd perhaps in that way the plans that are being made to capture his party. n many instances the Southern commanders having seized some telegraph tation in their enemy's rear, sent orders in the name of Northern generals to arious posts, directing them to move so as to fall into a net prepared for hem; trains of supplies of which they were in great need were thus secured. o prevent such tricks being played upon you, a secret signal, to be frequently hanged, should be determined upon, without which no orders are to be beyed. It is necessary that the operators should not even know that such xisted. For instance, for the month of June, it may be arranged that each nessage should begin or end, or both, with a word of 5 letters, for the next nonth with a word of 6 letters, or that the 3rd word in the message should be f so many letters, &c. &c. The secret to be communicated only to Os. C. posts.

To Destroy Telegraph Line.—Pull down a pole so as to get at the wire, nd then cut it in several pieces: the more poles destroyed the better. This

* Birmingham Wire Gauge.

is, however, easily repaired. An admirable plan for destroying communications is by means of non-conducting wire having the outward appearance of the ordinary wire in use. Being furnished before starting with some of this wire, and the tools used in repairing telegraphs, send a man experienced in such work up a pole, and let him there cut the wire close to it, uniting it again by the non-conducting wire spliced on in the usual manner. This should be done at several places along a line, and always at a pole. The result will be that, although all galvanic communication will have ceased, a man merely marching along the line shall not be able to discover where the break exists; one must go from post to post with an instrument to test each intervening portion of wire before the exact spot can be ascertained. It is advisable that a pole here and there should also be destroyed, and the wire cut, so that it should be supposed at first that the interruption simply resulted therefrom. Another plan is to unite the several wires together by a thin platinum wire thread. Done close to a pole it is imperceptible from the ground, and diverts the current, acting as a leak and as a confusing medium. If there is only one wire, the platinum thread should be brought to the ground to cause a leak.

SIGNALLING.—The system is so simple that it might be advantageously included amongst the subjects upon which regtl. offrs. are examined previous to promotion. It is of great importance that outposts should be able to communicate by signals with the main body, and that offrs. in charge of patrols, reconnoitring or flanking parties, advd. or rr.-gds., should have the power of rapidly communicating to the general what they observe or the intelligence they may obtain. Sending messages by mounted men is always liable to accidents, and at best is but a tedious process. At times circumstances may preclude the possibility of doing so. During an action or the execution of movements in presence of an enemy, orders can be sent with rapidity and silence, by night or by day, to the several detached corps by means of the new system of signalling. By its means communications can also be maintained between the troops ashore and the fleet. Communication by means of the system of flag signals described farther on, will be kept up between the main body and the flanking parties whilst advancing upon Fort Garry in 1870; it worked well, and was of great use. The electric telegraph is, during war, constantly liable to interruptions, so it is essential to have the power of supplementing it by a system

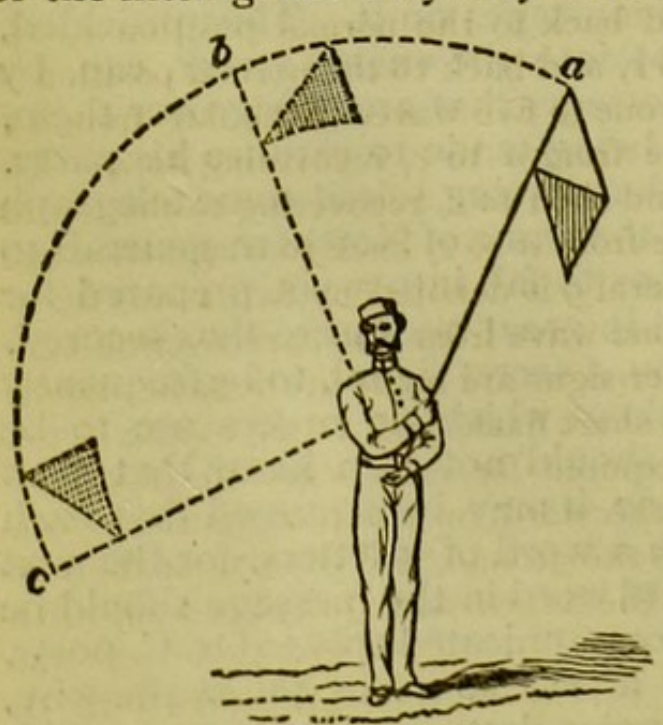


Fig. 55.

of signalling that is independent of all elaborate apparatus. Signal rockets can be used at night with advantage, and are visible in clear weather at long distances—see page 47.

The mode of signalling adopted is by a combination of short and long flashes, or appearance of any given object with proper intervals or obscurations between them, which are made by visual apparatus, such as revolving shutters or disc, collapsing cones, flags, banderols, jets of steam, &c., by day; by lamps or lights at night; and by a combination of short and long sounds made with a fog horn, bugle, or steam whistle, in fogs, or when visible symbols are not available. The appearance of the object are termed 'flashes,' and are of two lengths, termed respectively 'short' and 'long' flashes, —sometimes also called 'dots' and 'dashes,'—which, separated by obscurations, are used in combination to express the signs required, and are usually written thus:

▬ to express the short flash or dot,

▬▬ ,, long flash or dash,

the interval of obscuration, or of the disappearance of the object, being left blank.

At night these signals are in all cases made by the obscuration and exposure of a single light; in the daytime by the different apparatuses which may be employed. At short distances no special apparatus is necessary, the simple waving of the arm with a hat, flag, handkerchief, &c., being sufficient. This signalling without apparatus is that which should be practised by offrs. and N.C.O.'s. When possible so to do, the handkerchief should be placed on the end of a stick about 6′ long. The flashes are made with the arm, or with a flag as described above, in the following manner.

The signalman may work from left to right, or from right to left, as shown in the figure (p. 484), according to convenience and the direction of the wind. To make a short flash, the flag is waved from *a* to *b*, and back to the normal position *a*. To make a long flash, the flag is waved from *a* to *c*, and back to the normal position *a*. The numerals 1 to 5 are, therefore, denoted by one to five waves of the flag from *a* to *b*, recovering to *a*. The numeral 6 by a wave from *a* to *c*, recovering to *a*. The numeral 7 by a wave from *a* to *b*, back to *a*, and then to *c*, recovering to the normal position *a*. The numeral 8 is denoted by a wave from *a* to *c*, back to *a* and then to *b*, recovering to the normal position *a*. The numeral 9 is denoted by two waves from *a* to *b*, and one from *a* to *c*. The numeral 0 by one wave from *a* to *c*, recovering again to *a*, and then two waves from *a* to *b*. The other signs are made in the same manner, so that a short motion shall always represent a short flash, and a long motion a long flash. On the completion of the motions required for each sign, the flag must always be brought to the position *a*. When the word, or group of figures, is completed, the butt of the staff may be brought to the ground, and the flag at the same moment gathered in. In receiving a message, the flag should always be kept in the position *a*, except when answering.

Messages can be sent either by means of the signals laid down in the 'Army and Navy Signal Book,' lately compiled by authority, or by spelling the words according to the alphabet given below, or by using the Morse

Alphabet when communicating with telegraph stations unprovided with the code. It is, I think, very much to be regretted that the Morse Alphabet has not been adopted for the code, as it is now in general use for telegraph purposes. At present, a good signalman must know the 2 systems, a necessity that makes the art difficult to acquire. It being advisable to keep the signal book as secret as possible, it will only be in possession of a few, so that for common work the alphabet will be used. 'The symbols and numbers expressing the alphabet are identical with those forming the alphabet in the signal book.'

Preparative . . . . ▬ ▬ ▬ ▬ ▬ ▬ ▬ ▬ ▬ ▬ ▬ ▬ ▬ &c.

(A continued succession of short flashes.)

Spelling prefix . . . . . ▬ ▬ ▬ ▬

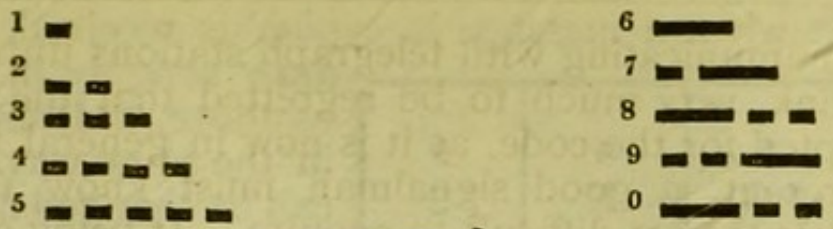
Stop . . . . . ▬ ▬ ▬ ▬ ▬ ▬

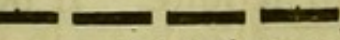
(A continued succession of long flashes.)

General answer . . . ▬ ▪ ▬ ▪ ▬ ▪ ▬ ▪ ▬, &c.

(A continued succession of long and short flashes alternately.)

1 Understood. ▪	2 Not Understood. ▪ ▪	A 5 ▪ ▪ ▪ ▪ ▪	3 Numeral. ▪ ▪ ▪	4 Wait, ▪ ▪ ▪ ▪
B 6 ▬	C 7 ▪ ▬	D 8 ▬ ▪	E 9 ▬ ▪	F 10 ▪ ▬ ▪
G 11 ▪ ▪	H 12 ▪ ▪ ▪	I 13 ▪ ▪ ▪	J 14 ▪ ▪ ▪ ▪	K 15 ▪ ▪ ▪ ▪
L 16 ▪ ▬	M 17 ▪ ▪ ▬	N 18 ▪ ▬ ▪	O 19 ▪ ▪ ▬	P 20 ▪ ▪ ▬ ▪
Q 21 ▪ ▪ ▬	R 22 ▪ ▬ ▪	S 23 ▪ ▪ ▪	T 24 ▪ ▪ ▪ ▪	U 25 ▪ ▪ ▬
V 26 ▪ ▪ ▬	W 27 ▪ ▬ ▬	X 28 ▪ ▪ ▬ ▪	Y 29 ▪ ▪ ▬ ▬	Z 30 ▪ ▪ ▪ ▬

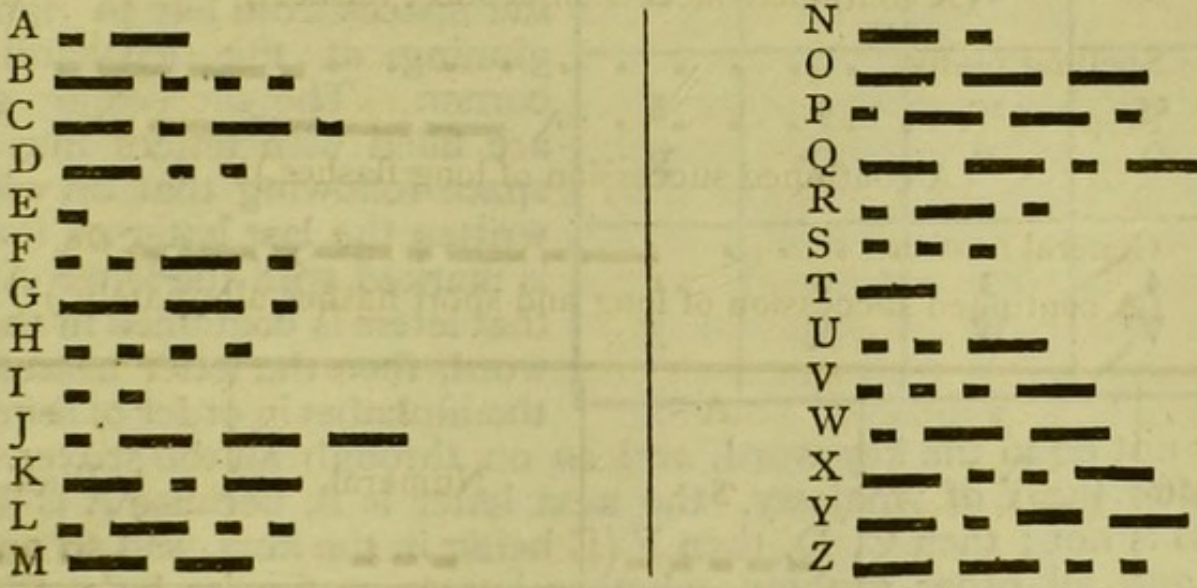


Stop or end of word  , &c.

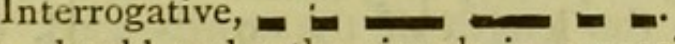
NOTE.—This signal is repeated twice at end of message.

In communicating with the Navy not more than two letters are to be sent in one group, and the numbers 1, 2, 3, and 4 are not to be used, the Naval Answer being .

THE MORSE ALPHABET.



Preparative, stop, and general answer are the same as in the code.

Repeat and Interrogative,  .

The operator should make the signals in a precisely similar manner to that in which he makes the numbers in signalling, pausing between each letter as he does between each figure, and treating each word as a number. He should never commence any word after the first until he has received the "Answer" from the receiving station, to indicate to him that the word is understood. With this code great expedition may be obtained in the transmission of messages to stations where the operators are very expert; but very constant practice is necessary on the part of the operators to enable them to transmit and receive messages accurately and quickly.

CYPHER.—It is most important to be able to transmit messages in writing, or by electric telegraph, or by signals, by means of a cypher unintelligible to those unprovided with the key. An admirable plan for doing so is described in the 'Army and Navy Signal Book,' but as it is rather too complicated to be generally remembered, the following simple plan will answer all outpost purposes. Divide a square into 25 spaces, and number them as below. This method of numbering them, and the key-word, is all that one has to

remember, so that when a message in cypher is received, one has only to draw roughly in pencil a square as above, and number the divisions in the same way. The key-word can be changed daily, or whenever it is considered necessary. It should be a word of at least 6 or 7 letters, and must not have any letter repeated in it. In the diagram given, the word 'MAJESTY' is the key. The letters composing it are accordingly spelt along the spaces from left to right, beginning at the left-hand top corner. The succeeding spaces are filled with letters thus: the space following that on which is written the last letter of the key is marked with the letter A: or if that letter is contained in the key-word, then the letter nearest it in the alphabet in order of sequence which may not be in the key-word, and so on through all the spaces. For example, after the Y of 'majesty,' the next letter is B, because A is in the word and B is not; then C, D, then F (E being in the key), and so on to Z.

