Manual for St. John ambulance companies, (Provisional) / by Lieut. Col. George E. Twiss.

MANUAL

FOR

ST. JOHN AMBULANCE COMPANIES,

(Provisional.)

MANUAL

FOR

ST. JOHN AMBULANCE COMPANIES,

(Provisional)

BY

LIEUT.-COL. GEORGE E. TWISS,

(Retired Pay) R.A.M.C.

M.R.C.P.I., F.R.C.S.I., M.D., C.P. & S., (Columbia) New York, Knight of Grace of the Order of St. John of Jerusalem in England, Hon. Life Member of and Lecturer and Examiner to its Ambulance Department, and Honorary Secretary and Life Member of the Southampton Centre, Assistant Commissioner, No. II. District, St. John Ambulance Brigade, Honorary Member First Grand Legion American Red Cross, Life Member of the Red Cross Society of Japan.

With abridged Extracts from the Royal Army Medical Corps Training, Army Medical Service Regulations, Manual of Military Engineering, Allowance Regulations, Voluntary Aid Scheme of the War Office, and certain Army Forms, by permission of the Controller of H.M. Stationery Office.

Price 6d. net ; by post 7d.

PUBLISHED BY

THE ST. JOHN AMBULANCE ASSOCIATION,

ST. JOHN'S GATE, CLERKENWELL, LONDON, E.C.

[1911]

To the Memory of

those gallant Members of the St. John Ambulance Brigade,

who, in maintaining the traditions of the Order,

laid down their lives in tending the sick and wounded

in the South African War, 1899-1902.

GEORGE E. TWISS.

The Grand Priory of the Order of the Hospital of St. John of Jerusalem in England.

Sovereign Head and Patron of the Order.

HIS MOST GRACIOUS MAJESTY KING GEORGE V.

Grand Prior.

FIELD-MARSHAL HIS ROYAL HIGHNESS THE DUKE OF CONNAUGHT, K.G.

Sub-Prior.

The Right Honble. the Viscount KNUTSFORD, G.C.M.G.

Bailiff of Egle.

Field-Marshal His Royal Highness the DUKE OF CONNAUGHT, K.G.

Executive Officers.

Prelate—His Grace The Archbishop of YORK.

Chancellor—Colonel Sir HERBERT JEKYLL, K.C.M.G., R.E

Secretary-General—Colonel Sir HERBERT C. PERROTT, Bt., C.B.

Receiver-General—EDWIN FRESHFIELD, Esq., LL.D.

Almoner—

Registrar—Major General the Lord CHEYLESMORE, K.C.V.O.

Genealogist—Sir ALFRED SCOTT SCOTT-GATTY, K.C.V.O. (Garter).

Director of the Ambulance Department—The Most Hon. the Marquess of BREADALBANE, K.G.

Librarian—Lieut.-Colonel RICHARD HOLBECHE.

Secretary—WILLIAM R. EDWARDS, Esq., A.C.A.

Chairman of the British Ophthalmic Hospital, Jerusalem—The Right Hon. the Earl of PLYMOUTH, C.B.

Chief Secretary of the Ambulance Department—Colonel Sir HERBERT C. PERROTT, Bt., C.B.

Assistant Executive Officers.

Assistant Director of the Ambulance Department—Lieut.-Colonel Sir R. C. TEMPLE, Bt., C.I.E.

Assistant Receiver-General—E. H. FRESHFIELD, Esq.

Assistant Librarian—C. DAVENPORT, Esq.

Hon. Secretary of the British Ophthalmic Hospital, Jerusalem—Colonel T. H. HENDLEY, C.I.E.

Assistant Hon. Secretary (for Scotland) of the British Ophthalmic Hospital, Jerusalem—J. H. STEVENSON, Esq. *(Unicorn Pursuivant.)*

St. John Ambulance Association,

BEING THE AMBULANCE DEPARTMENT OF

The Grand Priory of the Order of the Hospital of St. John of Jerusalem in England.

Patron.

HIS MOST GRACIOUS MAJESTY KING GEORGE V., K.G.
(Sovereign Head and Patron of the Order)

President.

FIELD-MARSHAL HIS ROYAL HIGHNESS THE DUKE OF CONNAUGHT, K.G.
(Grand Prior of the Order.)

Central Executive Committee.

Consisting exclusively of Members and Associates of the Order.

Director of the Ambulance Department and Chairman of Committee.

The Marquess of BREADALBANE, K.G.

Assistant Director and Deputy Chairman.

Lieut.-Colonel Sir R. C. TEMPLE, Bt., C.I.E.

Deputy Chairman.

Sir J. FURLEY, C.B. (Life Member of the Committee, *Honoris Causa*).

Members.

Major-General J. C. DALTON, R.A.
Colonel C. W. BOWDLER, C.B.
Lieut.-Colonel A. C. YATE.
Colonel Sir J. R. A. CLARK, Bt., C.B., F.R.C.S.E.
The Rev. T. C. ELSDON.
W. DIXON, Esq.
Major G. E. W. MALET.
Colonel Sir J. W. OTTLEY, K.C.I.E., R.E.
Inspector-General B. NINNIS, M.D., R.N.
G. FOWLER, Esq.
Surgeon-Major G. H. DARWIN, M.D.
Colonel G. S. ELLISTON, Esq., C.B., M.R.C.S.
Lieut.-Colonel C. J. TRIMBLE, C.M.G., L.R.C.P.
Colonel Sir C. M. ROYDS, C.B.
Captain Sir J. W. NOTT-BOWER, C.V.O.
H. BOULTON, Esq., M.V.O.
E. OWEN, Esq., LL.D., F.R.C.S.
The Lord CLAUD HAMILTON, M.P.

Central Executive Committee—*continued.*

Sir J. L. Langman, Bt.
The Hon. Sir J. A. Cockburn, K.C.M.G., M.D.
Sir A. Conan Doyle, M.D.
The Right Hon. J. L. Wharton, P.C.
Surgeon-General Sir A. Keogh, C.B., F.R.C.E. & I.
S. W. Malkin, Esq.
Surgeon-General Sir B. Franklin, K.C.I.E.
J. S. Griffiths, Esq., M.R.C.S.
Lieut.-Colonel J. A. Jones, M.D.
The Lord Merthyr.
The Viscount Hythe.
C. B. Palmer, Esq.
The Earl of Bessborough, C.V.O., C.B.
Lieut.-Colonel G. E. Twiss, F.R.C.S.I.
Colonel J. Cantlie, F.R.C.S.
Colonel T. H. Hendley, C.I.E.
Robert A. Gibbons, Esq., M.D.
J. H. Morgan, Esq., C.V.O., F.R.C.S.
Surgeon-Major G. A. Hutton.
Surgeon-General Sir C. McD. Cuffe, K.C.B., F.R.C.S.E.
F. R. Cassidi, Esq., M.D.
A. T. Brand, Esq., M.D.
J. A. Bloxam, Esq., F.R.C.S.
F. N. Ellis, Esq.
Major E. West-Symes, M.D.
W. E. Audland, Esq., M.R.C.S.

Ex-officio Members of Committee.

Col. Sir H. C. Perrott, Bt., C.B. *(Secretary-General of the Order).*
E. Freshfield, Esq., LL.D. *(Receiver-General of the Order).*
The Earl of Plymouth, C.B., *(Chairman, British Ophthalmic Hospital).*

Chief Secretary.

Colonel Sir HERBERT C. PERROTT, Bt., C.B.,
(Secretary-General of the Order).

Director of Stores and Accountant.

WILLIAM R. EDWARDS, Esq., A.C.A.,
(Secretary of the Order.)

Storekeeper.

William H. Morgan, Esq. *(Superintendent, Invalid Transport Corps).*

TERRITORIAL BRANCH:

Controller in Chief.

Lieut.-Colonel Sir Richard C. Temple, Bt., C.I.E.

Assistant Secretary.

P. G. Darvil-Smith, Esq.

PREFACE.

AS an old retired soldier doctor nothing gives me greater pleasure than by presenting this book to the Order of the Hospital of St. John of Jerusalem in England to assist to the best of my ability a movement which aims at supplying a real, efficient, trustworthy and reliable Reserve for the Medical Service of His Majesty's Army of the need of which I have had ample experience.

The matter dealt with in the manuals published by the Ambulance Department of the Order, "First Aid to the Injured," "Home Nursing," "Home Hygiene," and "Military Sanitation," has not been repeated herein, and this manual should be read in conjunction with these.

The contents are in accordance with the various books of regulations published by the War Office, parts of which have been included verbatim or abridged.

I would strongly recommend to every Commandant who wishes to bring his Company to the highest possible state of efficiency the following books—

"Training R.A.M.C." Latest edition.
"Standing Orders, R.A.M.C." Latest edition.
"Regulations for the Army Medical Service." Latest edition.
"Field Service Manual, R.A.M.C." Latest edition.
"Scales of Hospital Equipment." (Active Service).
Army Forms, G. 1098—63 Field Ambulance.
do. 64 Stationary Hospital.
do. 65 A General Hospital.
do. 66 A Clearing Hospital.
do. Nomenclature of Diseases.

We are to work with and for the Royal Army Medical Corps and should know its way of working. Much additional help will be gained by the perusal of :—

"Manual of Ambulance Transport."—*Longmore.*
"Military Hygiene."—*Woodhull.*
"Behelfsvorrichtungen beim Sanitätsdienste im Felde."—*Westphal.*
"Report of the Medical Arrangements South African War."—*Wilson.*
"Practical Nursing."—*Hassard.*

CHAPTER I.

Introductory.

Objects in View.

The medical organization of the Territorial Force is sufficiently complete to meet the immediate requirements of the combatant forces on the march and in action, as it provides medical establishments and units which accompany the troops. It also provides general hospitals; but, inasmuch as it lacks some of the medical units which are to be found in the expeditionary force of the Regular Army and in all armies on the Continent, it is incomplete.

The units which the medical organization lacks are—

(1) Clearing hospitals.
(2) Stationary hospitals.
(3) Ambulance trains.
(4) Other formations.

The functions of the above units may be summarized as follows:—

1. **A clearing hospital** is a mobile unit which receives the sick and wounded from the field ambulances, and transfers them, by various methods, to the stationary hospitals which may be established at various points on the lines of communication and to the ambulance trains. It is important that field ambulances should not be encumbered with casualties,

otherwise the mobility of the fighting troops is interfered with.

2. **Stationary hospitals** are hospitals established at various points on the lines of communication, their location varying with the lines up which reinforcements are proceeding, or down which casualties are being forwarded.

3. **Ambulance trains** are of various kinds—

(*a.*) *Permanent.*—These are trains built in accordance with specifications already in existence, and will be used solely for transporting serious cases. They consist of special ambulance coaches fitted with tiers of cots, coaches for the medical officers, nursing sisters and remaining personnel, treatment room, dispensary, kitchen, &c.

(*b.*) *Temporary*, which are made up of the ordinary vehicles equipped with some arrangement for carrying sick and wounded, such as vans fitted with the Zavodovski, or other special apparatus, and which, when once so fitted, are kept for this special purpose during the progress of hostilities. They are intended for the conveyance of less seriously wounded and to supplement the permanent ambulance trains.

(*c.*) *Improvised.*—These are composed of railway wagons which have brought up troops and stores to the front, and are improvised on the spot for the transport of sick and wounded on the return journey. The improvised arrangements are dismantled after disposal of the casualties, and the vehicles used again for the transport of troops and stores. These trains would only be employed after severe engagements resulting in a great influx of wounded.

4. Other formations—

(*a.*) *An entraining station* is the point on the line of railway where the sick and wounded are loaded on ambulance trains.

(*b.*) *A rest station* is a place where sick and wounded are halted on their way from the front for the purpose of, it may be, resting for the night, or merely for the issue of food or light refreshments, or where dressings may be changed and urgent cases attended to.

On railways the station buildings may be utilized and fitted up as a small hospital with facilities for housing, say, from 1 to 50 patients, with cooking, dispensing, and other arrangements. The extent of these arrangements must depend largely on the military importance of the place at the time.

(*c.*) *Private hospitals.*—These institutions may be of any size, but should be complete in every respect for the treatment of surgical or medical cases.

(*d.*) *Convalescent homes* will be required for providing accommodation for convalescent officers and men who, requiring no further active medical or surgical treatment, are fit for discharge from hospital but not to return to duty.

The expenses in connection with the upkeep of both private hospitals and convalescent homes should be met entirely by private funds. Schemes for these institutions may be made out and forwarded to the various County Territorial Associations through the proper channel.

The duties connected with this work will be somewhat as follows :—

1. The preparation of country carts and other vehicles for the removal of patients lying down.
2. The improvisation of stretchers, &c., for the transport of very severe cases by hand.
3. The conversion of country houses, farms, public buildings, or, in fact, whole villages or small towns into temporary hospitals for the care and shelter of sick and wounded, until they can be placed on railway trains for conveyance to general hospitals.
4. Similar utilization of local resources for the care of trivial cases of sickness or wounds in the vicinity of active operations.
5. The formation of rest stations along lines of evacuation, either by road, rail, or water, where sick and wounded may receive rest and refreshment, or, if necessary, accommodation over night; or where they may be made comfortable while waiting to be loaded on trains, or after they are taken off trains.
6. The provision of a personnel for accompanying the sick and wounded in transit.
7. The fitting out of empty goods vans or other rolling stock for the transport of sick and wounded by rail.
8. The collection and distribution of material for clearing hospitals and rest stations, and the management of depôts of such material.