1 M	2 A	3 J (I)	4 E	5 S
8 T	9 Y	10 B	11 C	6 D
7 F	12 G	 H	12 K	7 L
6 N	11 O	10 P	9 Q	8 R
5 U	4 V	3 W	2 X	1 Z

In this and all other cyphers, whether letters or figures be used, they should always be written in groups of 4 or 5 letters or figures, so that while avoiding giving any clue to the length of the words used, the accidental omission of letters or figures may be more easily detected. This is especially necessary when the messages are transmitted by signal or electric telegraph.

Messages are written in this cypher as follows; for every required letter of the alphabet, having found it in the diagram, see the number of its space and substitute for it in the message, the letter in the space having the corresponding number. Thus I want to send the following message:—

WE ATTACK AT NOON.

It runs thus in this cypher:—IVXR RXOG XRDC CDDD.

It may be seen there are 2 more letters in the cypher message than in the actual words of the message: these 2 letters are to complete the last group to 4, which would otherwise have only had 2 letters in it. In addition letters for this purpose, care must be taken to select those which are least liable to lead to misinterpretation. One letter will always be on the central square, which has no number. Whenever, therefore, it may be necessary to use it, the true letter is used. With 'majesty' for a key-word, the

etter is H. To decypher a message, the process is merely the reverse of hat described above. For example, the following message is received :— IVXR RXOG XRDC CDDD. I look out for I in the diagram, and find ts number to be, 3, and that the letter on the space with the corresponding umber is W, and so on. This cypher is of course easily made out, but if very 3rd, 4th, or 5th letter (as may be previously arranged) is a dummy nserted after the message has been put into cypher, it is then extremely difficult to decypher, unless you are in the secret.

The following cypher is also by a substitution of letters one for the other ; t is somewhat more troublesome to use than that already described, but without a knowledge of the key it almost defies interpretation, as the same letter s represented by various letters at different parts of a sentence, word, or even syllable. It was used successfully during the Ashantee war. The key is any number that may from time to time be fixed upon, of seven or more figures, say 4,631,870. Let us suppose that the same message as above is to be sent n this cypher. Write under it (beginning at the first letter in the message) he key-number, one figure under each letter in rotation, and keep on repeating the key-number until there is a figure under every letter in the message. The substitution of letters is then determined as follows. The irst letter W having 4 under it, you represent it by the letter that comes ourth after W in the alphabet, but as there are only three, you add on as many letters as may be required from the beginning of the alphabet in egular order ; A is therefore the substitute for W. The next letter, E, as 6 under it, and is represented by K, which is the sixth letter after it n the alphabet. The next letter, A, has 3 under it, and is therefore represented by D, the third letter after it, and so on, the whole sentence eing as follows—

WEAT TACK ATNO ON	message.
4 6 3 1 8 7 0 4 6 3 1 8 7 0	key.
AKDU BHCO GWOW VN	message in cypher.

The decyphering is merely the process reversed : whenever the figure 0 occurs, there is no substitution. Like the other cypher, the letters in a message should be written in groups of 4 or 5 letters, and it can be rendered more puzzling by a prearranged agreement to insert dummy etters as described in the previous cypher.

MILITARY SURVEYS.—It is taken for granted that offrs. understand the rt of surveying ; if not, let them ask a brother offr. to teach them as soon s possible, and let them study Jackson's book on the subject. It is very necessary that every offr. on the Staff, especially the younger offrs., should e able to delineate the features of a country on paper, at the same time t is ridiculous to imagine that every one can acquire the art of doing so well. All men can, however, learn to survey, and most men can, by pplication, even learn to give a rough idea of ground on paper. To repre-

sent the features of a country on paper really well, requires a considerable gift of artistic talent that is not to be acquired by every one, and it is only men who are so gifted who should be selected for topographical work during war. A really good military draughtsman would convey a better idea of ground after a few hours' work, than the unartistic sketcher could do in a similar number of days. The topographical work of a campaign should be done by a special branch of the Staff, as it was done during the China war of 1860, the officers employed upon it being available at all times for all other purposes, such as reconnaissance duties, &c., as required by the C. of the S.

As soon as the staff is organised, it is most necessary that special instructions should be issued by the C. of the S., as to the descriptive terms to be used in reports of localities, positions, &c., when describing their physical features, and as to the manner in which they should be represented on paper. This is necessary to prevent confusion, for so many men have different styles of doing so, that a few clearly defined rules on these points are essential. The best scales for field surveys are 2, 4, and 8 inches to the mile; and for an index plan, 2 miles to the inch; it is taken for granted that maps of about this last-named scale are in possession of all S. O.'s before the campaign opens. The object of the survey must always be held in mind; it is not to measure land for farming or building purposes, but to put on paper a delineation of the country, showing all its features which affect military operations, and showing the distances with sufficient accuracy for all military purposes. The instruments to be in every S.O.'s possession are—the prismatic compass, marked off from 1° to 360°, and bronzed on the outside; a protractor (made for compass surveying, and divided by the 4-in. scale); a pair of folding compasses; a small colour box, with brushes, pencils, and a piece of india-rubber; pencils of coloured chalk are also very useful at times. The small range-finder issued for musketry use is of great use in surveying, and I strongly recommend that all officers employed on topographical work should have one. I saw it used to great advantage in Zululand. A block sketch-book 9 in. square, with blue lines ruled parallel to one another, but at irregular intervals, is the best to draw upon. Paper ruled into squares of $\frac{1}{4}$ in. sides is also very convenient. With each division in charge of the A.A.G. there should also be a box sextant. Some one officer belonging to the topographical branch should have sole charge of all the triangulation work. He will commence by measuring a long base; and working from it, will fix the positions of all villages and important points in his vicinity, extending his work as far to the front as possible. He can do this either with a pocket sextant resting on a stand, or with a small theodolite. With the steeples of churches or other remarkable points fixed, and their positions pricked off on the sketch-book, an officer filling in the detail has only to observe two that subtend an angle of about 90° from where he

s, and lay off the bearings from each of them on his book ; where those bearings intersect is his position ; in this manner the details of 5 or 6 quare miles can soon be filled in. In doing so he will make use of the tyle that he is best acqnainted with, for some that use the vertical touch annot do the horizontal one. It should be a rule with all employed survey-ng in the field that the day's work is inked in every evening. The author as had some experience, and he strongly recommends brush-work in preference to pen-work, as saving time and labour. All streams and water hould be shown in blue ink, woods by a wash of green (Hooker's is the best). Whilst surveying, the compass should be secured round the neck by a string, and carried in a breast-pocket. It should have no cover ; the glass should be strong, and the action of putting down the sight-vane flat on he glass should throw the needle out of gear. The pencil, a hard HHH, hould be fastened by a string to the sketch-book, as should also the protractor and india-rubber. *In pacing distances*, do not attempt to carry arge numbers in your head ; when you have counted 100 close the little inger of either hand ; for the next 100, close the third finger, and so on until 500 is counted ; for 600 open the little finger, and so on until all the ingers are open again, when 1000 will have been counted. Each 1000 paces should be at once noted in your book or on your sketch. When written down, you begin again with another 1000. Some prefer to measure distances in yards instead of the pace of 30". I have always paced in yds., and found from practice that I was much less liable to error than when I measured distances in paces of the regulated length, and in plotting one's work on paper, the advantage is all in favour of using the yard.

To judge distances accurately is of great importance ; every opportunity should be taken of practising the eye in doing so. Where there are tele-graph poles in the direction you wish to know a distance, they are a great assistance, as they are usually from 50 to 100 yds. apart, according to the number of wires, and having ascertained the number of poles used per mile on any line of telegraph, the distances between them may be roughly assumed as the same throughout. Good eyesight can distinguish bodies of troops at 2000 yds. ; at that distance a man or horse appears like a dot ; at 1200 yds. cavalry is distinguished from infantry, and movements can be seen ; at 900 yds. they become clear ; the motion of arms and legs is visible at 800, and the head appears as a ball at 650 yds.

In sketching the features of the ground, the one great guide is to observe the course the water flows in ; stand on any little hill or mound, and in looking round you will see the marks left by the water of the last shower. In fact, a delineation of the natural drainage of any section of the country describes its features, and requires only little additions to make it into a good military map. Given to any one accustomed to sketching a ground, a plan showing the water-courses (which when drawn alone resembles a de-

cayed leaf with its fibrous portions only remaining), the features can b sketched in with tolerable accuracy, although the draughtsman had neve seen the country. The groundwork of all surveying must be triangulation, an working from the large data down to small results and deductions therefrom The more it enters into a survey, be it with or without instruments, th

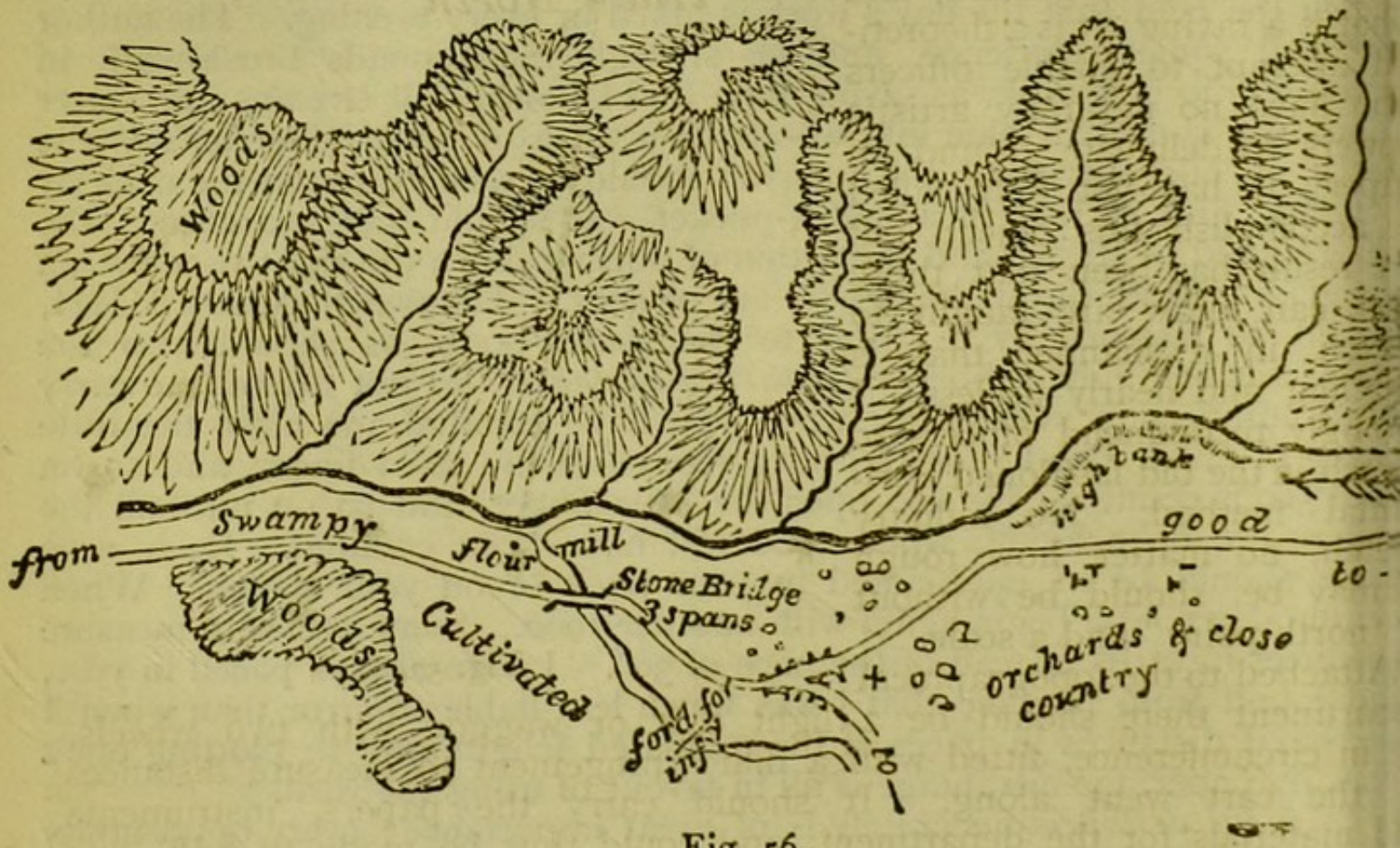


Fig. 56.

better will be the work. The more information you can convey on the fa of a plan the better : it is far better to learn from the plan itself that such bridge is of *wood*, or of 4 *spans* &c. &c., than that you should have search through an accompanying report for that information. The sa thing as regards roads ; it is easy to write along them *good*, *bad*, *macad mised*, *paved*, *&c.* For rough sketches, when time is of importance, th is really only one style for military drawing : the touch is so simple tha requires no artistic powers, and although done with the greatest rapidi is yet capable of being subsequently worked up and improved into a high finished sketch, either by pen or brush, the latter being the best. Here rough specimen. The writer has many times made sketches in this way horseback, taking care to fill in particulars and improve them as soon possible.

When time admits, avail yourself of every possible opportunity of tak accurate bearings and angles from all church steeples and high ground, well towards the rear as the front.

"*The scale of shade*," lately introduced into our army, is good in theory, ut very bad in practice: the more neatly rolling features of ground are presented in it, the more difficult it is for those studying the sketch to ascertain what is a range of elevated ground, and what is a ravine: it is a theoretical attempt to enable officers who have no naturally artistic powers to delineate ground on paper; it has not only failed to accomplish this object, but the result has been that those who can draw are taught to sketch in a manner that is puzzling and nearly useless. I strongly recommend officers to sketch in the old fashioned horizontal method. No military sketch, no matter how rough it may be, should be without a "north-point" and a scale.