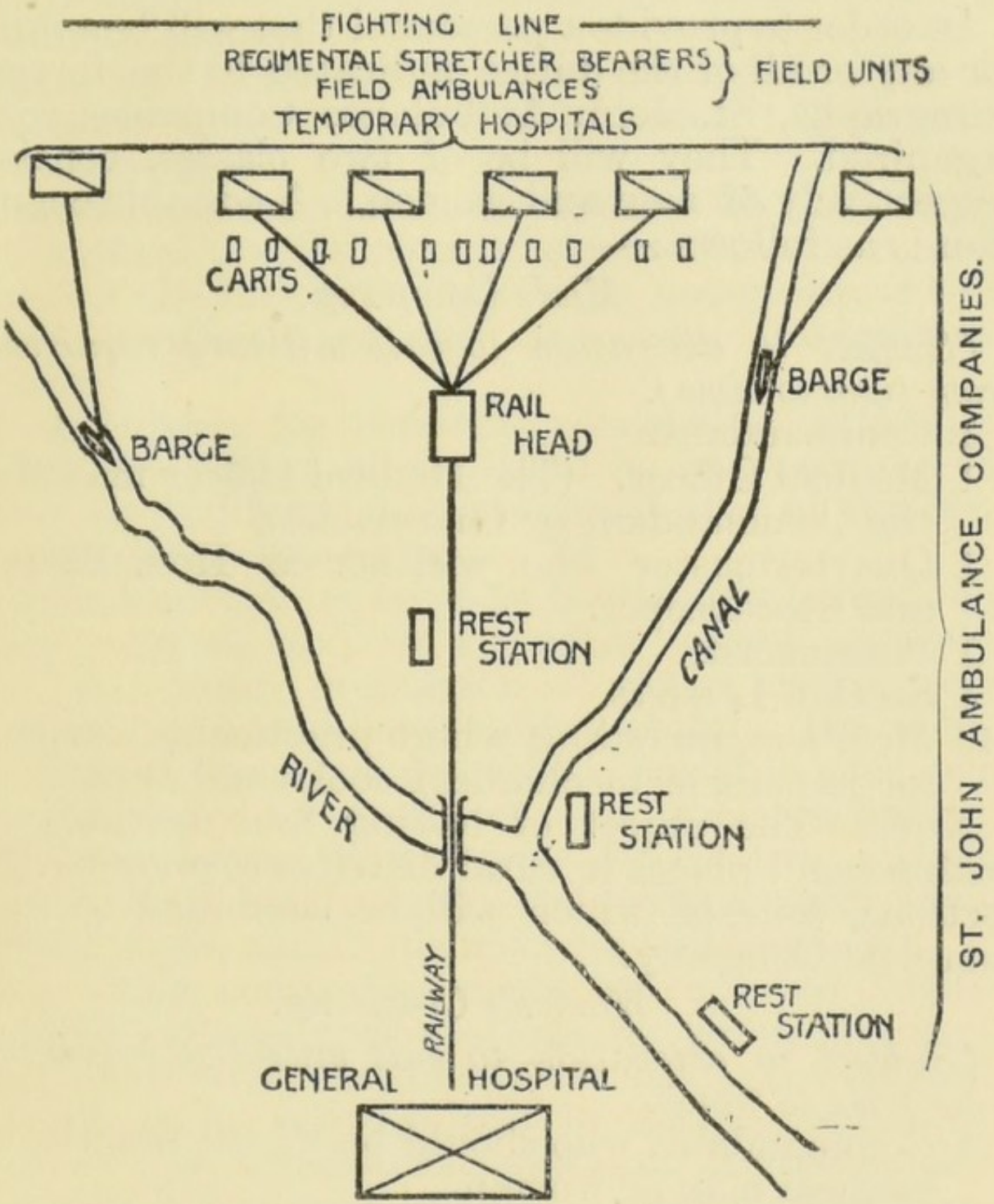


Fig. 1.—Showing diagramatically the position of St. John Ambulance Companies.

Formation of St. John Ambulance Companies.*

In order to provide a personnel that will be available for any or all of the duties indicated in the foregoing paragraphs, St. John Ambulance Companies will be organized. They will be of two classes, consisting respectively of men and women. A suitable composition is as follows :—

Men's Company.

(Subject to alteration to suit military requirements from time to time).

1 Commandant.
1 Medical Officer. (The Medical Officer may also be the Commandant or Pharmacist).
1 Quartermaster who will act as Hon. Secretary and Storekeeper.
1 Pharmacist.
4 Section Leaders.
48 Members, including where practicable, carpenters (or joiners, or mechanics), cooks and clerks.

Note.—The object of having four sections is to enable small places in rural districts to organize single sections, four of which will be combined to form a complete Company.

Women's Company.

(Subject to alteration to suit military requirements from time to time).

1 Commandant, who should be where practicable a medical man or woman.
1 Quartermaster (man or woman) who will act as Honorary Secretary.

---

* A St. John Ambulance Company is the equivalent of a Voluntary Aid Detachment.

1 Lady Superintendent, (preferably a trained nurse).
4 Section Leaders.
16 Members including 4 cooks (divisible into 4 Sections* each composed of 1 Leader, 1 Cook and 3 Members).

All candidates for men's companies, with the exception of medical practitioners, pharmacists, and retired members of the R.A.M.C. shall be in possession of the first aid certificate of the St. John Ambulance Association.

All candidates for women's companies, with the exception of trained nurses, shall be in possession of the first aid and home nursing certificates of the St. John Ambulance Association.

The men's companies must be thoroughly trained as stretcher bearers, and to a certain extent as male nurses. A certain proportion of clerks, carpenters, and mechanics would be especially useful. The principal duties of the personnel would consist in carrying sick and wounded by stretchers, and, when necessary, in preparing means of transport by road or rail, in converting local buildings or whole villages into temporary hospitals, and in disinfecting buildings, &c.

The women's companies would be employed chiefly in forming railway rest stations for preparing and serving meals and refreshments to sick and wounded during transit by railway, and in taking temporary charge, in the evacuation stations or temporary hospitals, of severe cases unable to continue the journey. They should therefore be trained not only in

---

* If preferred a Company can be divided into *two* Sections, each composed of 1 leader, 2 cooks, and 7 members.

cooking and the preparation of invalid diets, but also in the method of arranging small wards for patients in suitable buildings, preferably near a railway station, and in such nursing as is necessary for the temporary care of patients until they can be transferred to the general hospitals. Companies, or a certain proportion of a company, may be employed for duty in ambulance trains.

Duties of different ranks.

In Peace.

The Commandant.—He or she is responsible for the regular training and constant efficiency of his company.

He will see that all returns are correctly kept and his signature to them will be held as meaning that he personally vouches that they are so.

He will have at his disposal full details of the personnel of his Company, of the buildings, etc., to be taken over and of the necessary arrangements to be made to convert them into temporary hospitals.

He will have lists of material, etc., required to fit such buildings out, and to meet other work in connection with the transport of patients and of the sources whence such equipment, etc., is to be obtained.

He will from time to time check equipment on charge for instructional purposes, and see that it is in order and serviceable.

He will enquire as to deficiencies, breakages, etc., and take steps to make them good.

When the half Company or a section is situated away from the head-quarters of the Company he will visit and inspect it as often as he may deem necessary to ensure that its work and training are as he wishes.

He will manage the finances of his Company and will consequently keep all vouchers, etc., so that such accounts may be regularly audited.

He should not wait when it seems to him that any special instruction or line of training may help in making the Company more useful, but promptly avail himself of the opportunity offered. If it promises success, he should let the headquarters know, so that other Companies may also improve themselves in a similar manner.

He will, if need arises, have to get certain things done. He should therefore think out every item, plan out every move, hear the ideas of others, and from the knowledge so gained arrange that he and every member of his Company shall be able when the call comes to move quickly and quietly to their places, and act in the best possible way. The scheme is a new one, and it is necessary to ensure order out of chaos. The last word has not been spoken as to the end by which this may be attained, but it can only be by the energy and zeal of all concerned.

To carry out the duties devolving in war on the Company, many people, not necessarily trained in first aid and nursing, but skilled in other ways, will not only be useful but necessary. The Commandant should therefore keep a roll of cooks, carpenters, clerks, mechanics, joiners, blacksmiths, tinsmiths, drivers, washerwomen, and others willing to place themselves at the disposal of the local Companies if needed. There is no apparent necessity to keep them regularly trained, for they would only have to carry out their ordinary peace avocations in different surroundings, and for a different object. If they can be induced to

gain the requisite certificates and become members of the Companies, so much the better.

He should impress on all members the necessity of constant reading of the contents of the First Aid and Home Nursing manuals, and especially those of the pamphlet on typhoid issued with the latter book, which must frequently be kept before the members, and no portion of them be overlooked. In addition to these the manual of Home Hygiene will furnish a useful text for lecturers to the female companies, and that on Sanitation for those to men.

Medical Officer.—He will assist in the technical training of the Company and advise the Commandant on all matters which pertain to his especial province as an authority on Sanitation and Medical and Surgical matters.

Quartermaster.—He will take charge of all equipment held by the Company. He will keep up all returns required in peace time and be responsible for lists, etc., needed by the Commandant.

Pharmacist.—He will obtain and record for the use of the Commandant information as to procuring supplies for medical and surgical purposes.

Lady Superintendent (Nurse).—She will impart practical knowledge to the other members.

Section Leader.—He or she will assist in the training of his section.

Members.—The members will in every way strive to render themselves thoroughly efficient in the work which on mobilization will fall to their lot and use every means possible to add to their knowledge of any and every duty which may conduce to the welfare and comfort of those who will then look to them for nursing and much besides.

On Mobilization.

Commandant.—He will take steps immediately to cause his detachment to carry out the duties which in peace time they have learned to perform.

He will command his hospital or other formation and be responsible for its discipline, interior economy, supplies and stores.

Not the least important of the Commandant's duties is to keep the members of his Company physically effective and he should ensure that they are well looked after without entrenching in any way on the needs of the patients committed to their charge.

The *personnel* must be as well housed, (not in the hospital building), as circumstances will permit and their duty hours should be so arranged that they will have ample time both for rest and sleep, and for filling their lungs with absolutely pure air.

Their meals should be regular and as good as obtainable. The first meal of the day should be taken before they go to their day's work, and though this is the more especially necessary for those engaged in ward work, and certain out-work, yet it is best for all. As this will be an early morning meal, the interval before the ordinary dinner hour makes too long a fast. Disease attacks the fasting person and consequently at 11 a.m., everyone of the personnel should have half a pint of chocolate or some effective substitute for it.

The night duties should be so arranged as to require as small a night duty party as possible, or if it be not

for any reason convenient that a separate party (not doing day duty) be detailed, then the night work must be so divided that each orderly gets half a night's rest.

Medical Officer.—He will take medical charge of the sick and wounded in any hospital formed by the Company, and he will carry out such other professional duties as he may be directed to perform.

Quartermaster.—He is, under the Commandant, charged with the receipt, care and expenditure of all equipment, supplies and stores issued, except as mentioned below. He will keep such accounts relating to the above as may be ordered. He will supervise the cleanliness of the hospital and other formations. He will in addition, if required, assist in the clerical work needed to keep up hospital records and returns.

Pharmacist.—He will take charge of the dispensing and be responsible for the receipt, care, and expenditure of articles used therein or in connection with it and will keep the Commandant informed as to all details regarding the proper supply of necessary drugs and dressings, shortage, or apparent excessive consumption.

Lady Superintendents and Section Leaders.—They will supervise, or actually be employed on, clerical or sanitary work, nursing and the care of certain stores.

Members. (Women.)

The nursing and tending of the sick and wounded, attendance and assisting at operations, and their own preparation and that of the patient in such cases. The sterilization of instruments. The sterilization and preparation of dressings. The taking of the pulse, respiration and temperature, and recording the

same. The ventilation and heating of wards. The necessary cleanliness of patients and wards. The special cooking for patients. Repairing clothes, etc.

Members. (Men.)

Equipping the building selected as a hospital Making all its added internal and external arrangements. Improvising equipment, etc., when none is obtainable. The transport of sick and wounded, and improvising equipment necessary for use as stretchers, or on road, railway or canal. Accompanying patients and caring for them on transfer to the temporary hospital and thence later to the general or other hospital. All the duties outside the wards. Improvising shelters, etc., when needed. The cooking generally for the sick and wounded, and for the *personnel*. Assisting and making themselves useful in every way.

Procedure on Mobilization.

In the event of a general mobilization for home defence, companies would not be called upon to serve until their services were actually required. Although members are under no legal obligation to leave their homes or even join their units if called upon to do so, yet, it is believed that, in the event of their being requested, volunteers, in sufficient numbers to meet all requirements, will be forthcoming. The following are suggested as general principles upon which preparations for mobilization should be based :—

1. A retired officer (not liable to recall) of any regular arm of the Service, but preferably a retired medical officer, should be nominated by the general officer commanding each territorial division, his name

being noted at the War Office for employment on mobilization being ordered. The duties of this officer would be to superintend, under the army medical authorities on the lines of communication, the arrangements for the evacuation and care of the sick and wounded as far as the companies are concerned in this work.

2. On an army being concentrated in any area of the country for the purpose of home defence, one or more of these officers would be appointed by the War Office to each line of communication, according to the strength and dispositions of the troops.
3. County Directors would perform the duties of mobilization officer for their respective counties. They would, on receipt of orders, assemble the various companies and arrange for their despatch to their destinations.
4. A suitable number of companies, according to requirements, would be directed by the War Office, through the County Association, to place themselves at the disposal of the army medical authorities. The first companies to be employed would be those nearest to the area of active operations; and others in the vicinity should, according to circumstances, be held in immediate readiness for service.
5. Companies not so employed, or held in readiness, would be available at different places throughout the country where their services might be required for carrying on the functions of rest stations, for transporting the sick and wounded from railway stations to the general and other hospitals, for providing personnel to ambulance trains, &c.

6. Each member of a company when called up for service will be provided with an identity certificate and a "brassard" or arm badge.

   The identity certificate and brassard will be issued by a responsible officer of the Army, and both must bear the same number and stamp; otherwise the wearer of a brassard will not be "protected."

7. Companies employed in the area of active operations, and in ambulance trains, will, if necessary, be rationed and housed by the military authorities; but companies doing duty in the immediate vicinity of their homes, where no active operations are in progress, will feed and house themselves.

The equipment of a Company consists of two portions :—

A.—Equipment used solely for instructional purposes.

B.—Equipment required on mobilization.

A.—For the purpose of maintaining their efficiency companies are recommended to provide themselves with the following :—

Anatomical diagrams.

Loose woven roller bandages.

Unbleached calico for making triangular, roller, T, and many tailed bandages.

First field dressings.

Materials and appliances in connection with splints:—

Cane, wire, poroplastic felt, leather, locally made wooden splints (copies of Listons, &c.), boards for fracture beds, canvas for making sandbags, tow, wool, &c., for making pads.

For men's companies only :—

Stretchers (improvised or otherwise).

Bearer's dressing case, containing 1 clasp knife ; 1 pair of dressing forceps ; 1 emery pin cushion ; 40 pins ; 6 safety pins ; 1 plated probe and director ; 1 pair of scissors ; 1 spatula ; thread ; and a vulcanite case containing (in vaseline) 6 sewing needles and 6 plated surgeon's needles.