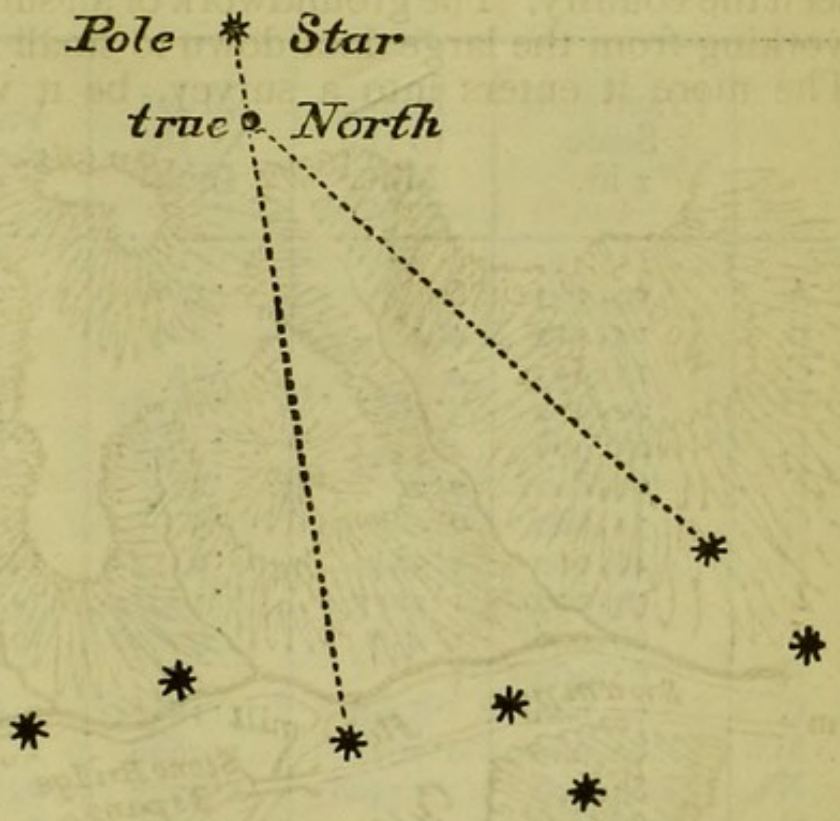


Fig. 57.

Attached to the topographical department there should be a light cart or waggon with two wheels, 5′ in circumference, fitted with a dial arrangement to measure distances as the cart went along. It should carry the papers, instruments and materials for the department, and could thus be made to fulfil two purposes. A corporal or serjeant as draughtsman and clerk should accompany the cart on the march, and make a regular traversed sketch of the road, taking the distance from the dial. In this manner a series of bases will be obtained according as the army advances. The variation of the compass should be constantly checked by finding the true meridian. The simplest method is by the polar star; the intersection of the dotted lines may be taken as the true north for all practical purposes. The illustration shows the position of the stars in the Great Bear. Erect a pole anywhere, and at the distance of a couple of hundred yards put up another, so that the two are in a line with the true north; the variations of your compass can be ascertained the next morning by taking the bearing of one pole from the other.

Scales. The fractional scales commonly used for military maps in Europe are shown in the following table, which gives their equivalents in inches to the mile, miles to the inch, and in yards to the inch.

These scales indicate on the map the fraction that any linear distance

measured thereon is of the actual distance on the ground. This is a little puzzling to us who are accustomed to scales of so many miles to the inch, or of so many inches to the mile. When obliged to use a map with a

	Fractional Scale 1 in.	Inches to the Mile.	Miles to the Inch.	Yards to the inch.	
A	10,560	6	·167	293·34	Austria uses, B, F, & O., Belgium, D, H, & M., Denmark, D, M, & S., France, H, M, & U., Germany, E, I, M, P, & T., Great Britain, A, C, G, K., R, & W., Holland, E, & I., Italy, E, I, L, & O., Russia, N, & Q., Spain, J, & P., Sweden and Norway, D, P, and T., Switzerland, E, & I.
B	14,400	4·4	·227	400	
C	15,840	4	·25	440	
D	20,000	3·168	·31565	555·55	
E	25,000	2·5344	·39457	694·44	
F	28,800	2·2	·454	800	
G	31,680	2	·5	880	
H	40,000	1·584	·6313	1,111·11	
I	50,000	1·2672	·78914	1,388·88	
J	60,000	1·056	·94696	1,666·66	
K	63,360	1	1	1760	
L	75,000	·8448	1·18371	2,083·32	
M	80,000	0·792	1·2626	2,222·22	
N	84,000	·75428	1·3257	2,333·33	
O	86,439	·733	1·364	2,401·09	
P	100,000	·6336	1·5782	2,777·77	
Q	126,000	·50285	1·9886	3,500·049	
R	126,720	·5	2	3,520	
S	160,000	·396	2·5252	4,444·44	
T	200,000	·3168	3·1564	5,555·55	
U	320,000	·198	5·0504	8,888·88	
V	500,000	·12672	7·891	13,888·88	
W	633,600	·1	10	17,600	
X	1,000,000	·06336	15·782	27,777·76	

fractional scale, you should at once construct a scale for it of British mile To do so, you have merely to divide 63360 (the number of inches in a mi by the denominator of the fraction of the scale to ascertain the number inches it is to the English mile. Thus a scale of $\frac{1}{80000}$ is 0·792 in. to t mile, because $\frac{63360}{80000} = 0{\cdot}792$. With a scale divided to hundredth parts an inch, mark off 79 parts and you have one mile on the map. It is ea to divide that distance into four parts to give you quarters of a mile. ascertain the number of English miles to the inch on a map with a fraction scale, reverse the process: thus, with a scale of $\frac{1}{80000} : \frac{80000}{63360} = 1{\cdot}262$, or other words, the scale of the map is that number of miles to the inch, 1·2 miles = 2222 yds. 8″.

Form of Report for an Itinerary.—I have found, from experience

nilitary reports accompanied by sketches, that the simplest forms are the best; most of the elaborate forms given in books were designed by men who never conducted a reconnaissance in war. As you open your metallic paper pocket-book (size 7 in. × 4 in.), let the left-hand page be ruled into squares, quarter of an inch in the side, so that if your scale is an inch to the mile, ach square is 440 yds. × 440 yds. Mark along right-hand edge of page 1, , 3, 4, and so on, at every inch, so that the distances in miles may be dis-inguished at once. If there is plenty of time to prepare this book, it is a ood plan to mark the mile lines in red ink, so that a glance at the paper hows you the distance upon it. Begin your sketch at lower end of page, vorking upwards, noting name of place and hour of starting. Let your oad wind about as it seems to do in reality, marking by compass the bear-ng of all villages one from another in degrees, read off a prismatic compass ivided from 1° to 360°; do the same with all remarkable objects to right nd left of the road, taking care to distinguish angles from distances by aving the degree mark over them. Place your ordinary remarks, such as he time you reached particular localities, close to the edges of the paper; e very particular to note the number of minutes you halted at each place. Under the name of each village, note the number of inhabitants, and of ouses, whether of stone, brick, or wood. Convey as much information on he sketch itself as you can do without interfering with the delineation of the eatures of the country. Keep the opposite page (ruled) for noting the nformation which you cannot put on your sketch, such as the name of post-nasters, magistrates, leading residents, the best guides to be obtained, the upplies to be had, &c. Never trust your memory. Note in your book all ou wish to remember, and ink it in every night after your march. In all eports, be careful to distinguish the information that is derived from your wn observation from that obtained from the inhabitants; in the latter case ame your authority, and state the amount of reliance that can in your pinion be placed upon it. The state of the weather during the march to be ecorded. For the accommodation that houses and villages will afford, see ages 266 and 309.

Field Fortification.—It is taken for granted that offrs. are conversant ith the names of works, and the technical terms in permanent fortifications, nd that they have a clear conception of the object of the art; also that they ave been well instructed in the construction of shelter trenches, as now aid down in our drill books. The official "Manual of Elementary Field Engineering" should be in every offr.'s possession. The works thrown up n the field, perhaps the work of a night, perhaps the labour of months, are ough imitations of the great fortifications constructed to defend cities: the rinciples are the same in both instances, but in the field the materials and he time required for the construction of such great works are wanting. Those principles must, however, be borne in mind by the offr. who has

merely to throw up cover for his advanced post—they must never be lost sight of; they are as applicable to the defence of a farmhouse as to that of a capital. For anything like an extended system of defence, there will always be R.E. offrs. to lay down the general plan, and give the outlines of the works to be made, but it is a disgrace to any S.O. who knows less of the science than an engineer: he should be able to go carefully over all schemes for defence, to point out to his general the weak points, and to make propositions accordingly for modifying the projected works, &c. It may also be of moment occasionally for S.Os. to design and carry out temporary works of defence. A few general memoranda will be given here for reference on this subject. The tracing must depend, 1st, on the configuration of the ground to be defended; 2nd, the object in view; 3rd, the time available for the construction, and the number of men to form the garrison. Our R.E. officers are too much inclined to construct redoubts without making allowance for the fact that the enemy may be savages without artillery: they have regulation notions of what a redoubt should be in these days of rifled ordnance, and they build their defensive works accordingly. Now very often when engaged in war with nations unprovided with guns, the best sort of work you can build is one very much resembling a mediæval castle; a work of thin mud walls loopholed all round.

Every preconceived notion must give way to the above-mentioned 1st consideration, which will generally determine the outline to be adopted. The following considerations should never be overlooked: no salient angle to be less than 60°; the re-entering ones to be from 90° to 110°, but never less than the former: the extent of isolated and enclosed works to be proportioned to the numbers intended for their defence, to be calculated roundly at a running yard of parapet to every 2 men deductions being made for space occupied by artillery. The prolongation of all faces of works to be directed upon points where it is impossible to establish batteries, such as marshes, &c. Apart from the local or immediate object in view, all works must provide, 1st, cover for the troops to occupy them; and 2ndly, must have their front well swept by their own fire, and that from other works or troops in their neighbourhood, to which again they should afford similar protection. In fact, the true test of the soundness or otherwise of any proposed scheme of defence is the aid and support its several component parts can mutually afford. The objects in view when it is determined to throw up field-works are so varied that I shall attempt no enumeration of them: they are to be found in every ancient and modern writer upon military history as of constant recurrence in every phase of a campaign. The time available must influence not only the profile to be given to the works, but also their tracing; for if there are only a few hours to spare, it is absurd to attempt enclosed redoubts, and so on; but in most cases the possibility of having more time than can be positively calculated on should be taken

o consideration, and the work should be of such a nature as to be pable of constant further development.

PROFILE.—The minimum height of parapets of all well-finished field rks constructed in a plain should be 8′. If the work is on ground ch higher than all around it, the height may be less; if the reverse is case, it must be much more; care to be taken that, not only are the men nning the front faces sheltered from fire, but that those standing on the nquette of the rear faces are so too. To *defilade* the interior of all field- rds is essential; the construction of large parados or traverses can be dertaken for that purpose when the work is otherwise completed. For y. who intend acting defensively, but who are to assume the offensive ing an action whenever favourable opportunities show themselves, a nk of earth 3′ high, with a base 8′ or 9′, having a trench on each side of vide by 1′ 6″ deep, is the best profile; a berme of 1′ should be left on h sides; 100 yds. of it can be easily thrown up by 100 men with two rs' fair work. In thus providing cover for men, all material that is pro- able on the spot that will add to the strength of the parapet, or which will rease the steepness of the interior slope, should be used, such as barrels, se furniture, logs of trees, turf, sods, hurdles, gates, rails, fences, &c. ery hour that men are left in such a breastwork, its defensible qualities ht to be added to, but in positions where it may be necessary to move y. or artillery to the front, care must be taken not to erect such a barrier he form of a parapet that both those arms cannot easily cross. After cover from the enemy's view (which is the first consideration) has been ained generally along the line of breastworks, and if time still admits of her work, it is better to devote all available labour to strengthening par- lar salient points, so that they should be, as it were, strong bastions to rest of the line, which should be their curtains. If time permits, they be made secure against capture by a sudden rush. As *points d'appui* will add immensely to the strength of a position; however, it must be embered that it is extremely dangerous to enclose any works in the rear. rule, they should be left open, so as to be seen into by other works or eries, for the purpose of recapture from the enemy, should he succeed in ing into one.

it is a question of constructing a square redoubt, the sides should not ess than 20 or more than about 100 yds.: in calculating the garrison for n, an allowance of 500 square ft. for each field gun, and the same for the ance traverse must be allowed; the remaining superficial space, cal- ted in square ft. within the foot of the slope of the banquette, divided o, will give the maximum garrison, but unless the parapets are most tantial, to put more than 300 men into any one enclosed work, would o convert it into a charnel-house if the enemy has the power of ging a heavy fire from field guns to bear upon it. The minimum

garrison for a square redoubt of the minimum size is 80 men, to be dispo in single rank along the banquette and without artillery; the maxim garrisons for the largest square redoubt should not exceed 400, with 4 pieces. If the number of men and guns to be enclosed in a field-work exc these limits, a redoubt, with good flanking defence should be construc The thickness of the parapet must depend upon the nature of guns are likely to be brought against it; from 10′ to 12′ of ordinary soil along superior slope is a fair thickness to resist fd. guns. If intended to res sustained fire from fd. guns, the thickness should be at least 15′. The d of the ditch having been fixed upon, its mean width can, of course determined by dividing the superficial area of a section of the parapet by depth, as the sections of the ditch should about equal that of the par To calculate the time that a certain ditch can be excavated in, the ord task of an untrained workman is commonly estimated as 1 cub. yd. per for 4 hours at a stretch in fairly easy soil. The average of men will however, excavate 1 cub. yd. in less than $1\frac{1}{2}$ hour, if he has to use the If the depth of the ditch requires the earth to be thrown on a stage from thence to the parapet, an additional number of shovelmen, equal t of those in the ditch, would be required on the stage to forward on the to the rammers and shovellers on the parapet. Profiles of the work s be erected at all the angles by driving poles into the ground of the rec height to represent the intersection of the several slopes of the parape banquette: these poles should be joined by sticks or string, so as to f complete section of the work. Good rammers are easily made by c off, with a saw, logs from trees about 9″ in dinmeter. The drainage works should be provided for when constructing them. The stora water is most important: biscuit tins answer well for this purpose 100lb. biscuit tins we used in Egypt in 1884–85 held $36\frac{1}{2}$ gallons. The of rifle ammunition should be distributed at regular intervals along ban at foot of interior slope.

Fd.-works should not be occupied by their garrisons until the en actually in view. It is advisable to keep the men away from them as as possible, and, unless surrounded by an enemy, the cooking at should be carried on outside. The following data may be useful. Ban to be 3′ for single, and 4′ 6″ for double rank: slope to it $\frac{1}{2}$: interior to be riveted, if possible, the base being 1′ or 1′ 6″; the superior should never be less than $\frac{1}{4}$, but it ought to be $\frac{1}{6}$; exterior slope, $\frac{1}{1}$; from 1′ to 3′. Escarp and counterscarp as steep as the soil will perm between 6′ and 12′ deep. The ditch never should be less than 10′ top. *Platforms* for guns should have a slope of $\frac{1}{13}$ to faciliate th being run out.

Sandbags are very useful in the construction of fd.-works, and works of defence. Those used by us are issued in bundles containi

d each bundle weighs 75 lbs. Sandbags when tarred are made up in ndles of 50, which weigh 70 lbs. The sandbag, when empty, measures ′ × 16″, and when filled and partially flattened down in a revetment, &c., measures 18″ × 10″, or 11″ × 6″ : it holds about a bushel, or, when in e, 1 cub. ft. of earth.

Gabions.—Their most convenient size is 2′ in diam. and 3′ high : when at size, they should weigh from 35 to 50 lbs., according to the nature of e brushwood employed. When they are made on the spot where they e to be used, they can be made 5′ or 6′ high with great advantage for the erior revetment of batteries or field-works.

Fascines are also very useful for revetments, the cheeks of embrasures, for e foundation of roads in swampy places, &c. The usual dimensions are long and 9″ in diam. ; they should not weigh more than about 140 lbs. ch should be bound securely at intervals of about 18″: wire makes the st binding material. Those used by assaulting columns to fill up ditches ould not be more than 6′ long.

Embrasures splay outwards, and should be 2′ wide at neck, and 3′ wide at distance of 5′ from neck : the sill should be $3\frac{1}{2}$′ above the platform for dinary field guns.

Loopholes splay inwards : if made with sandbags they should be 3″ wide front, and 10″ wide in rear ; in making them in walls, they should not a rule be less than 3′ or 4′ apart, so as not to weaken the wall unduly.

Obstacles.—In all closed works, or in the portions of a long line that present the bastions, as it were, every effort should be made to render proach to them difficult by the construction of obstacles placed in their mediate front, so as to be always under your observation and under your e. They are especially useful in all savage warfare to guard against ght attacks. When your enemy are barefooted, broken bottles or small rp stakes driven into the ground are very effective. *Abatis ;* The most sily made, and the best obstacle, is that afforded by felled timber, or the

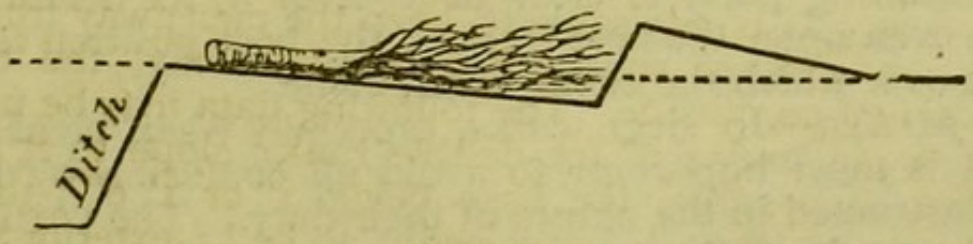


Fig. 58.

ut limbs of trees about 12′ or 15′ long, with the leaves and small branches pped off, the other branches being pointed and turned towards the enemy ; y should be laid as close together as possible. If the trees are on the spot, ey should not be cut more than two-thirds through, so that they cannot dragged away. The *abatis* should be about 5′ high, the thick ends

burried in the ground, secured by stout stakes, or the still safer system placing logs along and across the butts. Pine trees make a bad *abc* and are very inflammable. If wire is to be had, it should be fastened fr branch to branch as much as possible, as it vastly increases the value of *abatis*. Wire fences are common now in many countries; they are inva able as an obstacle in front of a work; all obstacles should be well un musketry fire; if they can be screened from the enemy's view or fire much the better; this can be accomplished, when time admits, by plac them as shown in sketch.

Wire entanglements are excellent obstacles, and are easily made if ple of wire is to be had. No. 14 (B. W. Gauge) is a good size—wt. of mile of it is about 90 lbs—but any telegraph wire will do. It is formed driving stout stakes firmly into the ground checquerwise, about 6′ ap leaving about 3′ above ground. The wire should be given 2 or 3 turn least round every stake, about 18″ from the ground, and interlaced betw the tops and bottoms of the stakes. The entanglement should be 8 o yds. in width. Small woods or plantations cut down to a height of ab 3′ or 4′ from the ground can be easily converted into a most effective entanglement.

Chevaux-de-frise can be made of sword-blades or pointed poles let in beam of wood so as to form an X in cross-section. The store pattern by us consists of an iron tube 6′ long, containing 12 spears (6′ long) ins which, when required, are easily fixed in 12 holes which are in the tu the tubes are fastened one to the other when placed in line, by a few l of iron chain. Each tube complete weighs 80 lbs.

Fougasses are small mines loaded with stones, bricks, or small live sh a hole is dug at an angle of 40° inclined towards the enemy, at the bo of which the powder charge is placed, the stones being placed immedi over the charge; no earth to be placed over the stones, &c.: the min in fact, merely an improvised mortar, and if discharged at the right mo when the assaulting party is close in front of it, its demoralising effe considerable even upon the best troops; the best position for them is road or path over which the enemy must come.

Working parties.—In siege works, especially when breaking groun first night, it is most important to avoid all confusion by having all cerned well instructed in the nature of their duty. The parties should r their ground exactly at the hour appointed, provided with their tools ready to begin work at once. There will always be R.E. offrs. to direc operation, but all S.O.'s should thoroughly understand the presc method for extending the men along the line selected for 1st parallel It is most desirable that each working man should be given a four h task, and when he has completed it, he should not have to work any that day. In a previous paragraph the working powers of an untr

n are given. The men should be placed at intervals of 5′ along the line vork : if, as is sometimes done, 1 man of each file digs and the other vels, the files should be the same distance apart as the men who both k and shovel. It is found to be a good plan in the construction of fd.-ks to tell the working party off in squads of 3 files each, of which 3 men k and dig, 2 shovel, and 1 rams the earth.

DEMOLITIONS.—*Destructive agents.* Taking gunpowder as "1," the tructive force of *gun-cotton* is 7, and of *Nitro-glycerine* (pure) is 10, when tamping is used. G.-C. and dynamite must be exploded by detonation. C. is made up by us in *discs* and in *slabs;* discs are carried dry in the l, packed in hermetically sealed tins ; slabs are carried wet in wooden ertight boxes, which when full weigh about 12 lbs. 14 oz. The explosive e of wet is the same as of dry G.-C. The discs are of 3 sizes, $1\frac{3}{4}$," $1\frac{1}{4}$" $\frac{7}{8}$" in diameter : the first weighs 2 oz. the other two sizes 1 oz. each. ere is one perforation in each disc for the detonator. In boring holes the reception of the discs, the hole should be $\frac{1}{4}$ in. wider than the diam. isc. The slabs in use measure $6\frac{1}{8}$" sqr. and $1\frac{3}{8}$ and 1 in. respectively in kness, one weighing 2, the other $1\frac{1}{2}$ lbs. each.

The Primers used with G.-C. are issued dry, and must be carefully tected from damp, or they will fail when required for use.

The Detonators for the field are used in connection with Bickford's fuze. y are packed in red tin cylinders, 25 in each. Those supplied to eries of R.H.A. contain only 4 each. To use the detonator, insert a ll piece of quick-match in the hole through the plug over the fulminating position : cut the Bickford's fuze to the required length, and insert the into the hollow end of the detonating tube, taking care that it rests on before-mentioned piece of quick-match. The tube should then be ntly bent to prevent the fuze from coming out. We now supply the y. pioneers with these detonators, leaving the quick-match and the kford's fuze attached and ready for use. As the G.-C., if set fire to, will n without explosion, care must be taken, by throwing a little earth over charge, to prevent a spark from the Bickford's fuze setting it alight. y should not be roughly handled, and the cylinders containing them ld not be allowed to fall.

ickford's fuze used for the ignition of mines, &c., is of 2 kinds, 1st, Or-ry ; 2nd, Instantaneous : the first burns at a rate not exceeding 4′, its l rate being only 3′ per minute. It is best lit by a vesuvian : it is kept linders ; each contains 24′. The second kind burns at the rate of about ds. per second ; it is quite water-proof. The "Instantaneous" is nguished from the "Ordinary" by being coated with an open-crossed ing of orange-coloured worsted. When it is desired to explode several ges simultaneously, and no electrical apparatus is to be had, the instan-ous fuze cut into equal lengths should be used ; the ends of these equal

lengths are collected together, and ignited by a piece of Ordinary Bickford fuze, cut long enough to allow the lighter to get away before the explosion takes place: care must be taken that all the lengths of the Instantaneous fuze are exactly the same, and that they all are effectively joined to the piece of "Ordinary" fuze used for ignition: it is a good plan to use a small bag of gunpowder for this joint, the ends of all the fuzes centering in it.

Powder hose is a substitute when Bickford's fuze is not to be had. It is simply a little tube of strong linen, ½ to 1 in. in diam.: it burns at the rate from 10′ to 20′ per second.

Gunpowder used in mines and demolitions should, if possible, be lodged in a wooden box well tarred or pitched over, or else placed in a leather or waterproof bag, or in a well-tarred sandbag. When the charge has to be carried in a sandbag, 2 tarred sandbags, 1 inside the other, should be used for precaution against untimely ignition: a sandbag will hold 50 lbs. of powder, but it is most conveniently carried in bags holding 25 lbs. each.

Destruction of wooden bridges.—If time admits, they can be easily burnt the inflammable materials obtained from the immediate vicinity being piled on or under the bridge for that purpose: if tar, pitch or coal-oil are to be had, their use hastens the destruction. In the American war of 1862-3 a small torpedo was advantageously used for the destruction of wooden viaducts and bridges. It is very easily made, and can be carried by a mounted man. It consists simply of a bolt of $\frac{7}{8}$″ iron, 8″ long, with head and nut, the head to be 2″ in diam., and about 1″ thick; a washer of same size as the head must be placed under the nut at the other end, with a hole in it; between the washer and the head is a tin cylinder, $1\frac{3}{4}$″ in diameter, open at both ends, which is filled with powder; the washer and nut, when put on, form a case which keeps it in its place. A coat of varnish should be applied to exclude moisture. To use it, a hole 2″ in diam. is bored in the timber, into which the torpedo is driven, head downwards, and the fuze ignited. The fuze should be about 2 feet long. The explosion blows the timber to pieces, and, if it is a main support, brings down the whole structure. It is essential that the main braces or lower chords of the bridges be chosen. Since then the use of gun-cotton has simplified the destruction of wooden bridges, as the stoutest timbers can be shivered to atoms by small charges used as described below in the destruction of large trees.

For masonry bridges, sink a shaft a few feet to one side of the middle of the roadway, down to the haunch of the arch, and drive a short gallery from the bottom, so as to lodge the charge under the middle of the roadway: from 50 to 100 lbs., according to the thickness of the arch, will destroy nearly any bridge. The mine should be well tamped. To determine the amount of powder, the formula is $C = \frac{2}{3} T^2 \times B$; where C is the charge in lbs.; T the line of least resistance in feet, measured through the arch; B the breadth of the bridge in feet. Except when the bridge is narrow

rge had better be divided into two, to prevent the chance of blowing a e through the centre, without bringing down the sides ; there is a risk, vever, in doing so, as it is difficult, when hurried, to arrange for the ultaneous discharge of the two charges together. If time presses, do be sparing of your powder. When time will not permit of your sinking haft to the haunch of the arch, a charge of 500 lbs. of powder placed in a nch 18″ deep over the keystone of a semicircular arch of 26′ span, $4\frac{1}{2}'$ ck, will break it in. The more earth and stones that can be piled up r the charge the better. Captain Schaw's rule for such demolitions is $= \frac{2}{3} T^2 \times B$. (See preceding formula.) When time is of consequence, parations should be made in two places at the same time, one as already scribed, and the other over the crown of the arch, so that if, at last, from near pursuit of the enemy, it is required to destroy the bridge before the nch of the arch can be reached, the demolition may be effected at the wn. When the side walls are lightly built, it is much better to drive in allery from the side, so as to lodge the charge against the haunch, as s does not interfere with the traffic over the bridge, is less liable to ident, and enables the powder to be kept dry for some time, if the mine ot required for immediate explosion. When G.-C. is to be used without mping along either the crown or haunches, the formula for charge in lbs. $C = \frac{3}{4} T^2 \times B$; when tamping is to be used, half that charge will be fficient. G.-C. is so local and violent in its action that it is not as isfactory as powder in the destruction of masonry bridges.

Iron girder-bridges can be destroyed by placing charges in the piers : the struction of a pier is of course the destruction of the bridge : the charges ould be placed in the piers immediately under where the girders rest upon em. The girders themselves may be destroyed by G.-C. thus. An iron te 1′ wide can be destroyed by the following charges which vary according its thickness : $\frac{1}{4}''$ plate, 2 oz. : $\frac{1}{2}''$, 6 oz. : $\frac{3}{4}''$, 14 oz. : 1″, 21 oz. : $1\frac{1}{4}''$, oz. : $1\frac{1}{2}''$, 56 oz. : 2″, 6 lbs. 3 oz. : 3″ 14 lbs.

To cut down trees with gun-cotton, a charge of 5 or 6 oz. placed in an ger-hole bored horizontally into the tree, is sufficient for one of 1′ in diam., d for other trees, varying as the square of the diam. in ft. : thus, if the e be 18 in. in diam., $1\frac{1}{2}^2 = 2\frac{1}{4}$ which multiplied by 6 = $13\frac{1}{2}$ oz. When e G.-C. is placed round the tree as a necklace, about eight times the antity as thus calculated will be required. In constructing an abatis it is y necessary to make the trees fall in the required direction ; this can sily be done by fastening a rope to the upper part of the tree, and taking e strain on the rope before firing the charge.

To blow in a gate.—50 lbs. of G.-C., or 200 lbs. of gunpowder suspended a sharpened pickaxe, or an auger driven into the centre of the door or te, or even laid on the ground touching the gate, will destroy it ; when wder is used, it should if possible be covered over with sand-bags.

Stockades and walls can be destroyed in a similar manner: a singl stockade of timber 12″ × 12″ may be blown down by 3 lbs. of G.-C. pe running foot. The slabs or discs (slabs are the best for this purpose) shoul be threaded together so as to be in contact, and hung against the stockad or laid on the ground at its foot. If powder be used, 80 lbs. without, or 6 lbs. with tamping will be required for the same stockade. For stockades o 10 in. timber and under, 4 lbs. of G.-C. per running yd. will only be required A 14″ wall will require 1½ lbs. of G.-C. per running ft., or charges of 60 lb of powder tamped with sandbags, &c., at intervals of 5′ or 6′ apart.