Set of carpenter's tools.

Light ambulance cart.

For women's companies only :—

Bedstead and bedding complete

Clinical thermometers.

Bath thermometer.

Sterilizer for instruments.

The articles enumerated in the list may be added to on the initiative of each company as its experience may teach. The object to keep in view while training is to learn how to make the best use of the material most likely to be always on hand and how best to adapt it to various needs, *e.g.*, permission may possibly be obtained from the proper authorities to fit out a railway van so as to make it available for the transport of the sick, either lying down or sitting. A waiting room at a railway station or part of a public building might be converted into a ward. The absence of a necessary article should be noted with a view to its provision should the necessity arise. In this way the sufficiency of local resources can be tested.

B—No definite scale of equipment per company can be laid down for use on mobilization, as companies may be called upon to perform many and various duties.

The following list, however, has been drawn up to show what is likely to be required for each 200 sick or wounded :—

I.—Medical and Surgical Stores.

Bandages, elastic or rubber	No.	1
,, flannel, 4 in. by 6 yards	,,	20
,, gauze, 3 in. by 6 yards	,,	40
,, loose woven, 3 in. by 6 yards ...	,,	400
,, suspensory	,,	3
,, triangular	,,	50
Boxes, ointment, chip, 1-oz.	,,	12
,, ,, ½-oz.	,,	12
Cradles for fractures	,,	2
Dishes, dressing, kidney shaped, of—		
Tinned brass	,,	1
Enamelled iron	,,	1
Drainage tubing, large	yards	3
,, medium	,,	2
,, fine...	,,	3
Dredgers, iodoform	No.	1
Dressing basins, rectangular, of enamelled iron—		
15 in. by 11 in. by 2 in.	,,	20
11 in. by 9 in. by 2 in.	,,	20
Dressings, first field	,,	100
Ether inhalers	,,	2
Finger stalls, caoutchouc, different sizes ...	,,	12
Portable disinfector (Thresh)...	No.	1
Gauze, double cyanide, in 6-yard packets	,,	6
,, bleached, 36-in wide 2½-yard packets compressed	,,	1,000
,, bleached, 36 in. wide, in 6-yard packets	,,	50
Gloves, thin, rubber, for operations	pairs	4

Ice bags, head	No.	2
Irrigators	,,	2
Jaconet, waterproof	yards	15
Machines, bandage winding	No.	1
Measures, pewter, 10 oz.	,,	1
,, graduated, glass, 4 oz.	,,	4
,, ,, ,, 2 oz.	,,	4
,, ,, ,, 1 oz.	,,	4
Needles, darning	,,	36
,, sewing	,,	36
Pails, enamelled	,,	1
Pasteboard, sheets (for splints)	,,	3
Pins, safety	,,	1,000
Plaster of Paris...	lbs.	10
Plaster, adhesive, I.R., 1 inch tape	tins	50
,, ,, spread on linen, about 16 inches wide	yards	20
Razors	No.	1
Rivets, split, for zinc splints	,,	288
Sandbags	,,	4
Scissors for cutting clothing	pairs	2
,, dressing	,,	2
Shears, for cutting perforated zinc splints ...	,,	1
Silk ligature, hanks	No.	100
Spirit lamps, small, metal	,,	1
Splints, thigh, Liston's—		
(*a.*) Large, 60 in. long	,,	5
(*b.*) Medium, 56 in. long	,,	5
(*c.*) Small, 54 in. long	,,	5
Spoons, medicine, china	,,	4
Sterilising apparatus, portable	,,	1
Surgeon's case of instruments	,,	1
Syringes, hypodermic	,,	4
Tables, portable, operating	,,	1
Tallies (specification)	,,	50
Tapes, measuring	,,	2

Thermometers, clinical	No.	4
Thread, white, sewing	ozs.	4
Thread, for ligatures	,,	2
Tooth instruments, set of 8	set	1
Tow, carbolised	lbs.	10
Tubes, test	No.	6
Wool, cotton, absorbent	lbs.	50
,, ,, unbleached	,,	10
,, ,, double cyanide	,,	20
Zinc, perforated, for splints (about 23 in. by 9 in.)	pieces	30

II.—Medicines, &c.

Acidum boricum	lbs.	4
,, carbolicum	,,	2
,, salaceticum	,,	½
Æther 0·720...	,,	4
Chloroformum	,,	4
Iodoformum	,,	1
Linimentum camphoræ co.	,,	2
Liquor morphinæ hydrochlor.	ozs.	4
Magnesii sulphas	lbs.	2
Oleum ricini	,,	2
Paraffinum molle	,,	4
Phenazonum (antipyrin)	,,	½
Sodii bicarbonatis	,,	1
Spiritus ammoniæ aromaticus	,,	2
,, ætheris nitrosi	,,	1
Tablets hydrarg. perchlor.	No.	1,000
,, morphine tartrate, ¼ grain each ..	tubes	12
Tinctura camphoræ co.	lbs.	½
,, chloroform et morphinæ co. ...	,,	½
,, digitalis	,,	½
,, opii	,,	1
Unguentum acidi borici	,,	2
,, paraffini	,,	2

III.—Linen and Clothing.

Aprons for orderlies	No.	30
Blankets	,,	470
Cases, bolsters	,,	200
Coats, woollen, for patients	,,	50
Flannel, white (for fomentations)	yards	12
Gowns, operation	No.	10
Handkerchiefs...	,,	300
Jackets, sleeping, woollen	,,	100
Mattresses	,,	200
Neckerchiefs	,,	400
Overalls, drill, for orderlies	,,	20
Pillows, feather	,,	50
Sheets, linen or cotton, bed	,,	480
,, ground, waterproof	,,	200
Shirting, 1 yard wide	yards	3
Shirts, cotton, white	No.	300
Slippers, pairs	,,	200
Socks, cotton	pairs	100
,, woollen	,,	400
Tablecloths	No.	10
Towels, hand	,,	400
,, operation	,,	10
Trousers, sleeping	,,	300

IV.—General Stores.

Axes	No.	6
,, pick	,,	4
Basins, wash-hand	,,	40
Baskets, carrying	,,	2
,, for dirty linen	,,	1
Baths	,,	2
Bedsteads (see stretchers)	,,	200
Bottles, water	,,	2
Boxes, for dressings	,,	4
,, salt	,,	2

Brushes, bottle...	No.	2
,, feeders	,,	30
,, nail	,,	12
,, scrubbing	,.	8
,, washing	,,	24
,, whitewash	,,	12
Buckets, water	,,	8
Camp-stools	,,	10
Candles, stearine, small	lbs.	10
Candlesticks	No.	2
Cans, enamelled, for milk or soup	,,	8
Chisels, ripping	,,	4
Choppers, meat	,,	4
Clippers, hair	,,	4
Colanders, large	,,	1
Cooking vessel, self cooker	,,	1
Corkscrews	,,	30
Cups, feeding	,,	30
,, spit	,,	30
,, tea	,,	200
Dish cloths (as required)	,,	...
Dishes, earthenware, different sizes	,,	5
,, pudding	,,	24
Dusters (as required)	,,	...
Filters	,,	4
Flags, small, union	,,	2
,, ,, Geneva Convention	,,	2
Footrules	,,	2
Forks, flesh	,,	4
,, dinner	,,	200
Funnels	,,	12
Gimlets	,,	1
Glasses, wine	,,	50
Graters	,,	2
Hammers, claw	,,	4
Ice picks	,,	4

Inhalers	No.	4
Jugs, enamelled	,,	4
Kettles, 2-quart	,,	4
,, oval, 12-quart...	,,	24
Knives, carving	,,	2
,, table, with metal handles ...	,,	200
,, opening tins	,,	20
Ladles, soup	,,	2
Lamps, hanging	,,	40
,, hand	,,	2
Latrine paper (as required)	...	...
Machines, bread cutting	No.	2
,, mincing	,,	4
Meat blocks	,,	2
,, saws	,,	1
Mugs, drinking...	,,	200
Nails, 1 in. long	,,	250
Pans, bed	,,	40
,, frying	,,	8
Paraffin oil (as required)	gallons	...
Plates, dinner, enamelled iron	No.	200
Pokers (according to requirements)... ..	,,	...
Pots, coffee	,,	30
,, earthenware	,,	10
,, tea	,,	10
Razors	,,	8
Razor strops	,,	4
Sacks, for carrying provisions	,,	4
Saws, hand	,,	2
Scales for weighing	pairs	4
Scissors, hair	,,	4
,, lamp	,,	8
,, nail	,,	10
Scoops, various	No.	15
Shovels	,,	4
,, fire (as required)		...

Soap (as required)	lbs.	...
Sponges	No.	8
Spoons, large, wooden...	,,	10
,, skimming	,,	3
,, table, metal	,,	200
Squeezers, lemon	,,	2
Stewpans	,,	32
Stools, night	,,	32
Stretchers (may be used as bedsteads) ...	,,	200
String, 2-oz. balls	,,	16
Tables, portable	,,	2
Thermometers, room	,,	2
Tongs, coal (as required)	,,	...
Trays, small, crumb	,,	1
Tubs, for disinfecting clothing, &c.... ...	,,	1
Tubs, washing up	,,	2
Tumblers	,,	20
Urinals...	,,	32
Urns, tea	,,	3
Wagons, ambulance (as many as can be obtained)	,,	...
Wheeled supports for stretcher	,,	6
Whisks	,,	2
Wicks (as required)	,,	...

V.—Medical Comforts.

Arrowroot, biscuits, brandy, calf's-foot jelly, chocolate, cocoa, coffee, cornflower, preserved fruits, meat extract, tinned meat, condensed milk, mineral waters, oatmeal, pepper, rice, sago, salt, tinned soups, sugars, tapioca, tea, preserved vegetables.

Contents of Case of Operating Instruments.
Handles metal.

Bistoury, str., sharp	No.	1
,, ,, button, ..	,,	1
,, curved, sharp, ..	,,	1
,, ,, button, ..	,,	1
,, hernia ..	,,	1
Cannula, tracheotomy, Fuller's bivalve, silver, large ..	,,	1
Ditto, ditto, ditto, ditto, small	,,	1
Catheters, olivary, Nos. 1, 3, 4, 7, 9, 12, solid ends ..	,,	6
Ditto, silver, Nos. 3 and 5 ..	,,	2
Ditto, nickel, No. 8	,,	1
Director, hernia	,,	1
,, silver, 5-in. spoon end	,,	1
,, steel, 8 inch	,,	1
Elevator, double	,,	1
Forceps, artery, fenestrated	pair	1
,, ,, Spencer Wells'	,,	16
,, bone	,,	1
,, bullet	,,	1
,, dissecting, large ..	,,	2
,, lion	,,	1
Knife, amputng., mtl.hndl.6-in.	No.	1
,, ,, Syme's ,, ..	,,	1
Needles, aneurism, metal handle	,,	1
Needles, Liston's	No.	1
,, Hagedorn's assorted	doz.	1
,, surgeon's ,,	,,	1
Needle holder	No.	1
Probang, double	,,	1
Probe, silver, 10, 8, 6, and 5-in.	,,	4
Pliers for cutting wire ..	pair	1
Retractors, double	No.	4
Saw, movable back	,,	1
,, amputating, ...	,,	1
Scalpels, mtl.hndls.lrge.4&3-in.	,,	2
,, ,, ,, ...	,,	3
,, ,, ,, tang ..	,,	1
Scissors, crvd.on flat, blnt.ptd.	pr.	1
,, straight, ,,	,,	1
Scoop, double, Volckmann's	No.	1
Silk, for ligatures, pat.plaitd.	hank	1
Tourniquet, screw	No.	1
Trocar and cannula, Pearce's	,,	1
,, ,, ,, hydrocele	,,	1
Trephines, with 1 metal handle	,,	2
Wire silver, for sutures ..	reel	1
Mahogany case to contain abv.	No.	1
Trays, tin, enclosing the case	,,	2
Cover, waterproof canvas ..	,,	1

Contents of Antiseptic Case. (Weight about 43 lbs.)
(Dimensions, 32 in. by 12 in. by 12 in.)

Bandages, loose woven, salalembroth	No.	50
Ditto, triangular	,,	6
Drainage tubing, assorted sizes, in aseptic solution tubes		3
Gauze, dbl.cyanide, 6-yd.pkts.	yds.	48
Housewives, canvas .. containing Pincushion, emery (1). Pins, common (40), ditto, safety (6). Scissors, pair (1). Tape, piece (1). Thread, sewing. tablet (1). Vulcanite case (1), containing (in vaseline)—Needles, sewing (6). Ditto, surgeons', plated (6).	No.	2
Jaconet, wtrprf., in 2 yd. pkts.	yds.	6
Sape, Mollis	tubes	4
Silk, twisted, fine and medium, in aseptic solution ..	,,	4
Wool, boric, in 2 oz. pkts.	lbs.	2
,, dbl.cyanide, in 2 oz. pkts.	,,	6
Box, tin-lined, with sliding lid, to contain above ..	No.	1

It rests with the County Territorial Associations to decide which articles they will accept as gifts for

storage, but they may be reminded that rubber goods, ether, chloroform and other volatile drugs and perishable articles should not be stored in peace. Dressings and linen articles could be "turned over" by presenting a proportion annually to local charities, a similar quantity of new goods being substituted.

If a central depôt should be opened by the County Association or their delegate for storing gifts of equipment the following list should be taken as a guide :—

ARTICLES WHICH COULD BE MADE BY LOCAL SEWING CLASSES.

For Ward Use.

Pillow cases.
Bolster cases.
Towels.
Table cloths.
Tray cloths.
Dusters.
Tea cloths.
Medicine cloths.
Utensil cloths.
Roller towels.
Fomentation wringers.
Hot-water bottle covers
Bandages of all descriptions.
Pneumonia jackets of "Gamgee" tissue.

For Patients' Use.

Calico shirts.
Flannel under-shirts.
Socks.
Handkerchiefs.
Dressing gowns.
Ties.
Pyjama suits.
Shirts, of flannel, for helpless cases.
Red flannel jackets.
Bed socks.

For Nurses and Attendants.

Aprons for women nurses of linen or union.
Sleeves for women nurses.
Aprons for women attendants.
Overalls, with sleeves, for male attendants.
Caps for women nurses, plain "Sister Dora" shape.

Chapter II.

The laws and customs of war relating to the sick and wounded and to Voluntary Aid Societies.