Destruction of guns.—With cast-iron guns, half fill with powder, jam in couple of round shot with nails, bits of iron, stones, &c., tamp up to th muzzle with stones and a little earth, fire by means of a long fuse laid to th vent. The trunnions are easily broken off by a sledge-hammer, or by a sla of G.-C., which renders a gun comparatively useless. Brass guns are easily de troyed by firing a shot from another gun into them behind the trunnions. Th explosion of from 1 to 1½ lbs. of G.-C. placed at bottom of bore well tampe will destroy most field or ordinary siege M.L. guns. The charge should b increased to 3 or 4 lbs. for the larger-sized wrought-iron pieces. When tir is immaterial, the operation will be generally performed by offrs. of R.A who are instructed in the best means for doing so. For the hasty disab ment of large guns, place a slab or two half slabs of G.-C. lengthwise on t chase, their long sides touching, about 1 in. from the muzzle, tying them with twine, so that the greatest possible amount of the surfaces of the G.-C should be in contact with the gun. Insert a detonator gently into a c primer, taking the greatest care not to twist or force it in. Insert the c primer fitted with its detonator into the perforation in the G.-C. provided it. The whole may be tied together with twine, taking a half hitch rou the detonator, and tied round the gun if necessary; but if primer a detonator fit accurately, as they should do, this will be superfluous, as t slab is already tied on. Turn the detonator round until the end of t safety fuze is to leeward of the slab: this is to lessen the chance of a spa igniting the G.-C. before it is detonated. Now cut off the end of the safe fuze diagonally with a sharp knife; if no knife is handy, tear off the cal cap which covers the end. Ignite the fuse with a vesuvian, and retire 40 50 yds. The fuze will burn about 45 seconds. Treat the safety fu gently, being most careful not to ignite it. If the explosion has not dem the gun sufficiently to render it unserviceable, repeat the operation, ty the slabs on to the same spot. The effect of the detonation can be increa by placing a filled sandbag or a sod of turf over the slabs when they h been tied on to the chase. One 1-lb. slab of G.-C. used as above descri will destroy most wt.-iron field guns. For B.L. guns, open the breech a detonate a slab of G.-C. inside on some part that will render impossible reclosing of the breech.

MENSURATION AND USEFUL FORMULÆ.

Circles.—Their areas are to one another as the squares of their diameters.

The diam. × by 3·1428 = circumference, or roughly the proportion between circum. and diam. is as 7 to 22.

Circumference ÷ 3·1416 = diameter.

Diameter^2 × ·7854 = area of circle.

Circumference^2 × ·07958 = area of circle.

The length of an arc = No. of degrees × radius × ·07145.

The area of the sector of a circle = $\frac{\text{radius} \times \text{arc.}}{2}$

The area of a segment is ascertained by finding the area of the sector, and subtracting from it the area of the triangle formed by the chord, and the radii of the sector, if the segment is less than a semicircle; if the segment is greater than a semicircle, then, by ascertaining the area of the smallest segment and subtracting it from the area of the whole circle.

Triangles.—The area = $\frac{\text{base}}{2}$ × perpendicular height. When the three sides are known, and the area is required, subtract each side severally from half their sum; multiply those three remainders and the half sum together, and the square root of the product will be the required area.

In right-angled triangles, if the 2 sides forming the right angle are known, the hypothenuse = the square root of the sum of the squares of the 2 sides.

Given the hypothenuse and 1 side, the 3rd side can be ascertained by subtracting the square of the known side from the square of the hypothenuse, and extracting the square root of the remainder.

The sums of the 3 angles of all triangles = 180°, so if 2 angles of any triangle are given, the 3rd is of course known by subtracting their sum from 180.

Let A, B, and C represent the 3 sides, and a, b, and c the 3 angles respectively opposite those 3 sides.

Given two angles (a and b) and one side B to find the other sides; $A = \frac{B \sin a}{\sin b}$ and $C = \frac{B \sin C.}{\sin b}$ This is the rule commonly in use in measuring distances to inaccessible points, where you can measure a base by a tape line, and the angles at it by a pocket sextant.

Given the two sides A and B and the included angle c, the side $C = \sqrt{A^2 + B^2 - 2AB \cos c}$.

The areas of all geometrical figures can be determined by the foregoing rules, by dividing them into triangles.

The cub. content of boxes, rooms, &c., is arrived at by dividing them into triangular and rectangular figures, and multiplying the area of such by the height.

The area of a parallelogram = the length × the height.

Spheres.—Surface = diam.^{2} × 3·1416 = diam. × circumference : the cub. content = diam.^{3} × 0·5236. The cub. content of the segment of a sphere = ·5236 H (H^2 × ^{3}R^2), where H = height of segment, and R = radius of the base of segment.

Cones.—Surface = area of base + circumference of base × ½ slant height. The surface of frustum = sum of girth at both ends × ½ slant height + area of both ends. The cub. contents of cone or pyramid = area of base × perpendicular height ; of a frustum = $\frac{1}{3}$ H ($A = a + \sqrt{A \times a}$) when A and a = areas of the ends, and H = perpendicular height.

Cylinders.—Surface = area of both ends + length × circumference : cub. content = area of one end × length.

Wedges.—Cub. content is found as follows : to length of base × 2, add length of edge ; multiply the sum by breadth of base, and by perpendicular height from base, and one-sixth of the product will be the cub. content.

PHYSICAL MEMORANDA.

Water.—1 cub. ft. distilled in vacuo. = 62·5 lbs. = 6·242 galls. = 25 quarts : 1 cub. in. = ·036 lbs. : 1 gallon (approximately) = 10 lbs. = 0·16 cub. ft. = 277·274 cub. in. : 1 cwt. = 1·8 cub. ft. = 11·25 galls. : 1 ton = 35·94 cub. ft. = 224 galls. : cub. ft. × 0·557 = cwt. ; cub. ft. × 0·028 = tons : 1 cub. ft. of sea-water = 64·25 lbs. : wt. of sea-water = wt. of fresh × 1·028. All these figures are only approximately accurate. Fresh water boils at 212° Fahr. or 100° Centigrade : it freezes at 32° Fahr. or Zero Centde.

Snow.—At home, snow weighs from 5 to 11 lbs., the cub. ft. In Canada 14·25 lbs. on falling, and 21·25 lbs. the day following, the temperature being 8° Fahr. In an ordinary English winter the density of fine snow is about 0·143 of water, its greatest density about 0·3.

Air is 840 times lighter than water : pressure of atmosphere at sea-level = 14·706 lbs. per sq. in. = pressure of column of mercury 29·92 in height = pressure of column of water 33·7 ft. high : its temperature falls 1° for every 300 ft. of vertical height. A man requires about 220 to 240 cub. ft. per hour.

Velocity of falling bodies.—N = number of seconds in falling : S = space fallen through in feet : V, velocity in feet per second acquired in N seconds ; V = N × 32·166 and S = N^2 × 16·033.

Animal power in lbs. raised 1 ft. per minute in 8 working hours daily :—The standard "horse power" is 33,000 lbs., but for average animals it may be taken as follows : the horse, 21,000 ; ox, 12,000 ; mule, 10,000 ; ass, 3500 : man may be taken as a 5·5th of a horse, or on an average at 3800 lbs. At low speeds an ordinary horse can exert in regular work day by day for 8 hours per diem a steady pull of about 150 lbs., although some animals will not average more than 100 lbs. When a number of men pull together, each pulls, on the average, horizontally about half his weight.

Velocity of sound through the air at a summer temperature is about

1142 ft. (say 365 yds. a number easily remembered), and through water about 4950 ft. per second: distances can be measured with tolerable accuracy by counting the number of seconds between the flash and report or a gun. Four beats of the pulse to 1000 yds. a fair rough calculation. This velocity increases with the loudness of the report.

The pulse, in health, beats from 72 to 75 times in a minute.

Measurement of distances to inaccessible places without instruments.—A B the breadth of a river is required: produce A B to any convenient distance D: from D mark off in a convenient direction equal distances D C and C *d*; join B and C and produce the line until *b* C = C B: join *d* and *b* and produce the line until A C produced intersects it: measure *a b* and the result be the distance A B.

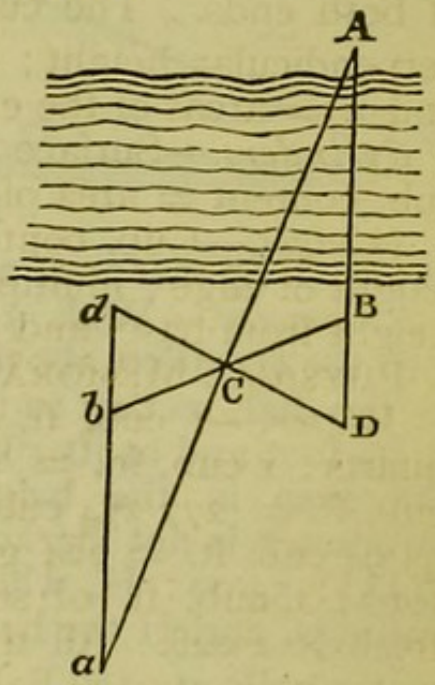


Fig. 59.

With a prismatic compass.—Measure a base C D and from its extremities plot on paper the lines A D and A C: their intersection will give A: the distance A B can then be measured by the scale upon which the base was laid down at. If time permits, it is better to lay off the base so that B bisects it, and the angles A B D and A C D should be about 60°; this is arriving at the distance by construction. To do so by calculation, the angles A D B and A C B should be measured by either the pocket sextant or the prismatic compass, and the required distance obtained by the formula given already regarding triangles.

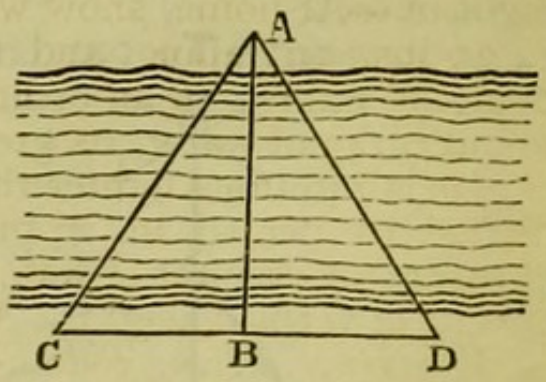


Fig. 60.

To measure the distance between two inaccessible points, measure a base, and find out, as described above, the distance between its extremities and both the points, which will give the two sides and included angle of the triangle that has the required distance for its base, and one of the extremities of the measured base for an apex.

Required the height of A B and the difference of level between B and C, D being the nearest point to which you can get to B. Erect a stake the height of the eye at D, and measure the angles A E C and A D C as well as the base E. D: $A C = \frac{E D}{\text{cotan A E D} - \text{cotan A D C.}}$ The height B C can be ascertained in the same way, which subtracted from A C gives A B. If A C is a height the foot of which is accessible, then A C = tan A E C E C.

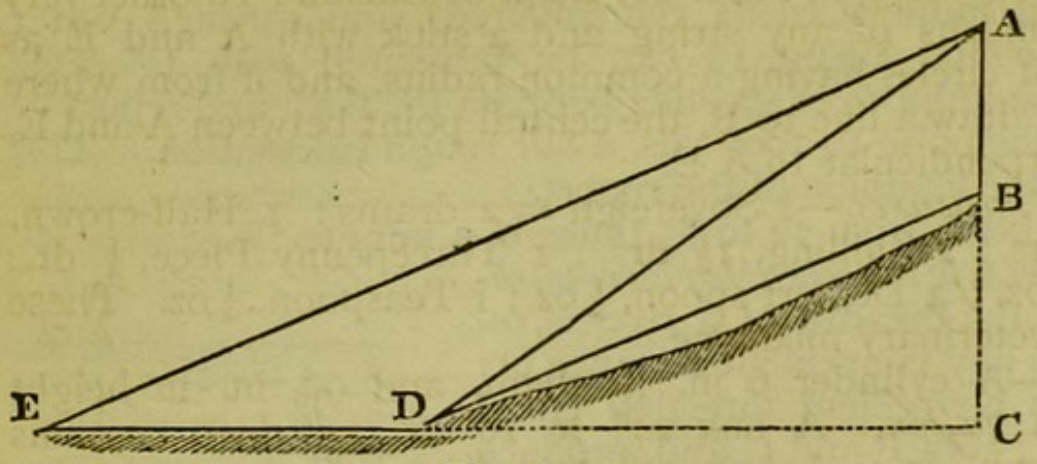


Fig. 61.

By the thermometer (Fahr.).—It can be used to ascertain the height of mountains thus: Let T = temperature of boiling water at any station deducted from 212°, and H = height in feet of station above the sea. Boil some water and ascertain T by means of a thermometer: $H = 520\ T + T^2$.

Barometer.—With a pocket aneroid, the number of ft. corresponding with the elevation above the sea is generally marked opposite the readings on the dial, so that to find the height of a mountain, observe the readings at its foot and at its summit, and subtract the former from the latter; the difference is the height of the mountain approximately. When the barometer is not marked with a scale of feet, the following is the formula: S : D : : 55·00 : H, where S is the sum and D the difference between the readings, and H the height required in feet. When the barometer usually stands between 28 and 30 in., the simplest and best formula is $\frac{D}{\cdot 0011} =$ height in feet.