Prior to 1864 no written international code relating to the protection and treatment of the sick and wounded in war existed. Mutual agreements on their behalf had on many occasions been made by belligerents, but towards the middle of the nineteenth century a period of lack of sympathy towards the sick and wounded set in, and, forgetting the numerous agreements that had been made in the past, many thought the proposals of the originators of the Geneva Convention were something new in the history of warfare.

In the year 1864 the first Geneva Convention was promulgated, but we are principally concerned with that of 1906, which is subscribed by almost all civilised powers, and which, unlike the first, gives official recognition to Voluntary Aid Societies.

Translation of the Geneva Convention of July 6th, 1906.

1. Officers and soldiers, and other persons officially attached to armies, shall be respected and taken care of when wounded or sick, by the belligerent in whose power they may be, without distinction of nationality.

Nevertheless, a belligerent who is compelled to abandon sick or wounded to the enemy shall, as far as

military exigencies permit, leave with them a portion of his medical personnel and material to contribute to the care of them.

2. (*Abridged*). Wounded and sick of an army falling into the hands of the enemy are prisoners of war. It is, however, permissible to restore mutually wounded left on the field after battle, to send back to their own country sick and wounded whom it is not desired to retain as prisoners after rendering them fit for removal or after recovery or to hand over to a neutral state the enemies' sick and wounded to be interned.

3. (*Abridged*). After each engagement the Commander in possession of the field is to search for the wounded, and protect against pillage and maltreatment the wounded and the dead. Careful examination of the bodies is to be made before burial or cremation.

4. (*Abridged*). Identification discs, and a nominal roll of wounded or sick collected by him are to be sent by each belligerent to the country or army to which they belong. Belligerents shall mutually inform each other of any internments, changes, admissions into hospital, and deaths amongst the sick and wounded in their hands. They shall collect personal property found on the battlefield, or left by the wounded or sick who have died in the medical establishments, so that such property may be transmitted to the persons interested.

5. A competent military authority may appeal to the charitable zeal of the inhabitants to collect and take care of, under his direction, the wounded or sick of armies, granting to those who respond to the appeal special protection and certain immunities.

6 and 7 (*Abridged*). The Medical Service shall be

protected by belligerents, unless made use of to harm the enemy.

8. The following facts are not considered to be of a nature to deprive a medical unit or establishment of the protection guaranteed by Article 6 :—

(*a*) That the personnel of the unit or of the establishment is armed, and that it uses its arms for its own defence or for that of the sick and wounded under its charge.

(*b*) That in default of armed orderlies the unit or establishment is guarded by a picquet or by sentinels furnished with an authority in due form.

(*c*) That weapons and cartridges taken from the wounded and not yet handed over to the proper department are found in the unit or establishment.

9. The personnel engaged exclusively in the collection transport, and treatment of the wounded and the sick as well as in the administration of medical units and establishments, and the Chaplains attached to armies shall be respected and protected under all circumstances. If they fall into the hands of the enemy they shall not be treated as prisoners of war.

These provisions apply to the guard of medical units and establishments under the circumstances indicated in Article 8 (*b*).

10. The personnel of Voluntary Aid Societies, duly recognised and authorised by their Government, who may be employed in the medical units and establishments of armies, is placed on the same footing as the personnel referred to in the preceding Article, provided always that the first-mentioned personnel shall be subject to military law and regulations.

Each State shall notify to the other, either in time

of peace or at the commencement of or during the course of hostilities, but in every case before actually employing them, the names of the Societies which it has authorised, under its responsibility, to render assistance to the regular medical service of its armies.

11. A recognized Society of a neutral country can only afford the assistance of its medical personnel and units to a belligerent with the previous consent of its own Government and the authorization of the belligerent concerned.

A belligerent who accepts such assistance is bound to notify the fact to his adversary before making any use of it.

12. The persons designated in Articles 9, 10, and 11, after they have fallen into the hands of the enemy, shall continue to carry on their duties under his direction.

When their assistance is no longer indispensable, they shall be sent back to their army or to their country at such time and by such route as may be compatible with military exigencies.

They shall then take with them such effects, instruments, arms, and horses as are their private property.

13. The enemy shall secure to the persons mentioned in Article 9, while in his hands, the same allowances and the same pay as are granted to the persons holding the same rank in his own army.

14. If mobile medical units fall into the hands of the enemy they shall retain their material, including their teams, irrespectively of the means of transport and the drivers employed.

Nevertheless, the competent military authority shall

be free to use the material for the treatment of the wounded and sick. It shall be restored under the conditions laid down for the medical personnel, and so far as possible at the same time.

15. The buildings and material of fixed establishments remain subject to the laws of war, but may not be diverted from their purpose so long as they are necessary for the wounded and the sick.

Nevertheless, the Commanders of troops in the field may dispose of them, in case of urgent military necessity, provided they make previous arrangements for the welfare of the wounded and sick who are found there.

16. The material of Voluntary Aid Societies which are admitted to the privileges of the Convention under the conditions laid down therein is considered private property, and as such to be respected under all circumstances, saving only the right of requisition recognized for belligerents in accordance with the laws and customs of war.

17. Sick convoys shall be treated like mobile medical units, subject to the following provisions :—

(*a*) A belligerent intercepting a convoy may break it up if military exigencies demand, provided he takes charge of the sick and wounded who are in it.

(*b*) In this case, the obligation to send back the medical personnel, provided for in Article 12, shall be extended to the whole of the military personnel detailed for the transport or the protection of the convoy and furnished with an authority in due form to that effect.

The obligation to restore the medical material, provided for in Article 14, shall apply to railway

trains, and boats used in internal navigation, which are specially arranged for evacuations, as well as to the material belonging to the medical service for fitting up ordinary vehicles, trains and boats.

Military vehicles other than those of the medical service, may be captured with their teams.

The civilian personnel and the various means of transport obtained by requisition, including railway material and boats used for convoys, shall be subject to the general rules of international law.

18. As a compliment to Switzerland, the heraldic emblem of the red cross on a white ground, formed by reversing the Federal colours, is retained as the emblem and distinctive sign of the medical service of armies.

19. With the permission of the competent military authority this emblem shall be shown on the flags and armlets (*brassards*) as well as on all the material belonging to the Medical Service.

20. The personnel protected in pursuance of Articles 9 (paragraph *a*), 10 and 11 shall wear, fixed to the left arm, the armlet (*brassard*) described in para. 19, delivered and stamped by the competent military authority, and accompanied by a certificate of identity in the case of persons who are attached to the medical service of armies, but who have not a military uniform.

21. The distinctive flag of the Convention shall only be hoisted over those medical units and establishments which are entitled to be respected under the Convention, and with the consent of the military authorities. It must be accompanied by the national flag of the belligerent to whom the unit or establishment belongs.

Nevertheless, medical units which have fallen into the hands of the enemy, so long as they are in that situation, shall not fly any other flag than that of the Geneva Convention.

22. The medical units belonging to neutral countries which may be authorized to afford their services under the conditions laid down in Article 11 shall fly, along with the flag of the Convention, the national flag of the belligerent to whose army they are attached.

The provisions of the second paragraph of the preceding Article applicable to them.

23. The emblem of the red cross on a white ground and the words "Red Cross" or "Geneva Cross" shall not be used either in time of peace or in time of war, except to protect or to indicate the medical units and establishments and the personnel and material protected by the Convention.

24. (*Abridged*). The provisions of the Convention are limited to parties thereto.

25. (*Abridged*). Commanders-in-Chief of belligerent armies shall arrange details for carrying out the provisions of the Convention.

26. (*Abridged*). The signatory Governments shall instruct their troops as to the provisions of the Convention, and bring them to the notice of the civil population.

27. The Signatory Governments, in countries the legislation of which is not at present adequate for the purpose, undertake to adopt or to propose to their legislative bodies such measures as may be necessary to prevent at all times the employment of the emblem or the name of Red Cross or Geneva Cross by private individuals or by Societies other than those which are

entitled to do so under the present Convention and in particular for commercial purposes as a trade-mark or trading mark.

The prohibition of the employment of the emblem or the names in question shall come into operation from the date fixed by each legislature, and at the latest five years after the present Convention comes into force. From that date it shall no longer be lawful to adopt a trade-mark or trading mark contrary to this prohibition.

28. (*Abridged*). Steps are to be taken by the Signatory Government for the repression in time of war of individual acts of pillage and maltreatment of the wounded and sick of armies, and for the punishment of unlawful employment of military insignia, and the Geneva Convention flag and armlet.

29 to 33. Provide for the ratification of the Convention, the date of its coming into force, its replacement of the Convention of 22nd August, 1864; fix the date for signature of the Convention, and give power to contracting Powers to denounce same.

CHAPTER III.

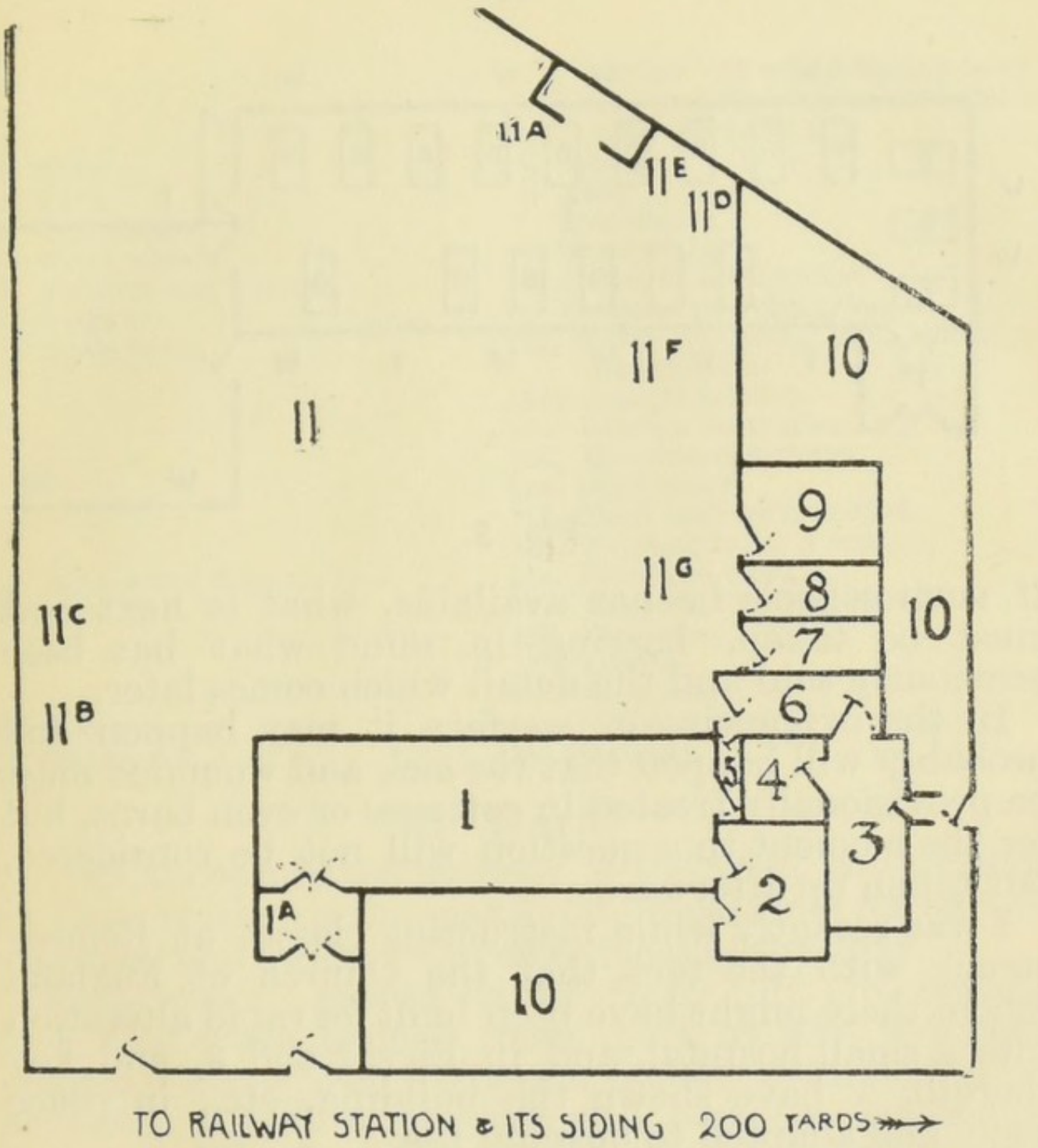
Buildings suitable for use as Hospitals and their requirements.

It is not an uncommon idea that any building which has a large room is suitable for transformation into a hospital. This however, is most erroneous, for unless there is the possibility of proper arrangements being made for the many wants of the sick and in addition for all sanitary requirements, a hospital chosen from this point of view alone, quickly becomes a very pest house for those treated in it, and may for years afterwards be a danger to the inhabitants of its neighbourhood.

What then makes a building suitable for use as a hospital ?

It must have large rooms, not too wide but with broad doorways, possibility of thorough ventilation, necessary sanitary arrangements, an open space in which to put up the annexes which are an integral portion of a good hospital and in which convalescents can take the air and exercise. It must be near buildings which can be utilized as stores, etc. There must be an ample supply of good water, and if possible the hospital should be conveniently near to a railway station or canal.

These conditions are best exemplified in modern schools, and it will I hope be possible for such buildings to be selected by most of the St. John units. Large boarding schools should if possible be secured.


11A
11E
11D
11F
10
11
9
11G
8
10
11C
7
11B
6
4
1
3
2
1A
10
TO RAILWAY STATION & ITS SIDING 200 YARDS

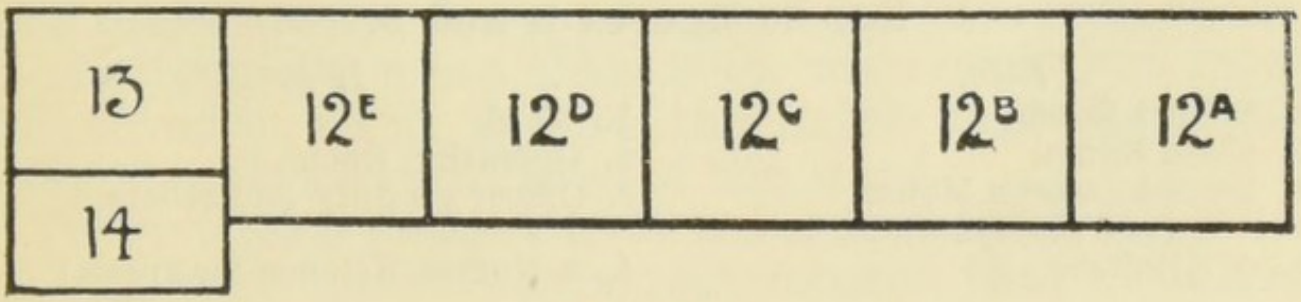

13
12E
12D
12C
12B
12A
14

Fig. 2.

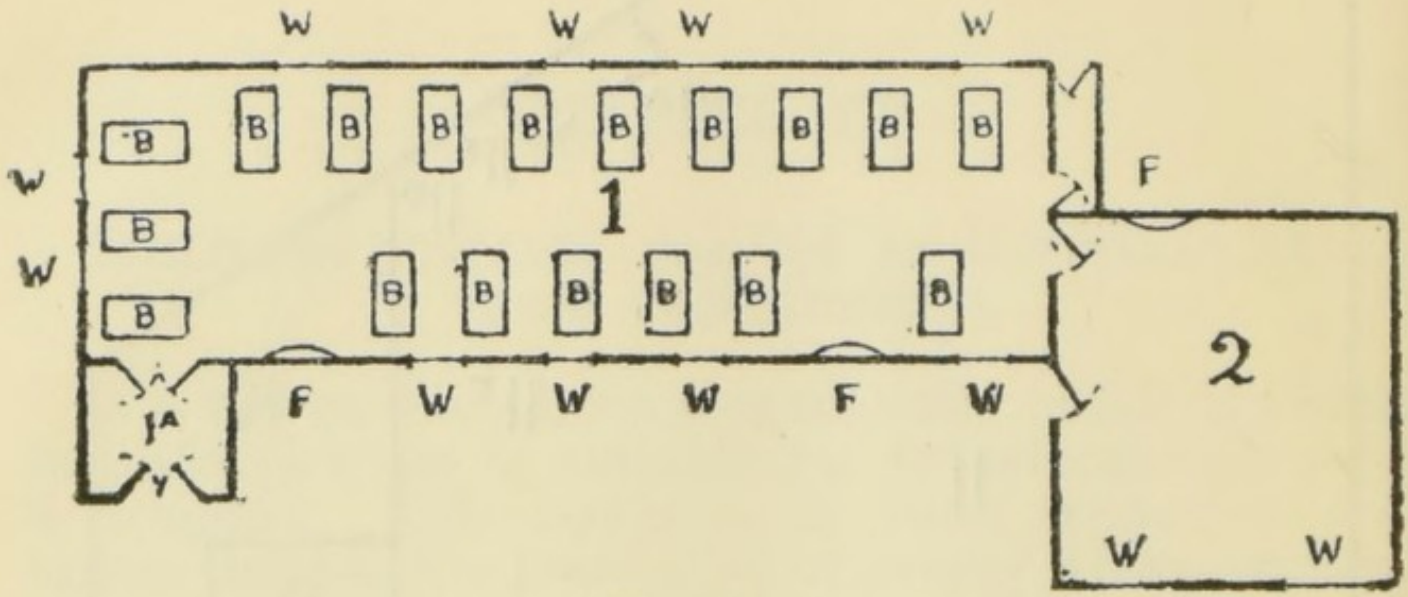


Fig. 3.

If such schools be not available, what is next best must be taken, bearing in mind what has been previously said and the detail which comes later.

In the exigencies of warfare it may happen and probably will happen that the sick and wounded must be provisionally treated in cottages or even barns, but for the moment this question will not be considered, but taken up afterwards.

I was recently while instructing classes at Romsey struck with the fact that the Church of England school there might have been built for rapid alteration into a small hospital, and in Figs. 2 and 3, and key thereto, I have shewn the building, etc., in peace time, and adapted to hospital use.

Key to figures 2 and 3.

Peace.	*War.*
1. School Room.	1. Ward.
2. Class Room.	2. Operating Room.
3. Schoolmaster's House. (two storeys).	3. Officer on duty and others.
4. A Kitchen.	4. A Nurses Kitchen for special

	extras. It would be necessary to establish communication between 4 and 5.
5. Passage.	5. Passage.
6. Yard.	6. Yard.
7. Coal stores.	7. Coal Stores.
8. Wood store.	8. Wood store.
9. Ablution and Latrine.	9. Ablution and Latrine.
10. Garden.	10. Patients' exercise ground.
11. Playground.	11a. Store for linen, etc., awaiting disinfection.
	11b. General kitchen.
	11c. Kitchen destructor.
	11d. Hospital destructor.
	11e. Disinfector.
	11f. Extra latrines if needed.
	11g. Extra ablution if needed.
12. Houses and Shops.	12a. Provision store.
	12b. Hospital Clothing Store.
	12c. Pack store.
	12d. Offices.
	12e. Dispensary.
13. Hotel.	13. Nurses' quarters.
14. Stable, etc.	14. Mortuary.

1. Ward.

A ward containing 20 beds is the most convenient as that number is the maximum of patients for supervision by one orderly and so reduces night duty.

Each patient should have 10ft. by 10ft. (100 square feet) floor space, hence a room 100ft. by 20ft. will best answer our purpose. Where a smaller room has to be utilized a simple calculation will give the accommodation it will afford keeping in mind that 100 square feet must always be represented by 10ft. wall space. If the room be more than 20ft. wide each bed must still stand in a 10ft. square, the extra space being an alley way down the centre of the ward.

To give each patient 1,000 cubic feet the walls must be 10ft. high and it is to be remembered that no height

greater than this is to be counted in reckoning a patient's air space. Anything above 12ft. in the height of a ward is a disadvantage, as unless special arrangements are present which permit of thorough perflation, the upper air, tainted by use, is stagnant. It is this reason which in the vast majority of instances renders churches unsuitable for use as hospitals, besides which they lack many other requirements.

There is no one point more essential to the welfare of sick and wounded than plenty of fresh air, a fact which explained the apparent paradox in the old wars that men treated practically in the open and exposed to the vicissitudes of the weather did better than others sheltered in buildings. There should be on both sides, preferably opposite each other, windows which will open freely top and bottom. These should reach from within three feet of the floor to near the ceiling. The area of the windows should be not less than one tenth of the floor space. Apart from the question of light to work by, sunlight is essential to the recovery of the sick. If the room be 100ft. by 20ft. viz., 2,000 square feet the combined area of the windows must be $\frac{2000}{10} = 200$ square feet. Ten windows in such a room each 5ft. wide by 7ft. high would be ideal.

To keep this ward warm (average temperature 60°) two large open fire places will be needed, one on each side not opposite to each other, or some other form of heating apparatus. To prevent the patients being cold plenty of bed-clothing should be put under as well as over them, *so that under no circumstances may the heat of the room be increased at the fatal cost of a diminished supply of pure air.*

Before equipment is put in all wall-paper should be removed and the ceilings and walls lime-washed. All

paint work should be thoroughly scrubbed with soap and water and afterwards wiped over with carbolic solution (1 in 40) or other available antiseptic (Condy's fluid and solution of perchloride of mercury should not be used for this purpose). The windows should be well cleaned ; the floor must be well scrubbed, and the spaces between the boards caulked if possible, or failing this pure izal should be dribbled along them so as to soak into the matter they contain.

2a. Operating Room.

This should be easy of access from the wards. It may be necessary to erect one in the yard of the building selected. It should be well lighted, preferably from above, be provided with cold and, if possible, hot water, an earthenware sink with the waste pipe opening into the open air over a trap connecting with the drain and covered by a grating. Proper provision for heating and ventilation must be made, and all possible steps taken to prevent the accumulation of dust in the corners or elsewhere. The only furniture required if an annexe be provided will be an operating table. A room 24 feet square is a good size.

2b. Operating Room Annexe.

Adjoining the operating room should, if possible, be an annexe in which should be kept whatever is not actually required in the case then being dealt with, including a sterilizer for dressings, cases of instruments, if possible an X-Ray apparatus, and other equipment required for operations. It may also be used as an anæsthetic room. This annexe it not shown in the plan.

3. Officers and others on duty.

Accommodation for these should be found in the building during their tour of duty.

4. Nurse's Kitchen for special extras.

This will be found useful for cooking delicacies and special extras which cannot be conveniently prepared in the general kitchen.

5. Passage.

Care must be taken to keep all passages free from encumbrances.

6. Yard.

A covered yard will be found useful and should where possible be retained as such.

7 & 8. Coal and Wood Stores.

These should be as near the kitchen as possible.

9 & 11g. Ablution and Bath Rooms.

Basins, arranged on a bench similar to those used for ablutions in large institutions, will be required for ten per cent of the total strength and baths for at least two per cent. An ablution room for thirty basins and four bath compartments occupies 42ft. by 18ft.

9 & 11f. Latrines.

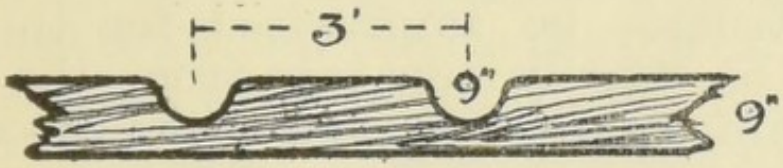
The latrines will be needed soon after the patients arrive. There should be seats for twelve per cent of sick. If the school house chosen has such accommodation it will be necessary for the carpenter to modify existing seats so as to make them suitable for adults

both as to height (say 18 to 20 inches), and width (3ft. for each person).

If the latrines are insufficient, or when none are available, either field latrines (see page 144), must be used temporarily or dry earth latrines, preferably of the bucket type put up. The buckets should fit as closely as possible up to the seat and a tin flange in front should be provided so that the floor be not soiled with urine. In Fig. 4 is shown a good plan for making the seat.

The buckets should be emptied twice daily, and it should be the special duty of certain men to put into them dry earth and either dry disinfectant or paraffin at least three times a day. This is in addition to the dry earth which *patients* should put in with a scoop after using the latrine.

A temporary building for twenty seats with separate urinals at both ends will cover a space of 38ft. by 18ft.



Front.—Fig. 4.

10. Patient's exercise ground.

The necessity for this should not be overlooked.

11a. Dirty Linen Store.

This must be a separate store well removed from all clean things and food supplies, and as near as possible to the disinfector.

11b. General Kitchen.

The first need of sick and wounded is warm easily digested food, so that fires over which milk can be heated, and soup, tea, chocolate or coffee made will be essential.

If the cooking arrangements existing in the building are not sufficient for the number of sick which it is to accommodate, a kitchen will have to be put up in the open space near it and a field kitchen be temporarily used. The usual field kitchens will be described later but if ranges can be obtained two may be set back to back in a temporary building and two more with their backs against the ends of the first two.

11c. Kitchen Destructor.

The kitchen fire itself, of whatever pattern it may be, should as far as possible be used as the destructor for kitchen refuse but in most cases it will be necessary that a destructor be improvised for this purpose. This must be wholly separate from the destructor for the burning of dressings, etc, from the wards.

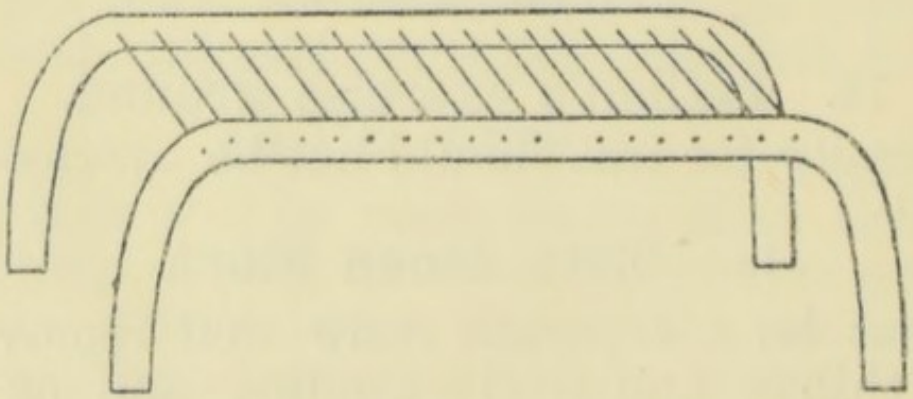


Fig 5.—Arnold's Spider Crematory.

Outside destructors should be so placed with reference to the prevailing wind as to be to the leeward of occupied buildings.

The spider crematory is, either for cooking or for use as a destructor, well worthy of consideration. It is the invention of Arnold, of the Pennsylvania National Guard.

"A spider is a frame-work of iron bars four to six inches apart, rivetted into side pieces whose ends are bent downward at a right angle to form legs and hold the frame sixteen to eighteen inches above the ground. On it may be done all the cooking except baking and roasting. To use it as a destructor a pit is dug sixty inches long, thirty inches wide, forty-eight inches deep at one end and thirty-six at the other. This is loosely filled with tolerably large stones to a height a few inches above ground level, and it is banked up all round sufficiently to exclude surface-water. The spider is then set on the stones and a wall of stones or sod is continued front and rear to the top of the spider, both ends being left open for draught. Fire is built under the spider on top of the stones, and by the time the meal is served there is a very hot fire needed only for heating water. The hot embers continually heat the stones they rest on, and these in turn heat those below. The garbage to be consumed is laid at each side of the central fire, and as it becomes dessicated it may be pushed into the flame and consumed. Incombustible material is purified for removal to a proper place of deposit. Dish water, etc., is carefully poured in at the deeper end of the pit."

11d. Hospital Destructor.

A second such destructor can be utilized for enteric stools and all hospital refuse, and it must be remembered that hospital refuse and everything that is passed by enteric and dysenteric patients, and it is well to add *everything* passed into bed-pans, commodes and urinals should be burned, (straw, sawdust, or other dry matter and paraffin being mixed with it to make it burn better). This should be done in a temporary building about 30 feet by 15 feet, near the destructor, and no one should be allowed in except those actually on duty. A bowl with water, soap and towel, and basin with disinfectant for cleansing the hands should be a necessary part of its equipment.