Thermometer.—To convert Centigrade or Reaumur into Fahrenheit let C, R and F represent degrees in each respectively: F = C × 1·8 + 32; F = R × 2·25 + 32 : C = (F − 32) ·5555; R = (F − 32) ·444·4

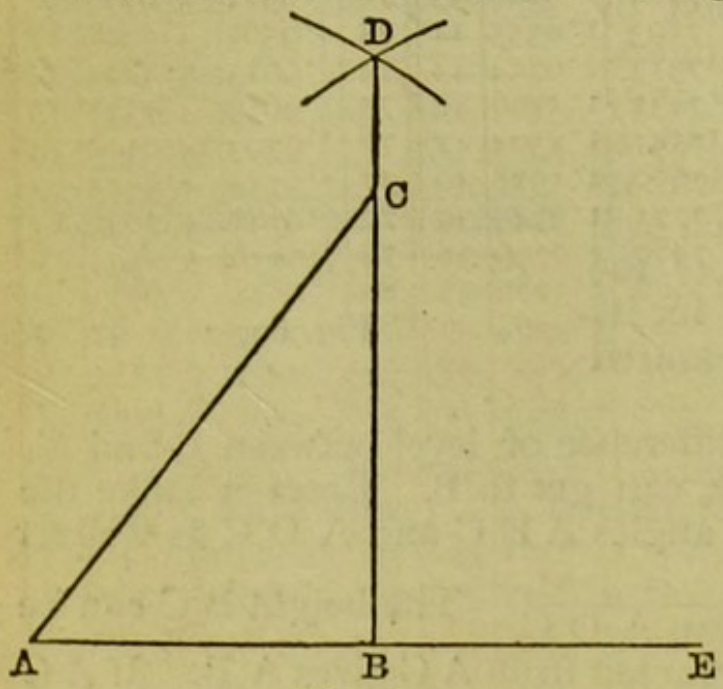


Fig. 62.

To lay out a right angle.—Take your 50′ measuring tape and unite in your hand the ring end and the point marked 48′ and pin or fasten down both ends at the point A: stretch it out from 1′ to 12′ along the line A B, on which you wish to erect your perpendicular; pin it to the ground, or pass it round a wire or thin picket at B, the 12′ mark, and then taking the 28′ mark (C) between your finger and thumb, stretch the tape in the direction D until both sides of the triangle are taut; a line uniting the apex C and B is perpendicular to A E.

This system is founded on the 47th Prob. 1st Book of Euclid. Another very simple method is by means of any string and a stick with A and E as centres, describe arcs of circles having a common radius, and if from where they intersect at D you draw a line to B, the central point between A and E, the line D B will be perpendicular to A E.

Useful weights and measures.—1 Sovereign = 2 drams: 1 Half-crown, $3\frac{1}{2}$ drs.: 1 Florin, 3 drs.: 1 Shilling, $1\frac{1}{2}$ drs.: 1 Threepenny Piece, $\frac{1}{3}$ dr.: 1 Tablespoon holds 1 oz.: 1 Dessert spoon, $\frac{1}{2}$ oz.: 1 Teaspoon, $\frac{1}{4}$ oz. These measures are used for veterinary medicine.

To make Measures.—A cylinder 6 in. in diam. and $9\frac{8}{10}$ in. in height holds almost exactly a *gallon*. A box 24″ × 16″ × 22″ deep contains 1 *barrel* = 10,752·00 cub. in. A box 13″ × 13″ × $13\frac{1}{8}$″ deep contains 1 *bushel* = 2218·125 cub. in. A box $7\frac{1}{2}$″ × 7″ × $10\frac{9}{16}$″ deep contains 1 *peck* = 554·5 cub. in.

NATURAL SINES and TANGENTS.

Ang.	Sines.	Tang.	Ang.		Sines.	Tang.	Ang.	Ang.	Sines.	Tang.	Ang.	Ang.	Sines.	Tang.	Ang.
5′	·0015	·0015		35′	·0102	·0102		37	·6018	·7536	53	64	·8988	2·0503	26
0′	·0029	·0029		40′	·0116	·0116		38	·6157	·7813	52	65	·9063	2·1445	25
5′	·0044	·0044		45′	·0131	·0131		39	·6293	·8098	51	66	·9135	2·2460	24
0′	·0058	·0058		50′	·0145	·0145		40	·6428	·8391	50	67	·9205	2·3559	23
5′	·0073	·0073		55′	·0160	·0160		41	·6561	·8693	49	68	·9272	2·4751	22
0′	·0087	·0087		60′	·0175	·0175		42	·6691	·9004	48	69	·9336	2 6051	21
Dg.			Dg.	Dg.			Dg.	43	·6820	·9325	47	70	·9397	2·7475	20
								44	·6947	·9657	46	71	·9455	2·9042	19
1	·0175	·0175	89	19	·3256	·3443	44	45	·7071	1·0000	45	72	·9511	3·0777	18
2	·0349	·0349	88	20	·3420	·3640	43	46	·7193	1·0355	44	73	·9563	3·2709	17
3	·0523	·0523	87	21	·3584	·3839	42	47	·7313	1·0724	43	74	·9613	3·4874	16
4	·0698	·0699	86	22	·3746	·4040	41	48	·7431	1·1106	42	75	·9659	3·7321	15
5	·0872	·0875	85	23	·3907	·4245	40	49	·7547	1·1504	41	76	·9703	4·0108	14
6	·1045	·1051	84	24	·4067	·4452	39	50	·7660	1·1918	40	77	·9744	4·3315	13
7	·1219	·1228	83	25	·4226	·4663	65	51	·7771	1·2349	39	78	·9781	4·7046	12
8	·1392	·1405	82	26	·4384	·4877	64	52	·7880	1·2799	38	79	·9816	5·1445	11
9	·1564	·1584	81	27	·4540	·5095	63	53	·7986	1·3270	37	80	·9848	5·6713	10
0	·1736	·1763	80	28	·4695	·5317	62	54	·8090	1·3764	36	81	·9877	6·3138	9
	·1908	·1944	79	29	·4848	·5543	61	55	·8192	1·4281	35	82	·9903	7·1154	8
	·2079	·2126	78	30	·5000	·5774	60	56	·8290	1·4826	34	83	·9925	8·1443	7
	·2250	·2309	77	31	·5150	·6009	59	57	·8387	1·5399	33	84	·9945	9·5144	6
	·2419	·2493	76	32	·5299	·6249	58	58	·8480	1·6003	32	85	·9962	11·4301	5
	·2588	·2679	75	33	·5446	·6494	57	59	·8572	1·6643	31	86	·9976	14·3007	4
	·2756	·2867	74	34	·5592	·6745	56	60	·8660	1·7321	30	87	·9986	19·0811	3
	·2924	·3057	73	35	·5736	·7002	55	61	·8746	1·8040	29	88	·9994	28·6363	2
	·3090	·3249	72	36	·5878	·7265	54	62	·8829	1·8807	28	89	·9998	57·2900	1
								63	·8910	1·9626	27	90	1·0000	infin.	0
	Co-sin.	Co-tan.	Dg.	Dg.	Co-sin.	Co-tan.	Dg.	Dg.	Co-sin.	Co-tan.	Dg.	Dg.	Co-sin.	Co-tan.	

ENGLISH and FRENCH WEIGHTS and MEASURES.

Capacity.

	Cub. Inches.	litres.	centi-litres.
4 Gills=1 pint	= 34·75 =	0	56·75
2 Pints=1 quart	= 69·33 =	1	13·5
4 Quarts=1 gallon	= 277·274=	4	54 =

10 lbs. of water.

2 Gallons=1 peck	= 554·5 =	9	9
4 Pecks=1 bushel	=2218·19 =	36	34
8 Bshls.=1 qr.=10·2 cub. ft.	=290		78
5 Qrs.=1 load=51·33 cub. ft.	=1493		90

Gals. × ·1605=cub. ft.: Cub. ft. × ·779 =bushels.

Bushels×1·284=cub. ft.: Cub. ft.×6·230 =gals.

Avoirdupois Weight.

437·5 grains, 16 Drams } =1 ounce =28·34 grammes.
16 Ounces = 1 pound = ·4535 kilgrms.
14 Lbs. = 1 stone = 6·350302 ,,
2 Stone =1 quarter=12·700604 ,,
4 Quarters =1 cwt. =50·802416 ,,
20 cwt. =1 ton =1016·04832 ,,
2000 Lbs. =1 ton in Canada and the U.S.
Lbs.×·009=1 cwt.: Lbs.×·00045=tons.
1 ton of freight by measurement=40 cub. ft.
Cub. inches×·003607=gals.
Cub. inches×·00045=bushels.

Length and Square Measures.

1 inch	=	·0254 mètres.
12 Inches =1 foot	=	·30479 ,,
3 Feet =1 yard	=	·9144 ,,
5½ Yards =1 rod	=	5·0292 ,,
22 Yards =1 chain	=	20·1168 mètres.
40 Rods =1 furlong	=	201·168 ,,

8 Furlongs, 80 Chains, 1760 Yards } 1 mile*= { 1609·344, 1·60934 kilo-mètres.

2025·27 yds.=1 nautical mile or Knot 1·15 miles.

69·0433 Miles or 60 nautl. miles=1 degree at the Equator: Miles×·87=knots (nautical miles.

6 Feet=1 fathom: Knots×1·15=miles. Yards×·00057=miles.

120 Fathoms=1 cable length.

Feet × ·00019 = miles: Yds. × ·0057 = miles.

640 Acres=1 sq. mile: 4840 sq. Yards = 1 acre.

For rough calculations, 70 yds. × 70 yds. =1 acre.

Sq. Feet × ·111 = sq. yds.: sq. in. ·007=sq. ft.: sq. yds=·0002067 acres.

Cub. Feet×·03704 (or for an approximate calculation ·04)=cub. yds.: Cub. Inches ×·00058=cub. feet.

40 Sq. Rods=1 rood: 4 Roods=1 acre.

4 Inches=1 hand (for height of horses).

500 Bricks=1 load.

32 Bushels of lime=Do.
36 ,, sand=Do.
36 Trusses of straw or hay=Do.
1 Truss of straw 36 lbs.
1 ,, old hay 56 lbs.
1 ,, new ,, 60 lbs.
1 Chaldron of coal=53 cwt.
1 Sack of Potatoes=224 lbs.
1 Cord of wood=128 cub. ft.

* In the province of Quebec the country people reckon distances by Arpents and Leagues; the former is about 63 yards (28 arpents=1 mile) 84 arpents=1 league.

Weights, Measures, and Money of Foreign Countries.

Afghanistan.—Standard Indian money is current: local coins as follows: At *Kandahar*, 8 pul-i-siah = 1 Shahi = 1 penny (English): 12 Shahis = 1 Kandahari Rupee = 8 annas = 10 pence (English): 10 Shahis = 1 Khani Rupee: official accounts are kept in Khani, although like the Chinese Tael no such coins exist. 1 Kandahari Rupee, Kham, = 6 annas, 8 pi (British). 20 Kandahari Rupees = 1 Kandahari Toman: 1 Toman, Puchta, = 2 Kandahari, Khaim = 10 British Rupees: 1·5 Kandahar Rupees = 1 Kabu

Rupee = 13 annas, 4 pi (British): 1 Kandahari Rupee, Puchta = 8 British annas. 1 Gaz-i-shah = 41·75″ is used by all shopkeepers: 1 Gaz-i-minar = 14 Gireh, used by surveyors: 1 Gireh = 4 fingers in breadth: 13·5 Gireh = 1 British Gaz: 1 Jerib or Tanab = 60 yds. × 60 yds. (land measure). Liquids are sold by weight. The Man-i-Tabriz is the standard of weight and = 20 Miskals = 1 seer = 2·5 oz.: 40 seer = 6·5 to 8 lbs.: 100 Mans-i-Tabriz = 1 Karwar = 10·5 British Maunds = 865 lbs. At Pisheen 4 seers = 1 man, and 100 mans = 1 Kharwar (Ass load). There the Gaz = 1 yd.

At Kabul = 50 Dinars = 1 Shahi = 1·5 pence: 2 Shahis = 1 sanar = 3*d.*: 2 sanars = 1 Abasi = 6*d.*: 3 abasi = 1 rupee = 13·5 British annas = 18*d.* The public accounts are kept in Kham money which is, 10 Dinars = 1 paisa: 5 Paisas = 1 shahi: 10 Shahis = 1 rupee: 20 rupees = 1 Toman = 16 rupees, 8 shahis Puchta. The ordinary *Kabul* weights are, 4 Charaks = 1 seer: 8 seers = 1 maund: 10 maunds = 1 Kharwar = 15 British maunds, 27·5 seers = 1292·5 lbs. The *Kabul* Tabrezi method gives 2·5 Charaks = 1 maund = 4 seers, 14·5 chittacks, British. At *Herat* both Persian and Afghan money is current. 1 Herat rupee = 1 Persian Keran = 10 pence; 25 to 30 Kerans £1. The Kandahar Abasi is here called the Jindek = 2 Persian abasi. The Afghan shahi = 2 Persian shahis. The Kharwar is about 800 lbs. The Jerib is the same as in Kandahar.

Austria.—The metric system is now commonly used (see France): but the old weights, &c., were as follows:—1 Pfund = 1·235 lbs. = 2 marks = 4 vierdinge = 16 unze = 32 loth: 100 pfund = 1 centner. The measures were 1 fuss = 1·037 ft.: 1 Elle = 2·55 ft.: 6 fuss = 1 Klafter: 4000 Klafter = 1 Meile = 4·714 miles = 8289·6 yds. = 7·586 kilomr.: 1 Yoch or Johart = 1600 sq. Klafter = 1·422 acres. The Eimer = 11·33 galls. = 56·564 litres: 1 Metze = 1·5387 bushels = 61·5 litres. The coinage is the silver Florin = 100 kreutzers = 2*s.* (about 9·83 florins = £1): the old coinage was, 480 Pfennige = 120 kreutzer = 2 gulden = 1 thaler = 4*s.* ·08*d.* (about); the gold Ducat = 9*s.* 4·75*d.* English.

Arabia.—1 maund = 3 lbs.: 1 bahar = 450 lbs.: 1 guz = 0·6944 ft.: 1 noosfia = 0·25 galls.: 1 gudda = 8 noosfia = 2 galls.: 1 piastre = 80 coveers = 3*s.* 8·5*d.*

Bavaria.—The metric system is now commonly used: the old weights, &c., were:—1 Pfund = 32 loth = 1·2346 lbs.: the measures were, 1 Fuss = 12 zoll = 11·49 in.: 1 Morgen = ·842 acres: 1 Meile = 2 post stunde = 4·6 miles = 7·442 kilomr: 1 Eimer = 13·7 galls.: 1 mutle = 4 schäffel = 24 metzen = 22·26 bushls. Coinage, 1 Gulden = 60 kreutzen = 24 pfennigen = 1*s.* 7·9*d.* = 2·10 francs.

Belgium.—The metric system and coinage as in France.

Brazil.—The same as Portugal.