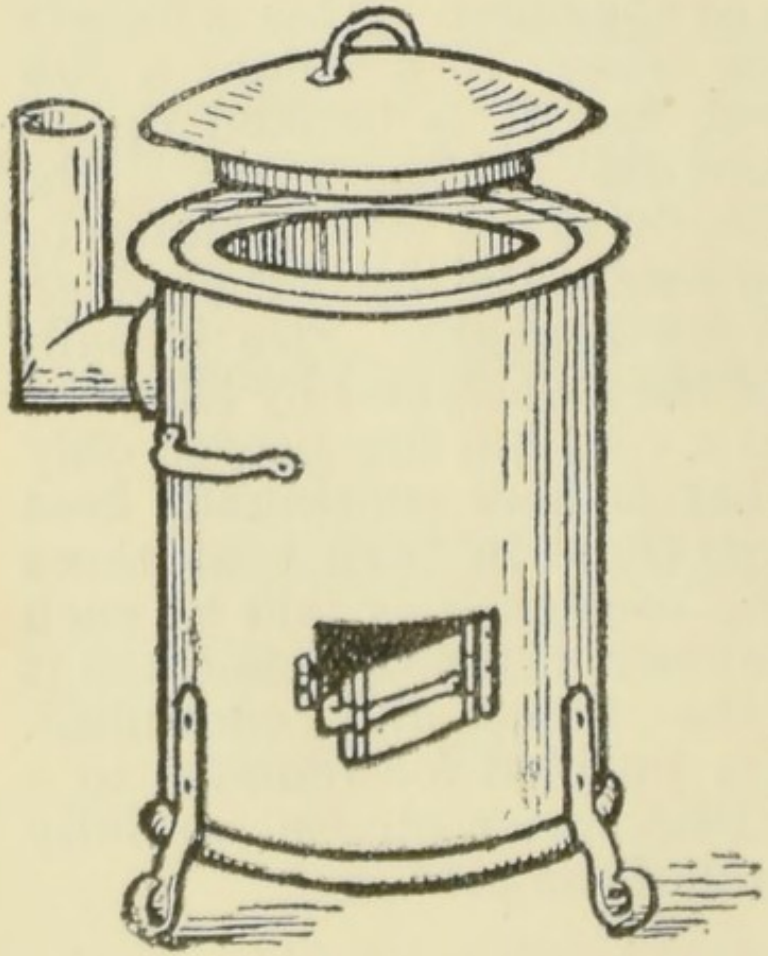


Fig. 6.—(A useful form of portable boiler).

11e. Disinfectors.

Arrangements must be made so that all clothing brought by patients to hospital can be disinfected either by boiling or otherwise (leather articles excepted). It will also be essential to have separate disinfecting accommodation for sheets, etc., and clothing used by the men while patients in bed.

12a. Provision Store.

This store should not be far away from the hospital proper. A corner shop or a public house (which would certainly be closed in war) with a door opening to each road will be easy of access to carts and enable orderlies drawing extras to file through. The supplies will be protected by the counter and be kept as far as possible on the shelves.

12b. Hospital Clothing Store.

The clothing in this store (in the army called Patients' Personal Equipment) should consist of (1) bundles ready for issue to be placed one on each spare bed when a convoy is arriving, (2) single articles, to be ready for issue when needed to exchange. This store may in addition be used as a general store for all hospital equipment.

12c. Pack Store.

The pack store must consist of two absolutely distinct rooms, viz., one for the kits as brought to hospital, the other for their storage *after* they have been disinfected and washed.

They must both be fitted up with racks so divided that each partition will hold a complete kit, the arms and ammunition being placed separately in the store. Each partition should bear a number. The kit should bear the name and regimental number of its owner, and its inventory in the pack store-book should show this name and number as well as the number of the partition.

12d. Offices.

Here should be kept the following books, the principal one to be kept in all hospitals being ;— A. *Admission and Discharge Book*, for from it will be at the end of war, obtained the records of the individuals treated and their wounds or sickness, and also the statistical results of the work of the medical service.

Its accuracy should be under the personal supervision of the commandant, and such accuracy as to number in hospital, etc., should be checked once a week.

It should have written plainly on the outside

No.....

Admission and Discharge Book .....Hospital

at .....

commenced .....

last admission.....

..... Commandant.

It should be ruled in columns for the following :—

1. Consecutive number (for admissions only).

2. Transfer number (for transfers from other hospitals which keep an admission and discharge book).

3. Regiment.

4. Battalion or number of unit (latter in case of R.A. etc.).

5. Regimental number.

6. Rank.

7. Name and Christian name.

8. Admitted (or transferred to this hospital), date (shown as say 7.9.10).

9. From what hospital transferred.

10. Disease. (This must be entered in the terms of the nomenclature of diseases drawn up by a Joint Committee appointed by the Royal College of Physicians of London). If a man suffers from two distinct diseases, say gunshot wound and enteric fever, both should be entered.

11. Operation, if any performed.

12. How disposed of (this column will be entered "R" for recovered. "T" transferred. "⌈D⌋" died.

13. Date of leaving hospital.

14. To :—*Here should be stated ; if the patient recovered* (*a*) Name of fighting unit or convalescent camp he went to. (*b*) if patient transferred by what hospital train, or convoy or what hospital he went to.

15. Remarks.

(See specimen.)

Specimen Admission and Discharge Book.

1 Admission number.	2 Transfer number.	3 Regiment.	4 Battalion, etc.	5 Regimental number.	6 Rank.	7 Name and Christian name.	8 Admitted or transferred to Hospital.	9 If a transfer, from what Hospital.
1		R.A.M.C.	—	55567	Pte.	Scott, George	7.9.10.	—
	1	S.W.B.	1	1265	Corp.	Jones, John J.	8.9.10.	Woolston. Action Itchen.
2		E. Surrey	2	4728	Sergt.	Smith, William	12.9.10.	— Action Eastleigh
3		Hants	5	9826	Sergt.	Bush, Charles	14.9.10.	—
	2	R.A.	23	11682	Br.	Eade, William	14.9.10.	Eastleigh.

10 Disease.	11 Operation performed if any.	12 How disposed of.	13 Date of leaving Hospital.	14 To.	15 Remarks
Infl. Knee—746, 1	—	R	25.10.10	R.A.M.C. Netley.	—
G.S.W. Thigh—1043	Amp'tion	T	19.10.10	Netley Hospital.	For Invalid
G.S.W. Knee—1040	—	[D]	17.9.10	—	
Enteric Fever—17	—	R	15.11.10	Con. Camp So'ton.	
G.S.W. Lr. Jaw—938	Removal	[D]	5.10.10	—	
Enteric Fever—17	fragments.				

B. *Register of deaths.*—Showing particulars similar to Admission and Discharge Book.

C. *Record of personnel.*—A book should be kept in which the names in full rank, etc., of all persons serving in the unit should be entered. It should give the date they join, and also the date of leaving, and the cause of leaving.

Medical officers should be encouraged to keep records of the cases they treat, and sheets should be served out to them for that purpose.

D. *Steward's books.*—There should be five books, viz., one each for :—1. Bedding ; 2. Equipment ; 3. Patients' personnel equipment ; 4. Equipment in stores ; 5. Food supplies. These should all show receipts and expenditure, and be balanced from time to time.

The other books needful which will be kept as their names indicate are :—

E. *Pack store book.*—Showing kits received from men, and handed back to them, or sent with them to other hospitals, etc. ; one page for each man. Money and valuables should also be entered in this book.

F. *Pharmacist's book.*—Showing receipt and expenditure of articles under his charge.

G. *Cook's book.*—Showing daily account of food supplies received and diets issued.

H. *Ward books.*—1. A diet book, with patient's name, etc., at head of each single page, and diet and extras ordered daily for him—initialled daily by the medical officer. 2. A book showing for each day a *summary* of diets and extras ordered. 3. Prescription book.

12e. Dispensary.

This can well be placed in a separate building near the hospital proper as it is a decided advantage in many ways that they should not be under the same roof, and must always be kept locked in the absence of the dispenser.

13. Hotel.

As licensed houses are sure to be closed in time of war this can well be used as Nurses' quarters.

14. Mortuary.

In order that the dead may not be a source of danger to the living a mortuary must be provided, and a coach house or similar building with a tiled or concrete floor would best answer the purpose.

Additional Accommodation.

If it be possible a dining room for such patients as can attend there for their meals is an advantage.

Constructing Temporary Buildings.

There is nothing so useful for this purpose as corrugated iron and if the frame on which it is nailed has its supports well sunk in the ground, in this climate it is not likely to be affected by wind. The roof should have a good slope and should overhang the walls.

All temporary buildings should be trenched so as to protect them from surface water and proper surface drains made to carry such water off from them.

Instead of windows an open space to a depth of two feet from the roof may be left open all round.

All places where men have to work should protect them from the inclemency of the weather.

CHAPTER IV.

Nursing.

The words "nurse" and "nourish" are both derived from the same Latin root, and a consideration of the meaning of these words will show that three factors—proper feeding, rest, and cleanliness—are the foundation upon which the art of nursing stands. Proper feeding forms the wherewithal for the building up and maintaining the tissues and strength of the body; rest is essential to the proper assimilation of food and the repair of injured or diseased tissues; cleanliness, in its full sense, has for its object the absence of disease germs and other forms of matter which militate against a person's health, and consequently against his strength and proper nourishment.

It is not unusual to distinguish between medical and surgical nursing, but essentially both rest on the same foundation. Patients suffering from disease feel ill and require tranquil and restful surroundings, while those undergoing surgical treatment, after the immediate effect of the injury or operation has worn off feel "fit," and require some mental occupation or amusement. The nurse should recognise the different requirements of the two classes of invalids, and as far as possible adapt her demeanour and the patient's surroundings to them.

The succeeding chapters on proper feeding, rest, and cleanliness apply to both classes, while the following details are more particularly those of surgical nursing.

Healing of Wounds.—A wound heals as follows :— Blood escapes washing the wound from within outwards. The ends of the severed blood vessels contract and retract ; clots of blood form in and round them, tending to stop the bleeding and to seal the wound against the entry of germs. New blood-vessels, by which the circulation is restored, are built up in the wound, new tissue is produced and firmly unites the cut surfaces. This is called healing by " first intention," and can only occur when the surfaces of the wound touch one another. When the wound is large and the raw surfaces cannot touch one another it is said to suppurate, and small rounded projections, called granulations, grow, come up to the level of the skin, and the new skin is gradually formed over them. In the end a scar forms ; this is called healing by " granulation."

The main object in the dressing of a wound is to protect it from the entry of noxious germs. These not only prevent healing, but lead to the formation of pus, and, possibly, to blood poisoning. A wound into which these germs have entered is called *septic*, and the treatment which is directed against these germs is called *antiseptic*. A germ-free wound is called *aseptic*.

First Field Dressing.—A first field dressing forms a part of every British soldier's kit on active service, and will be found stitched in the left side pocket of the service frock. It consists of two separate dressings each complete in itself as under :—

(*a*) Bandage, $2\frac{1}{2} \times 2\frac{1}{2}$ inches.

(*b*) A piece of salalembroth gauze folded into a pad 4 × $3\frac{1}{4}$ inches and stitched to the bandage 18 inches from one end.

The bandage and gauze are enclosed in waterproof jaconet.

(*c*) Safety pin, wrapped in waxed paper.

Printed directions for use are upon the outer cover, and a printed label of directions for use is placed upon each of the two inner covers.

Directions for use.—To open the outer cover pull tapes apart, and to open the inner waterproof cover tear apart the uncemented corners as indicated by the arrow. To apply, take the folded ends of the bandage in each hand, and keeping the bandage taut apply the gauze pad to the wound and fix the bandage. One dressing should be used for each wound. No attempt should be made on the field to clean the wound.

Specification tallies.—When the necessary surgical treatment has been afforded to a wounded man on the field a specification tally (which resembles a tie-on label) will be filled up and attached to him, any points requiring attention during transit being noted. Tallies are of two colours; white with red border for cases requiring immediate attention at the dressing station, and white for less serious cases. Identification discs are quite distinct and are metal discs stamped with the owner's name, &c., and worn tied round the neck. They are for the purpose of identifying the dead and unconscious.

The attention of a doctor should be called to severely wounded men before removal as it may be inadvisable to remove them at once, although they would generally be the first removed.

The rules laid down in R.A.M.C. Training to be followed in applying dressings are :—

(1) Never begin to change a dressing until everything that is likely to be required for the new dressing is ready close at hand.

(2) Arrange the bed clothes so that no part of them can touch the wounded area ; the bedding, &c., should be protected from damp, &c., by means of waterproof.

(3) Remove the bandages, but do not touch the actual dressing at present.

(4) Scrub your hands most thoroughly with soap and a stiff nail brush which has been soaking in antiseptic solution, or, preferably, previously boiled.

(5) Rinse off the soap and without drying your hands soak them for some minutes in antiseptic solution.

(6) Having thus cleaned your hands as thoroughly as possible, they must on no account be allowed to touch anything, such as your clothing, your face, or the patient's bedding or person. They should not be dried, unless a sterilized towel is available to dry them on.

(7) Never touch either dressings or wound with the fingers. Use a pair of sterilized forceps instead.

(8) Remove the old dressing with the forceps, having first loosened it if it has stuck, with warm antiseptic solution. Be careful to wipe from the wound outwards, so as not to carry germs from the surrounding skin into the wound.

(9) Place the fresh sterilized dressing gently in position with the forceps and then re-bandage the wounded area.

(10) Before dressing any wound or assisting at an operation which might produce infection, it is advisable to protect any cuts or scratches on the hands by covering them with a couple of layers of gauze and painting them over with collodion, so as to make a waterproof coating.

(11) If the necessary means of purifying the wound are not at hand do not attempt to wash it or wipe its surroundings; simply apply a dry antiseptic dressing.

(12) All old dressings should be at once removed from the ward and destroyed, preferably by burning.

Aseptic wounds should be attended to first, and the septic ones should not be dressed until attention has been paid to *all* those that are aseptic. To keep an aseptic wound aseptic and to make a septic one aseptic should be the aim in all dressing.

The antiseptics principally used for dressing wounds are:—

Perchloride of mercury is used as solutions varying between 1 in 1,000 and 1 in 10,000. It is a very powerful antiseptic. Steel instruments should not be placed in this solution as it spoils them.

Biniodide of mercury is employed in the form of a 1 in 400 solution in methylated spirit for purifying the hands or the skin of a patient before operation.

Carbolic acid.—This is generally used in the form of a solution of a strength of 1 in 20 for disinfecting instruments, and 1 in 40 and 1 in 60 for dressing wounds or disinfecting the hands.

Boric Acid is used either as the powder or as a lotion made by dissolving as much of the acid in water as it will take up.

Iodoform is used for dusting on septic wounds.

Permanganate of potash is used in solutions of varying strength (generally expressed as grains to the pint). Strong solutions make brown stains.

Dressings must be sterilized before use. Dry dressings such as wool and gauze can be purchased ready sterilized in small packets, and in this form are considered safe for field use provided the packages have been freshly opened.

If sterilizers are obtainable the material to be sterilized should be placed in a towel in the sterilizer, lightly packed, and should be kept there for at least half an hour. If no sterilizer be available, a very useful substitute can be improvised by using a vegetable steamer. The sterilized dressings will be taken to the ward still wrapped in the towel. If it is necessary to sterilize dressings or swabs by boiling, they should be placed in a linen bag, and after ten minutes boiling the bag should be lifted out with forceps, allowed to cool, wrung out, and the contents emptied into a sterilized bowl, and covered with a cloth soaked in carbolic solution 1 in 40. No dressing that has subsequently to sterilization touched anything not sterilized can be considered aseptic.

Every receptacle for dressings or instruments should be of a hard, smooth material, such as china, glass, or vulcanite, capable of sterilization by heat before and after use. Scissors, forceps, etc., should be made to take apart easily, and, as well as knives, should be as smooth as possible and without crevices, in order that they can be thoroughly cleaned.

An antiseptic bath is made by dissolving boric acid in the proportion of 5 grains to the ounce of water. The part to be bathed is held in the warm solution for the time directed.

An antiseptic fomentation is just like an ordinary one, except that several folds of boric lint are used instead of flannel or spongio piline.

Preparation of a patient for an operation.—Rest in bed for a day or two is desirable before an operation of any magnitude. Early in the day before the operation an aperient should be given, and the patient should have a bath or be thoroughly washed in bed in the afternoon. On the day itself an enema should be given first thing in the morning, but no food, except a pint of beef tea given for four hours before the time of operation.

The day before the operation the skin within a radius of ten inches of the part to be operated on must be carefully shaved. The attendant should then cleanse his hands in the manner described on pages 62 and 105 and treat the shaved area firstly by washing it with hot water and soap, secondly by scrubbing it with swabs of sterilized wool soaked in turpentine, thirdly by rubbing it with swabs soaked in ether to remove all grease, fourthly, by further scrubbing with carbolic 1 in 20, perchloride or biniodide of mercury, 1 in 1,000 in water or methylated spirit, fifthly, the part is then to be covered with a sterilized gauze wrung out of biniodide solution and kept in place by sterilized absorbent wool and a bandage. These are not to be removed until the patient is placed on the table for operation. Throughout the performance of the above the part must be protected from the bedclothes by means of sterilized towels.

A new method for sterilizing the skin introduced and successfully practised by Dr. Antonio Grossich of Fiume is as follows: The skin of the patient is if necessary dry shaved and then painted with tincture of iodine over and for a considerable distance round the part to be operated on both immediately before the anæsthetic is given and when the patient is on the operating table. The skin to which the iodine is applied should be perfectly dry.

Sterilization of Instruments.—With the exception of those used for cutting, is accomplished by boiling them for twenty minutes in water to which bicarbonate of soda in the proportion of a drachm and a half to a pint has been added. They are then with sterilized forceps placed in trays containing carbolic lotion 1 in 60. After sterilization they must on no account touch anything that is not sterilized. Cutting instruments are wiped with pure carbolic on a sterilized swab, then placed in ether for ten minutes before being transferred to the carbolic lotion.

The room where the operation is performed and everything in it must be scrupulously clean, using the word in its surgical sense. During the operation the temperature of the room should be kept as near as possible to 70 degrees.

Treatment after an operation.—Watch the patient carefully until he becomes conscious, and if there is a tendency to vomit turn the head to one side. Frequently examine the dressing without disturbing it, and apply a fresh pad of sterilized wool over the original dressing should blood or discharge be seen, reporting the circumstance at once. If it is blood that shows through, and the patient is pale, faint, cold, and with a weak pulse, pressure should be made on the appropriate pressure point and assistance summoned.

CHAPTER V.

Proper Feeding.

The ordering of diet is a doctor's business; the preparation of diet is the cook's, or in special cases the nurse's. The giving of the diet and, in the doctor's absence noticing the effects, are those of the nurse herself.

It cannot be too strongly insisted that to do a patient good the food, whether liquid or solid, must not only be swallowed, but also be digested and absorbed, and when absorbed needed. If any one of these conditions be not fulfilled, the effect both in the system and in its excretion is very much the reverse of beneficial. The hospital diets prescribed by the Army regulations will be found useful as a guide, though they will probably have to be varied in accordance with what provisions are available.

As bread is but rarely obtainable by troops on active service, its provision in temporary hospitals will be much appreciated by the patients, and for that reason a certain number of the members of a St. John Ambulance Company should be able to make bread, an art that cannot be taught by a text book.

Hospital Diets, etc.

Article.	Class of Diet.					
	Ordinary.		Chicken	Beef Tea.	Milk.	Plain Milk.
	*Roast.	†Convalescent.				
Meat (Beef or Mutton) without bone ... ozs.	8 (steak)	8	Half a fowl	8 (beef)	...	...
with bone ,,	10 (chop or joint)	10		10 (beef	...	...
Bread (white or brown)	18	16	16	14	19	...
Salt ..... ozs.	½	½	½	½	...	...
Tea ..... ,,	⅓	⅓	⅓	⅓	...	...
Sugar ..... ,,	1½	1½	1½	1½	1	...
Milk..... ,,	6	6	6	6	...	...
,, ... pints	...	.	...	...	3	3
Butter ..... ozs.	1½	1½	1½	1½	1	...
Potatoes ..... ,,	8	8	8	...	...	...
Vegetables ... ,,	4	4	...	...	...	...
Barley ..... ,,	...	1½	...	...	...	...
Rice ..... ,,	..	..	...	...	2	...
Pepper (every 100 diets) ,,	2	2	2	2	...	..
Mustard (every 20 beef diets) ,,	1	1	..	...	...	...

* Sunday, Monday, Wednesday and Friday.
† Tuesday, Thursday and Saturday.

When any of the following extras are ordered, they should be made in the under-mentioned proportions :—

Barley water—barley, 2 ozs. ; sugar, 2 ozs. } For every 5
Rice-water—rice, 2 ozs. ; sugar, 2 ozs. } pints of each.
Lemonade – two large lemons and 1½ ozs. of sugar } to every
Gruel – oatmeal, 2 ozs., and 1½ ozs. of sugar } 2 pints.
Rice-pudding—rice, 1 oz. ; milk, 15 ozs. ; sugar, ½ oz. ; egg, 1.
Sago-pudding—sago, 1 oz. ; milk, 15 ozs. ; sugar, ½ oz. ; egg, 1.
Tapioca-pudding—tapioca, 1 oz. ; milk, 15 ozs. ; sugar, ½ oz. ; egg, 1.

Custard Pudding—milk, 1 pint ; sugar, 1 oz. ; eggs, 2.
Oatmeal, 2 ozs. ; with milk, 8 ozs.
Arrowroot, 2 ozs. ; with sugar, 1 oz.
Sago, 2 ozs. ; with sugar, 1 oz.
Egg flip ; 2 eggs, with ½ oz. sugar.
Tea, per pint ; ⅙ oz. tea ; ¾ oz. sugar ; 3 ozs. milk.
Beef tea, per pint } 1 lb. fresh beef without bone, or 1 oz. meat extract.

The composition of a ration on active service is :—

1¼ lb. fresh meat, or 1 lb. (nominal) preserved meat, or 1 lb. salt meat.
1¼ lb. bread, or 1 lb. biscuit, or 1 lb. flour.
½ oz. tea.
¼ lb. jam.
2 oz. sugar.
½ oz. salt.
$\frac{1}{360}$ oz. pepper.
½ lb. fresh vegetables, or 4 oz. dried vegetables, or 4 oz. preserved fruit.

$\frac{1}{320}$ gal. lime juice ($\frac{1}{10}$ gill) with ¼ oz. sugar, on days when fresh vegetables are not issued
$\frac{1}{64}$ gal. rum (½ gill) ...
Tobacco, not exceeding 2 oz. per week, for those who smoke

} At the discretion of the G.O.C., on the recommendation of the medical officer.

To show how these rations may be utilized in the construction of hospital diets, which were found to meet requirements in No. — General Hospital, South African Field Force are given below.

A. Diet.—Rations, less jam, cheese, and rum, but with milk 6 oz. and butter 2 oz. added. Corresponds to ordinary roast diet.

B. Diet.—Similar, but meat made into soup. Corresponds to convalescent diet.

C. Diet.—Chicken, half a fowl, etc. Corresponds to chicken diet.

D. Diet.—Milk, 3 pints. Corresponds to plain milk diet.

Any obtainable extras may be ordered on any diet except that where chicken is needed the diet must be C. diet.

C. diet may be ordered minced, stewed or roast.

When rice, tapioca, sago or custard pudding is required it will be ordered as "pudding." In this way all puddings for the same day will be prepared of the same kind.

Recipes and Directions for Cooking, selected and abridged from the R.A.M.C. Training.

Stock and the Stock-pot.—A stock-pot should find a place in every kitchen, with the object of producing a nourishing liquor, for use instead of water principally for gravies and soups. A large boiling pot, a copper boiler, or a steam vessel may be used, and should be fitted with a lid.

Fresh bones and trimmings from meat, either raw or cooked, to which cold water in about the proportion of three pints to the pound is added, form the basis of

the stock. It must be brought slowly to boiling point and the scum rising to the top must be carefully removed from time to time. Fresh vegetables, such as onions, carrots, turnips, and a small cabbage (but not potatoes), washed, cleaned, and cut up, are, as well as a little salt, now added, and the whole should be gently boiled for four hours. The scum should be removed as boiling proceeds, but fat rising should be left, the stock should be strained ready for use as required. In warm weather stock should be made without vegetables, or it will turn sour.

Raw beef tea.—1 oz. finely shredded lean beef, 1 tablespoonful water. Put the meat and water into a jar, and stand the jar in a warm place for one hour ; strain and serve in a coloured glass or cup.

Mutton broth.—One lb. scrag-end of mutton, 1 quart of water, 1 dessert-spoonful of pearl barley or sago, 1 clove, 6 peppercorns, 1 teaspoonful of chopped parsley, salt to taste.

Take the meat off the bones, and cut into dice. Trim off the fat and put the meat and bones into a saucepan with the water ; add the salt and bring slowly to the boil. Skim well. Add the rest of ingredients. Simmer gently for about three hours, skim again, and add the parsley. When cooked, remove the bones. If vegetable flavouring is allowed, cut up a small onion, half a small carrot and a turnip and cook them in the broth. Blanch the barley before using ; chop finely about one teaspoonful of the cooked meat, and add it to the broth before serving.

Steamed chops.—Loin chops are best, trim off the fat and roll up the end, which may be skewered. Place it on a small plate and put in a stewpan, containing

stock or seasoned water, also a sprig of thyme and a little parsley. Cover the pan and cook thus for half an hour or longer till the meat is tender. Serve it with mashed potatoes.

Minced mutton.—Remove the bone and fat from a mutton chop, and mince it very finely. Melt ½ oz. of butter in a small stewpan, when hot put in the meat and cook very gently for ten minutes. Season very lightly with salt and pepper, and serve with small fingers of toasted bread or dry biscuits.

Beefsteak balls.—Scrape the required quantity of lean beef with a sharp knife, so that there is nothing left but the tough fibres, to each half pound of meat add the yolk of one egg, season with salt and pepper, and mix well. Shape into balls of even size. Use a little flour or breadcrumbs for shaping. Melt some butter or dripping in a frying pan, when hot put in the meat balls, and fry to a golden brown. Serve with a little thin brown sauce.

Puddings.

Rice.—One oz. Patna or Carolina rice, ¾ pint of milk, ½ oz. sugar, 1 egg.

Wash the rice, put it in a saucepan with the milk, and let them simmer until the milk is thick, add the sugar and flavouring, and well beated egg, pour the mixture into a slightly greased pie dish or pudding tin and bake in a moderate oven from 20 minutes to half an hour, dredge with sugar and serve.

Note.—Lemon, cinnamon, nutmeg, cloves and other spices may be issued as flavouring. When flavouring is used, it should be put in the pudding just before it is baked. A thin piece of lemon rind boiled in the milk and removed before baking is found excellent.

Other farinaceous foods which can be used and suitable for milk puddings are—tapioca, sago, barley, cornflower, semolina, &c.

Tapioca.—Three-quarters of a pint of milk, 1 oz. of tapioca, ½ oz. of sugar, 1 egg, flavouring essence.

Put the tapioca to soak in the milk for a few minutes, then cook over the fire until the tapioca is quite tender. When it is cooked let it cool slightly, then add sugar and beaten egg and a few drops of flavouring essence. Butter a pie dish, pour the pudding into it, and bake for about twenty minutes.

Custard.—One pint of milk, 2 eggs, 1 oz. sugar, flavouring.

Beat the eggs, add to them the milk and sugar and flavouring, pour the custard into a pie dish, and bake in a moderate oven for twenty minutes ; sprinkle sugar over, and serve either hot or cold. The same ingredients can be put in a greased basin and steamed or they can be put in a double saucepan or jar and boiled.

Savoury custard.—A savoury custard can be made by substituting herbs, chopped meat, and pepper and salt for sugar and flavouring.

Suet.—Three ozs. beef suet, 6 ozs. flour, 2 ozs. sugar, 1 egg, ½ oz. or 1 teaspoonful baking powder, a pinch of salt.

Remove the skin from the suet and chop it very finely. Put it in a basin with the flour, sugar, baking powder and salt. Beat up the egg and stir in. Work into a smooth paste and fill into small well greased moulds. Cover each with buttered paper and steam for forty-five to sixty minutes. Turn out and serve with honey jam or golden syrup.

Sago.—One oz. sago, ¾ pint milk, 1 egg, 1 oz. sugar. Proceed the same as for rice pudding.

Beverages.

Lemonade.—Two large lemons, 1½ ozs. sugar to every 2 pints of boiling water.