Canada.—Same as in England, except that 1 cwt. = 100 lbs. and 1 ton = 2000 lbs. The dollar = 4*s.* 1·25*d.*

Cape of Good Hope.—Generally the same as in England, but the old Dutch weights are still much used by the Boers. The proportion generally made use of in comparing Dutch and English weights is 92 lbs. Dutch to 100 lbs. English; the true rate, however, is considered to be 91·89 Dutch to 100 lbs. English avoir. In comparing the old Dutch measures of capacity with the English, the following ratios will be found useful:—

	Imperial.
1 schepel is equal to ·7663 old Winchester bushel, or	·743
1 muid is 4 schepels, or 3·0658 ,, ,,	2·072
1 load is 10 muids, or 10·652 ,, ,,	29·72

The 107 Dutch schepels = 82 Winchester bushels, or 4 schepels are about 3 imperial bushels, and 11 schepels are about 1 quarter.

A schepels is $4\frac{1}{2}$ inches square by $8\frac{1}{2}$ deep.

The weight of a muid of oats or barley is 104 lbs. Dutch, or 113 lbs. English; of Boer meal, wheat, beans, peas, and mealies, 180 lbs. Dutch, 195·65 English.

1000 Cape ft. = 1033 British ft.: 12 Cape ft. = 1 Cape rood. 1 English mile = 425,944 Cape roods (nearly): 1 Cape morgen = 2·11654 English acres. 1 Rix dollar = 1*s.* 6*d.*

Central Asia.—Russian wts. and measures are used wherever Russia rules. Elsewhere the Batman is the common wt. in use, though it differs much according to locality. The *Bokhara* Batman = 8 Russian Pud = 288·84 lbs. The small Batman of *Khiva and of the Teke* = 1 Russian Pud: the large Batman of *Khiva and Kokand* = 4 Russian Pud; the Batman of *Tashkend* = 10 Russian Pud, that of *Khashgar* = 32 Russian Pud. The Batman is usually divided into 64 large Chariks. The *Sart* Gaz = 1·5 Russian Arshin = 42″ English: the *Sart* Kos = $\frac{1}{2}$ Verst = 583·33 yds. The Tash of Khiva = 6 to 9 versts. The Tchakrim = about 1 verst.

China.—10 Mace = 1 Tael: 16 Taels = 1 Catty = 1·333 lbs.: 100 Kin or catties = 1 Canton Picul = 133·333 lbs.: 111 catties = 1 seda picul = 148 lbs.: and 150 catties = 1 Chuppa Picul = 200 lbs. The common measures are the Yin = 10 Chang = 100 Chih = 1000 tsun = 10,000 fun = 122 ft. (about): 1 Pu = 5 chih: 1 Li = 360 pu = 609 yds. (about) (like the Indian Koss, the Li varies greatly). In some localities it is ·22, and in others ·36 of a mile. The Tael (it only exists in name) was formerly = 6*s.* 8·625*d.* (about). In 1869 the sterling value of the tael was only 6*s.* 2¼*d.*, and since then its value has been frequently quoted as only 6*s.*, and is now only worth 5*s.* 10*d.* The Tael = 10 Mace = 100 Candereen = 1000 Cash.

Cyprus.—The oke is the common standard of weight, and is also used in the measurement of wine: it is 2·8 lbs. English, and contains 9·35 gills at 32 gills to the gallon: 3·42246 okes go therefore to the Imperial gallon. The measure of length is the Arslim, or Pik, which according to the Ottoman Code = 75 centimetres (= 2·46 ft.); but in Cyprus 2·575 ft. would seem to represent it more accurately. The Dunum is the measure for land; and

whilst in Turkey it is 40 arslims² (103 ft.²), in Cyprus the farmers count the dunum as 60 arslims² ; or, roughly speaking, the two dunums are 1108 and 2500 sqr. yds. respectively ; or, very roughly, the ¼ and the ½ of an English acre. Distances are always estimated by the hour, and when a muleteer tells you the distance is a 5 hours' journey he means 20 miles, or 4 miles to every hour. The coinage is the copper piastre and the silver and gold coins of England.

Denmark.—1 Pund = 1·1028 lbs. : 1 Centner = 100 pund = 10,000 Kvinten = 100,000 Ort = ·50 kilogr. (French). The Mark = ·519 lbs. = ·235 kilogr. Measures, 1 Fod = 1·02973 ft. ; 1 Rode = 12 fod : 1 Meile = 2000 roder = 4·68 miles = 7·53 kilomr. = 8237.834 yds. 1 Potte = 0·2339 galls. : 1 Anker = 5 viertel = 38·75 potte = 8·239 galls. The Rixdaler = 6 marks = 96 skillings = 2*s.* 2·35*d.* The gold Christiansdor = 7 dalers = 36 skillings = 16*s.* 3*d.* The Tönde of land = 1·5 acres : of corn 3·8 bushls., and of coal = 4·6775 bushls.

Egypt.—English and French gold and silver coins are in common use.

CORN MEASURE IN LOWER EGYPT.

9 Kuddah	=	1 Melweh.
4 ,,	=	1 Ruba.
2 Ruba	=	1 Kayleh.
2 Kayleh	=	1 Waybeh.
6 Waybeh	=	1 Ardeb.
1 Ardeb	=	5·6 bushels.

IN UPPER EGYPT.

4 Roftow	=	1 Mid.
3 Ruba	=	,,
8 Mid, 6 Waybeh	=	1 Ardeb.
1 Ardeb	=	5·6 bushels.

WEIGHTS.

4 Kumh	=	1 Kirat.
16 Kirat	=	1 Dirhem.
12 Dirhem	=	1 Wukiyeh.
12 Wukiyeh	=	1 Kantar.

1 Kantar=about 98 to 100 lbs. (Aver.)
400 Dirhem=1 Oke=2·5 lbs. (Aver.)

LINEAL MEASURES.

The chief is the Pik, of which there are several varieties:
Pik (draa beledi) for Land=22·93″
,, (draa Nili) for Nilometre=20·63″
,, (draa Stambouli or Turkish)=23″
Kassaba=11·64′
All short measures are given in spans from tip of thumb to tip of little finger =9·5″.

LAND MEASURES.

22 Kharubeh=Kassabah=135·5 sq. ft.
22 Kirat=1 Zeddan or Feddan=1·05 acres.
In calculating tonnage of boats, 7·5 Ardebs=1 Ton.
For Wt. of Freight 22 Kantars=1 Ton.

The Government tariff for Egyptian money is as follows :—

	Piastres.	Paras.	English. £	s.	d.
£1 Egyptian	= 100	0	= 1	0	6
£1 Sterling	= 97	20	= 1	0	0
£1 Turkish	= 87	30	= 0	18	0
1 Napoleon	= 77	6	= 0	15	9·8
1 Medjidieh	= 16	10	= 0	3	3·8
1 Talari Egyptian	= 19	20	= 0	4	0
1 Colonnat	= 19	0	= 0	3	10·5

	Piastres.	Paras.	English. £. s. d.
1 Regina or Maria Theresa	= 17	20	= 0 3 7·75
The Kees or Purse	= 500	0 (average)	= 5 2 6

The Piastre = 40 paras = about 2½ pence English.

The Soudan.—The Tassa, a small cup-shaped measure holds about 1 Rotoli of corn: it is always used by the people in their dealings one with the other. There are about 288 Rotolis or Tassas in an Ardeb: 4 Tassas = 1 Mud: 12 Muds or 4 Roubos = 1 Mouri: 6 Mouris = 1 Ardeb. Approximate equivalents, 1 Gallon = 7 Tassas or 2·25 Muds: 1 Peck = 14 Tassas or 4·5 Muds: 1 Bushel = 56 Tassas or about 1 Mouri: 1 Ardeb = 5 Bushels. The Rotoli = about 0·86 lb. (aver.): 1 Kantar = 108 lbs. = 40 Okes: 1 Oke = 2·5 lbs. (aver.): 1 Gasaba = 0·944′.

France.—The Metric system.

LENGTH.

	Yds.	Ft.	In		Yds.
Centimètre =	0	0	·39371	or × ·010936 =	
METRE =	1	0	3·371	or × 1·0936 =	
Hectomètre =	109	1	1	or × 109·363 =	
Kilomètre =	1093	1	10·2	or × 1093·63 =	

Lieue de poste (2000 toises) = 4263 yards or 2·4222 miles.
Lieue commune (4·44 kilomr.) = 2·75 miles = 4840 yards.
Kilomtr. × ·621383 = miles; Miles × 1·60934 = Kilomètres.

WEIGHT.

1 GRAMME = ·0022 lbs.
1 Kilogramme = 2·2048 lbs. = ·01969 cwt.
Lbs. × ·4535 = killogramme; Tonnes × 1·015965 = tons.
Tons × 1·984 = tonnes.

SOLIDS.

Millistere = 61·028 cub. in.
STERE = 35·317 cub. ft. = 1 cub. mètre.
Hectostere = 130·8 cub. yards.
Cub. Ft. × ·0283153 = cub. mètres.

CAPACITY.

Centilitre = ·0022 gals. or ·6103 cub. inchs.
LITRE = ·22 ,, or 61·028 ,,
Hectolitre = 22·0 ,, or 2·75 Impl. bshls.
Kilolitre = 220 ,, or 35·317 cub. ft.
Gallons × 4·543 = litres; Cub. In. × ·016 = litres.

SQUARE MEASURE.

Milliare = 115 sq. in.
Centiare = 10·764 sq. ft.
Deciare = 11·96 sq. yds.
ARE = 119·6 ,,
Decare = 1196·046 ,,
Hectare = 2·4712 acres = 11,960·46 sq. yds.
Sq. Mètres × 10·7643 = sq. ft.
Sq. ft. × ·0928997 = sq. mètres.

N.B.—In the French system Deca means 10 times: Deci, $\frac{1}{10}$th of; Hecto, 1[illegible] times, and Centi $\frac{1}{100}$th of: Kilo, 1000 times, and Milli $\frac{1}{1000}$th of.

1 Franc = 100 Centimes = 9·38*d.*: 1 Napoleon = 20 francs = 15*s.* 10·32*d.*

Germany.—The French metric system is now common in Germany. The old measures were the Pfund, which was generally divided into 32 loth (each loth = 4 quentchen), and which varied in the several States from 1·03 lb. to 1·234 lbs.: the Centner = 110·232 lbs.: 1 Fuss (Rhein) = 12·357 in.: 1 Elle = 26·258 in. The Fuss was divided into 12 Zolle and varied from 11·15 to 11·8 in. The Morgen varies generally from ·62 to ·8 acre. The figures shown after each State is the number of English miles in its Meile

Baden, 4·6028: Brunswick, 4·613: Hamburg, 4·68: Hanover, 4·61: Lubeck, 5·72: Oldenburg, 6·133: Prussia, 4·68: Saxony, 4·222. The long German mile = 10,126 yds. = 5·753 miles; the short mile = 6859 yds. = 3·897 miles. The common liquid measure was the Fuder = 6 Ohm, which varied from 187 to 212 galls., and the dry was the schäffel, which varied from 2 to 8 bushels. The Mark is practically = 1*s.*; the 20 mark piece = 19*s.* 7*d.*; the Thaler = 30 groschen = 300 pfennigen = 2*s.* 10·75*d.* English. In South Germany, including Bavaria, Wurtemburg, Baden, &c., 240 pfennige = 60 Kreutzers = 1 florin = 1*s.* 8*d.*

Greece.—The French metric system is used, the Drachmé = gramme, and the Mnâ = kilogramme. The Libbra = 1·06 lbs.: the Oke = 2·84 lbs.: the Quintal = 123 lbs. The Pecheus = mètre: the Stadion = kilomètre. The Stremma = the are. The ancient Keramion or Metrates = 8·488 galls. The coins are the Drachma = 100 Leptai = 8½*d.*, and the gold 20 drachma piece = 14*s.* 2·2*d.*

Holland now uses the French metric system, the Pond weighing exactly the same as the Kilogramme (or 2·204 lbs.). The old pound = 1·088 lbs. The Elle is the same as the mètre and is divided into 10 palms. The mile (15 to a degree) = 4·6028 miles. The Bunder = hectare. The Kan = litre. The Guilder or Florin = 100 cents. = 1*s.* 8*d.*, and the gold Double William = 33*s.* 1*d.*

India.—The standard pukka seer of Bengal = 16 chittacks, = 80 tolas, = 2·20571 lbs. English; 40 of these seers = 1 maund = 88 lbs. The bazaar maund in Bengal = 82·2857 lbs. In Madras, according to the Tola system, 1 Madras Kuccha seer = ·6171 lbs., and 1 pukka seer = 2·0571 lbs.: 5 kuccha or 1½ pukka seers = 1 viss = 3·0857 lbs.: 8 viss = 1 Madras maund = 24·6857 lbs.: and 20 maunds = 1 candy = 493·7142 lbs. The Madras commercial weight is, 1 pollum = (1¼ oz.) = ·078 lbs.: 40 pollums = 1 viss = 3·125 lbs.: 8 viss = 1 maund = 25 lbs.: and 20 maunds = 1 Candy = 500 lbs. In Bombay 30 pice = 1 seer = ·7 lbs: 40 seers = 1 maund = 28 lbs. and 20 maunds = 1 candy = 560 lbs. In Burmah 100 kyats = 1 pictha or viss = 3·6 lbs.

In Bengal the yard or Guz = 3 ft.: in Bombay ·75 ft.: and in Madras 3·0833 ft. The Ilahy Guz = 33 in., is now the standard measure in all Revenue Surveys, and the Beegah = 3025 sqr. yds. = 3600 sqr. Ilahy guz = ·625 acre, is now the standard measure for land in the Bengal Presidency, but locally the beegah varies considerably. The Kos is the common road measure. The official Kos = 2000 Dandas = 4000 Guz = 2·75 E. miles. The Rupee is common coin, in which all sums of money are calculated; it is worth about 1*s.* 7*d.* = 16 annas = 192 pi (the copper *pice* = 3 pi). A Lak = 100,000: a Crore = 100 Laks. The Gold mohur = 16 Rupees in Bengal.

Italy.—The same as France now: the old standard weight was the

Table of Foreign Weights, Measures and Coinage mos

COUNTRY.	WEIGHTS.		MEASURES.		LAND MEASURES.	
	Name of Weight.	English Weight avoirdupois, lbs.	Name of Measures.	English Feet.	Measures.	English Acres.
Austria	Pfund = 32 loths ..	1·2347..	Fuss	1·0371..	Joch	1·4233..
Arabia	Maund	3	Guz.	0·6944..	.. ..	.. ..
	Bahar	450 ..				
Belgium ..	.. .. See France		Foot	0·937 ..	Same as France.	
Bavaria	Pfund = 32 loths ..	1·2347..	Fuss	0·953 ..	.. ..	.. ..
Bengal	Maund(40 seers)	82·133	Guz.	3·0 ..	.. ..	.. ..
	Seer	2·0533				
Bombay ..	Maund(40 seers)	28	Guz.	·75 ..	.. ..	.. ..
	Seer	0·7 ..				
	Candy	560				
Bohemia ..	.. .. See Austria		.. ..	.. ..	.. ..	.. ..
Canada	Cwt.	100 ..	.. ..	Same as in England ..		.. ..
Cape of Good Hope ..	.. .. See England		.. ..	,,	,, ..	.. ..
China	Pecul = 100 catties ..	133·3333	Chang = 10 chin ..	11 75 ..	.. ..	.. ..
Denmark ..	Pfund	1·1028..	Fod	1·02973	Morgen ..	0·63094
Egypt	1 Cantar = 40 okes ..	100·8 ..	Gasab	0·944 ..	Fedden al risach	0·6628..
France	Kilogramme ..	2·2048..	Metre	3·2808..	Hectare ..	2·4712..
Greece	Libbra	1·06 ..	Foot	·98416..	.. ..	.. ..
Germany ..	Metric lb. ..	1·1024..	Rhenish foot	1·02973	.. ..	.. ..
Hamburg ..	Pfund	1·0682..	El = 2 fuss ..	1·8974..	Morgen ..	0·6309..
Hanover ..	Centenar = 100 pfunds	103·1236	Foot	0·954	Do. ..	0·6438..
			Ell	1·91667		
Hesse	Pfund	1·07 ..	Fuss	0·9 ..	Acker	0·5897..
Holland ..	Pond	2·2047..	Foot	0·928	Bunder ..	2·4711..
			Ell	3·280916		
Italy	Kilogramme ..	2 2048..	Metra	3·280916	Giornata ..	0·9393..
Japan	Pecul = 100 catties ..	133·3333	Inc	6·25 ..	.. ..	..
Malta	Rottolo	1·7503..	Foot	0·93 ..	Salma	4·44
Madras . ..	Seer	0·625 ..	Yard	3·0833..	.. ..	..
Milan	Libbra Mettrica ..	2·9642..	Metra	3·280916	Tornatura ..	40·468..
Naples	Rotolo	1·9642..	Canana	6·93167	Moggio ..	0·8261..
Netherlands	.. ..	.. ..	.. ..	Vide	Holland ..	..
Persia	Cherray	0·7885..	Arish	12·7566	.. ..	..
			Guerze	2·083		
Portugal ..	Arratel	1·0118..	Vara	3·5958..	Geira	1·4818..
Poland	.. .. See Russia		.. ..	.. ..	.. ..	..
Prussia	Centenar = 110 Pfunds	113·436	Fuss	1·02973	Morgen ..	0·6309..
Rome	Libbra	0·7477..	Canna	6·5307..	Pezza	0·6524..
Russia	Pood = 40 pounds ..	36·11408	Foot	1·146	Desatine ..	2·45
			Sachine ..	7·0		
Saxony	Pfund=32 loths	1·0309..	Ell	1·8582..	.. ..	..
Sicily	Libbra . ..	0·7 ..	Canna	6·3725..	.. ..	..
Spain	Libbra Castiliana ..	1·0144..	Foot	0·927	Fanegada ..	1·1364..
			Warra = 3 pies	2·782		
Sweden ..	Skalpund ..	0·93653	Foot	0·974107	Tunland ..	1·2198..
Switzerland ..	Kilogramme ..	2·2048..	Metre	3·2808..	Hectare ..	2·4711..
United States of America	Cwt.	100	Foot	1	Acre	1 ..
	Ton	2000 ..				
Turkey	Rottolo	1·27 ..	Pike	2·218 ..	.. ..	..

ommonly in use, with their equivalents in English Measures, &c.

ROAD MEASURES.

Mile, &c.	Engh. Miles.	English Yards.
Mile	4·71	8239·034
Mile	..	2148 ..
Same as France ..		
Meile	..	8059 ..
Koss	..	2000 ..
. .. .		.. ..
Mile		8297 ..
. .. .		.. ..
. .. .		.. ..
Li ..	..	609 ..
Mile	4·68	8237·834
. .. .		.. ..
Lieue .. .		4374·55
Mile		1640 ..
Long mile ..		10126
Short do. ..		6859
Mile		8237·834
Mile		84·66 ..
Mile		10547
Kyle		1093·638
o.		1093
Same as China ..		
.. .. ..		.. ..
.. .. ..		.. ..
.. .. ..		.. ..
illia		2024·236
.. .. ..		.. ..
rasang ..		6086 ..
egua		6763 ..
Long mile ..		8101
hort do. ..		6075 ..
ile		237·8347
iglia . ..		1628 ..
erst		1167 ..
ile		7432 ..
.. .. ..		.. ..
eague ..		4565·461
l		11689 ..
eue		4374·552
le		1760 ..
rri		1826 ..

LIQUID MEASURES.

Measures.	Imperial Gallons.	Number to 100 Imperial Gallons.
Eimer	0·2201..	454·3889
Noosfia	0 25 ..	400
Gudda (noosfia)	2	50 ..
.. ..	.. ..	.. ..
Eimer	14·116..	7·0841..
.. Liquids are sold by Weight ..		
Do.	Do. ..	Do. ..
.. ..	.. ..	.. ..
.. .. ..See England		.. ..
.. . .	,,	.. ..
Shing..	1·025.. (liquid	sold by Weight
Potte	0·2339..	470·32..
.. ..	.. ..	.. ..
Litre	·22 ..	454·545
Keramion ..	8·488 ..	11·7836
.. ..	.. ..	.. ..
Viertel	1·593585	62·7515
Stubchen	0·85705	116·9609
Mass	0·44	
Viertel	1·76 ..	.. ..
Kan	0·2201..	454·3889
Boccale	0·1722..	.. ..
.. ..	.. ..	.. ..
Caffiso	4·58 ..	.. ..
.. ..	.. ..	.. ..
Pinte	0·2201	454·3889
.. ..	.. ..	.. ..
.. ..	.. ..	.. ..
Cantaro	3·6405..	27·47 ..
.. ..	.. ..	.. ..
Quart..	0·252021	396·791
Boccale	0·4012..	.. ..
Vedra	2·7049..	36·27 ..
Kann..	0·2059..	485·6726
Salma	19·226 ..	.. ..
Aroba major ..	3·55 ..	28·169..
Kannor	0·576043	173·598
Setier	10·06 ..	9·94 ..
Gallon	0·83311	.. ..
Almud	1·152 ..	86·96 ..

COMMON COINAGE.

Name of Coin.	Metal	Value in s.	d.
Gulden or Florin ..	Silver	2	0
Piastre .. 80 coveers	Silver	3	8·5
Franc ..	Silver	0	9·38
Gulden =60 kreut n ..	Silver	1	7·9
Rupee ..	,,	1	10·29
Do.	,,	Do.	
Thaller ..	,,	4	0·8
Dollar ..	Silver	4	1·25
Rix dollar= 8 skillings	,,	1	6
Tael	,,	6	8·625
Rixdaler ..	,,	2	2·35
Piastre ..	,,	9	2·47
Franc ..	Silver	0	9·38
Drachm ..	,,	0	8·4
Thaler = 30 groschen	,,	2	10·75
Rixdollar ..	,,	3	7
Thaler ..	,,	2	10·75
Do.	,,	2	10·75
Florin. ..	,,	..	.. ..
Lira-nuova	Silver	0	9·38
Itsiboo ..	,,	1	5·25
Scudo ..	,,	1	8
Rupee ..	,,	1	10·29
Lira-nuova	,,	0	9·38
Ducat ..	,,	3	3·75
Gulden ..	,,	1	8
Rupee ..	,,	1	6 (about)
Milreis ..	,,	4	8·66
Florin ..	,,	0	5·62
Thaler ..	,,	2	10·75
Scudo ..	,,	4	2·5
Ruble ..	,,	3	1·53
Thaler ..	,,	2	10·75
Scudo ..	,,	4	1·4
Piastre= 13 reals	,,	4	2·25
Rixdaler ..	,,	4	4·5
Franc ..	,,	0	9·38
Dollar ..	Silver	4	1·25
Piastre ..	,,	0	2·25

Libbra, which varied locally from ·7 to ·8 lbs. The Braccio = about 22 or 23 in. The Naples Miglis = 1·15 miles: The Turin Miglis = 1·532 miles. The lira of 100 centesimi = 1 French franc = 9·38*d.* In Rome the Scudo = 10 Paoli = 4*s.* 2·5*d.* The gold 10 scudi piece = 41*s.* 7*d.* English.

Japan.—The Pacul = 100 catties = 133·33 lbs. The Inc = 6·25 ft. Road measures same as China. The Itsiboo = 1*s.* $5\frac{1}{4}$*d.* The gold Cobang = 25*s.* 11*d.* English.

Malta.—The Rottolo = 1·7503 lbs. The Foot = 0·93 ft. The Salma = 4·44 acres. The Caffiso = 4·58 galls. The Pezza = 30 tari = 50*d.*; 1 Scudo = 12 tari = 20*d.* The Tari = 12 grani = 1·67*d.* English. The Salma of wheat is now by law the same as the British Quarter of 8 Bushels.

Mexico.—Weights and measures same as old Spanish; 1 Duro = 8 reals = 50*d.*; 1 Real = 12 dineros = 100 cents = 6·25*d.* English.

Persia.—The Artaba = 1·79486 British Bushels, but corn is also commonly sold by wt. The Cherray = 0·7885 lbs. The Bushire Man = 760 Miscals = $7\frac{1}{2}$ lbs. The Tabriz Man is the standard of wt., and is 6·5 lbs. (some say 7 lbs.): 100 of these Mans = 1 Kharwar = 650 lbs. 1 seer = 0·162 lbs.: 40 seer = 1 Man-i-Tabriz. The Arish = 12·7566 ft.: the Gaz varies according to locality from 36·5″ to 44″: 4 Charak = 1 Zar = 3·412 yds.: 6000 Zar = 1 Farsakh = 6824·2 yds. (about 4 miles). The Parasang = 6086 yds. The silver Keran is the unit of money, and varies in value from that of a shilling to a franc. The gold Toman or Ashrifi = 10 Keran = about 8*s.* 4*d.* The British Rupee is called the Kaldar.

Portugal.—Now the same as in France; the old weights, &c., were, 16 Onca = 4 Quarta = 2 Marco = 1 Arratel = 1·0119 lbs. The Braca = 2 Varas = 10 Palmos = 7·214 ft. The Geira = 4840 sqr. varas = 1·445 acres. The Legua = 3·84 miles = 6·18 kilomtr. = 6763 yds. The Almude = 2 Cantaros = 3·64 galls. (at Lisbon): the Oporto Almude = 5·52 galls. The unit of money is the Rei: 100 reis = 1 Testoon: 400 reis = 1 Crusado = 1*s.* 11*d.*: 1000 reis = 1 Milreis = 4*s.* 8·66*d* The Gold Crown = 5000 reis = 23*s.* 11·15*d.* English.

Poland.—See Russia.

Russia.—1 Funt = 12 Lanas = ·9024 lbs.: 40 funt = 1 Pud. The Pud = 36·1056 lbs.: the Chetwert = 5·75 bushls: 30 puds = 1 Packen = 9·67 cwt. The measures are: 1 Sechine = 3 Archines = 6 Stopas = 48 Verchocs = 7 ft.: 500 sachines = 1 verst = 1166·66 yds. = ·663 miles. 1 Desatin = 2400 sq. sachines = 2·45 acres. The Vedra = 2·7049 galls: 40 vedras = 1 Sarotowaja = 108·196 galls. The silver Rouble is the unit of money = 100 Kopeks = about 2*s.* 1*d.* The Gold Rouble = about 3*s.* 1·53*d.* The Gold Imperial = 10 roubles = 30*s.* 11*d.* English.

Spain.—Now the same as France. The old standards were, the Libibra Castiliana = 16 onzen = 1·0144 lbs.: this varied a little in the various provinces. The Pie de Burgos = 12 Pulgadas = 11·12 in. The Fanegada

= 1·1364 acres. The Onze d'Oro or Dobloon = 64*s.* 8*d.* ; the Gold Ochenta = 16*s.* 10*d.* ; the Escudo = 8*s.* 5*d.* ; the Duro = 20 reals = 50·5*d.* ; and the Real = 2·5*d.* English.

Sweden.—The Skalpund = 100 Ort = 10,000 Korn = 0·937 lbs. : 10,000 Skäpund = 100 Centners = 1 Nylast = 4·1843 tons : the Kanna = 4·608 pints. The Daler banco = 48 skillingar = 19·93*d.* ; 1 Species dalar = 53·06*d.* ; and the Biksgäld daler = 13·28*d.* English.

Switzerland.—See France.

Turkey.—The new metric system is : 1 Archine = 1 metre : the Archine is divided into 10 Par Maks (pouces). I Mille = 1000 archines : 1 Pharsagh (10 milles) = 10,000 archines and is a journey of about 2 hours. 1 Dennum = a piece of land 10 × 10 archines : the Djérib = 100 Dennums. The Eultchek = 1 cubic parmak = 10 Kontons (boites) = 61 cub. ft. : 1 Konton = 10 Zarfs : 1 Kilé = 10 eultcheks. The Oke = 1000 drames : 1 Drame = 10 denks ; 1 Denk = 10 boughdais : 1 Boughdai = 10 habbés : The Batman = 10 okes : 1 Kantar = 10 batmans : and 1 Tchéki = 10 kantars. The Oke = 2·8286 lbs. : the Quintal = 44 okes = 124·45 lbs. : the Pik = 24 kerats = about 27 in. 40 Paras = 1 piastre = 2·25*d.* : 100 Piastres = £1 Turkish = 18 shillings English.

ARMY MEDICAL STAFF LIBRARY
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