Put the thinly peeled lemon rind, the lemon juice and sugar into a jug, and pour over this the boiling water. Cover and let cool, then strain and serve. A little more sugar may be added if needed. Great care must be taken to peel the lemon very thinly and to remove the white skin afterwards, otherwise the lemonade will be bitter.

Rice water.—Carolina rice 2 ozs., sugar 2 ozs. to every 5 pints.

Wash the rice thoroughly in cold water, then soften by steeping it for three hours in a quart of water kept at tepid heat ; afterwards boil slowly for an hour and strain. This may be flavoured with lemon rind or clove. The sugar may also be added if liked.

To blanch barley.—Cover it with cold water, bringing to the boil and strain.

Barley water.—Two ozs. barley, 2 ozs. sugar, for every five pints.

(1) *Clear.* Blanch the barley ; then put it back into the saucepan and add five pints of cold water Bring it to the boil and let it simmer for half an hour. Strain and add the sugar. Allow to cool.

(2) *Thick.* Proceed as above, only instead of boiling for half an hour, boil down to two-thirds of liquid. Strain and add sugar.

As barley water will only keep a few hours, it should stand in a cool place and should never be heated to boiling point again.

Egg flip.—Two eggs, ½ oz. sugar, 1 small glass of wine or lemon if allowed.

Put the yolks of the eggs and the sugar in a tumbler, and stir until creamy. Beat the whites of the eggs to a stiff froth and stir it lightly in. Serve. Half the juice of a lemon or a little wine (sherry or Marsala) can be used to flavour if allowed.

Gruel.—Two ozs. of oatmeal, 1½ ozs. sugar to make 2 pints.

Mix the oatmeal with a little cold milk or water; boil the remainder and pour it, when boiling, on the oatmeal; return the mixture to the saucepan, and boil for ten minutes. Add the sugar and serve very hot.

Oatmeal porridge.—Two ozs. of oatmeal with 8 ozs. milk.

Stir the oatmeal gradually into a pint of boiling water, and let it come to the boil whilst stirring. Cook gently for about an hour. Add a pinch of salt and serve with the cold milk. The porridge must be stirred occasionally whilst cooking.

Bread and milk. Rub bread-crumbs through a fine sieve, put them in a cup and cover with boiling water, then place a saucer on the top of the cup; allow the crumbs to steep for fifteen minutes, drain off the water and in its place pour on some warm milk. Beat the whole well up, and then put the bread and milk into an enamelled saucepan and boil gently for a minute or two, stand it aside to cool a little, and before giving it to the patient, stir it, and see that it is nice and smooth, adding a little sugar and more milk if liked.

Albumen water.—Take the white of an egg well beaten up, mix it with from an equal to a double quantity of cold water, and slightly flavour with cinnamon. Being easily retained and very digestible and sustaining, it is a good form of nourishment when

the patient suffers from nausea or is disposed to vomit, and is much used in enteric fever.

Peptonizing is an artificial means of performing the functions of the principle called pepsin contained in the gastric juice of the stomach. It is a form of pre-digestion, useful in cases where the patient's powers of digestion are weak, and essential when food has to be administered in the form of nutritive enemata, by the rectum.

Many sorts of peptonized foods can be obtained; the recipe for peptonizing milk will, however, often be useful.

Peptonized milk.—Take one pint of new milk, five ounces of water, and one zymine powder. Make a smooth paste with the zymine powder and an ounce of the milk. Add the water to the remainder of the milk and after dividing the mixture into two equal parts, boil one half, add the cold half to it, and then stir in the zymine paste. Pour the whole into a jug which is to be covered and allowed to stand in hot water in a warm place for twenty minutes. Now bring the mixture to the boil for half-a-minute, let it cool, and if the weather is warm stand it on ice.

Directions for Sterilizing Milk by the Aymard Milk Sterilizer. Six gallon Tin Sterilizer.

The water is placed in the outer pan to such a height that it will run out of the tap. The tap is turned off, and the fire is lighted. The two lids are now removed, and the required quantity of milk is poured into the milk chamber (it is best to strain the milk previously.) Now replace the two lids and insert the thermometer through them. In about twenty minutes the milk will indicate upon the thermometer a temperature of 195

degrees. The furnace door must now be opened and the milk kept at this temperature for five minutes; then rake the fire out. The milk is now sterilized. In order to cool the milk, remove the thermometer and the outer lid, but on no account the inner lid, for if the inner lid is removed even momentarily a scum forms. Introduce a hose pipe into the outer pan, or in case no constant supply is available, pour water in with a bucket, at the same time turning on the tap. Place the thermometer again in the inner lid in position. The cooling process must be continued until the temperature falls to 100 degrees. After this the thermometer may be removed, cleaned, and placed in a position of safety. The milk is now ready to be served out, and should be ladled into vessels for distribution; or if intended to be kept in the canteen should be transferred to a separate vessel. It should not be stored in the sterilizer. The vessel the milk is transferred to should be covered with a clean cloth to prevent unnecessary exposure to the air. The milk should be stirred every three or four minutes during heating and cooling by drawing the handle of the stirrer up and down once or twice. In order to get all the milk out of the sterilizer, lift it bodily out of the pan and pour it through the spout. The sterilizer should be cleaned by filling the milk chamber with cold water and allowed to stand for a short time, then wipe out and dry. The water in the outer pan will be ready for use without re-filling. Always leave the lid off the sterilizer until required for use again. No sand should be used in the milk chamber, and soda is unnecessary. It should be remembered, in case the thermometer gets broken, that in about twenty

minutes from the commencement of heating, steam will issue freely from the lid and spout. This indicates that the temperature of the milk has reached 195° F.

Field Cooking.

Food may be cooked out of doors in a field kitchen, either by boiling or stewing in kettles, by frying in the lids of mess tins or by baking in dishes in an oven.

The Army Service kettles are oval and of two sizes :

Large.—13½ inches long, 9 inches wide, and 11 inches deep, including the cover. The weight is 7 lbs. 13 oz., and its capacity is 12 quarts. It will cook for eight men with vegetables or for fifteen men without vegetables.

Small.—12½ inches long, 8½ inches wide, 8 inches deep, including the lid. The weight is 4 lbs. 12 oz., and its capacity is 7 quarts. It will cook for five men with vegetables, or for eight men without vegetables.

For a small party the cooking may be done over a shallow trench dug in the direction of the wind, containing the fuel. Small pieces of iron, if obtainable, may be used to support the kettle. An alternative plan is to build two rough walls of stone or sods and support the kettle over them. If the party exceeds twenty and the stay in camp is but for one night, a proportion of kettles may be arranged on the ground in two parallel lines about nine inches apart, handles outwards, the leeward end of the space so enclosed being blocked by another kettle. The fire is laid in the enclosed space, and a row of kettles may be laid upon those already placed in position.

The Trench Kitchen.—A trench should be dug of a length proportionate to the food to be cooked, 9 inches

wide, and 18 inches deep at the mouth, and for a distance of 18 inches ; the depth then should be greatly diminished until at the end it is not less than 4 inches or more than 6 inches. The trench should be provided with a ramped splay mouth pointing towards the wind, and with a chimney 2 feet high at the opposite end built with sods cut off the side of the trench. It is well to cut these trenches on a gentle slope, the chimney end being the higher. Iron cooking bars are laid across the trench to support the kettles which are placed side by side resting on the edges of the trench. The spaces between the kettles should be packed with wet earth or clay reaching as high as the loops of the handles. The splay mouth will be found convenient for stoking (see fig. 7).

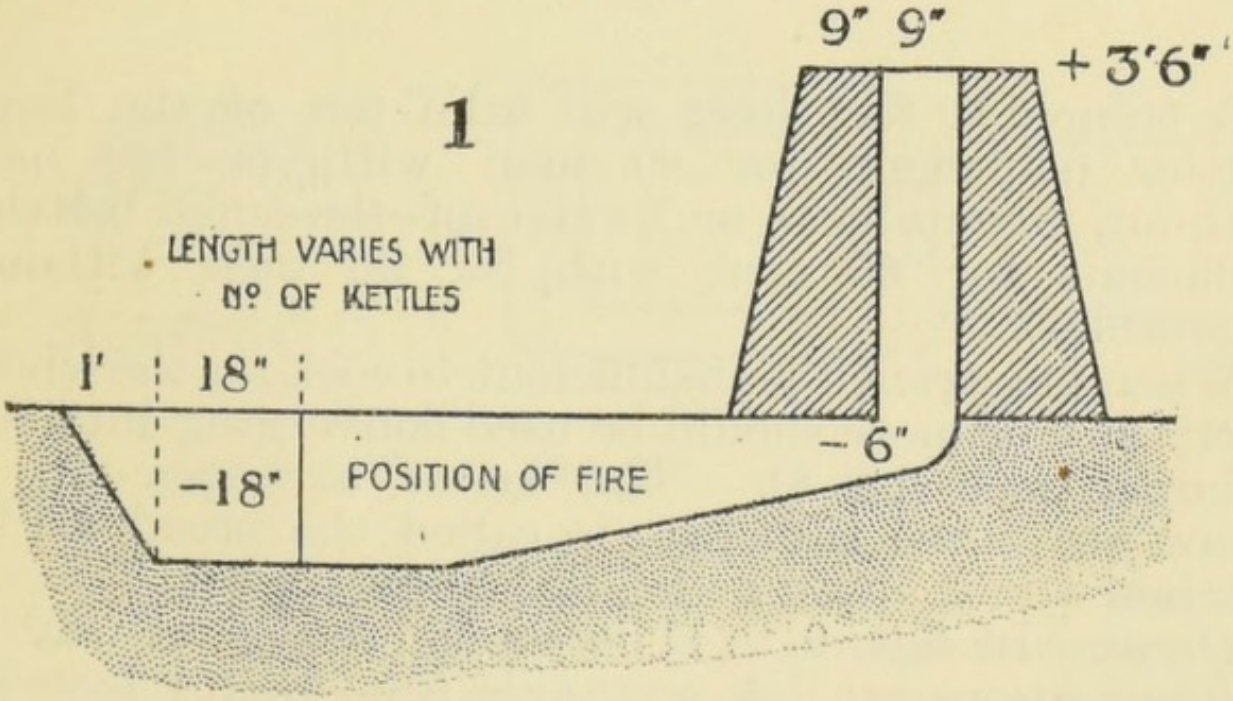


Fig. 7.

N.B. + 3′ 6″ means 3 ft. 6 in. above ground level, — 18″ means 18 in. below ground level.

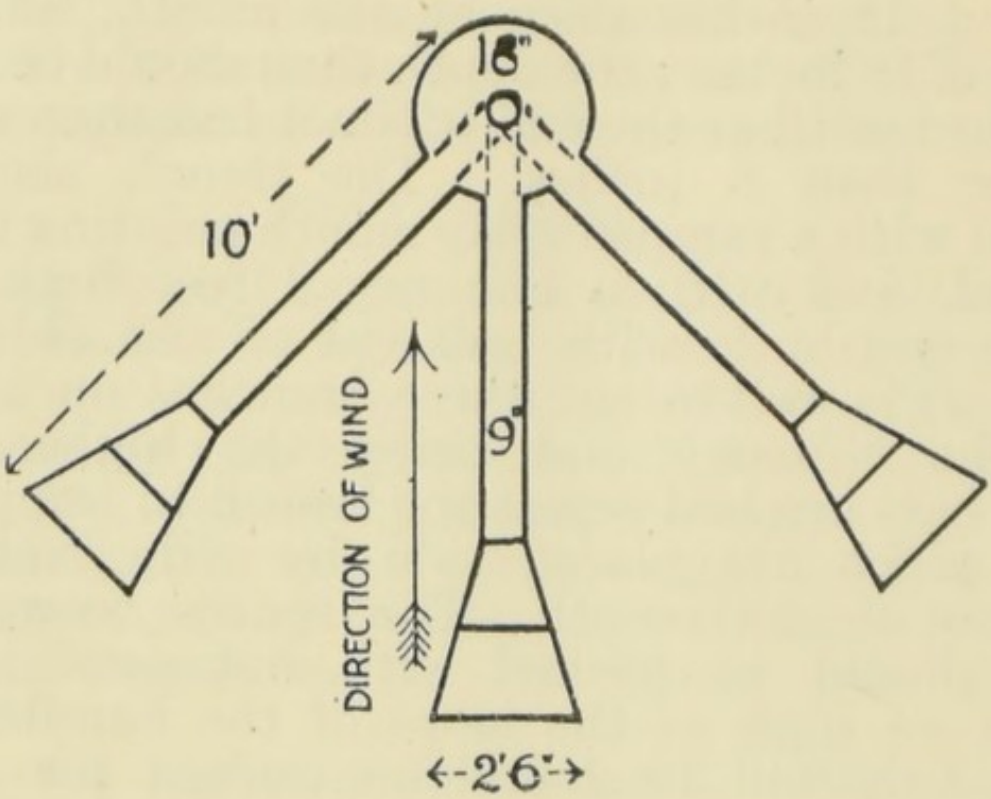


Fig. 8.

A trench 10 feet long will take ten of the large kettles (sufficient for 80 men with, or 150 men without, vegetables) or twelve of the small kettles (sufficient for 60 men with, or 96 men without, vegetables).

When one trench is insufficient to cook for the whole party two or more should be used converging into one chimney (see fig. 8). The latter arrangement, if there are three trenches, is called the broad arrow kitchen

Ovens.—In figs. 9 to 11 is shown the usual way of making an oven. A rectangle (fig. 9), $13\frac{1}{2}$ feet by $3\frac{1}{2}$ feet is marked off in the ground and the earth removed from in it the parts enclosed by lines. The hearth should be 5 feet long $3\frac{1}{2}$ feet

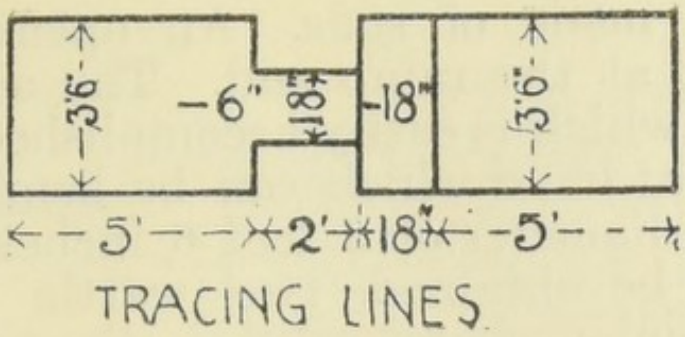


Fig. 9.

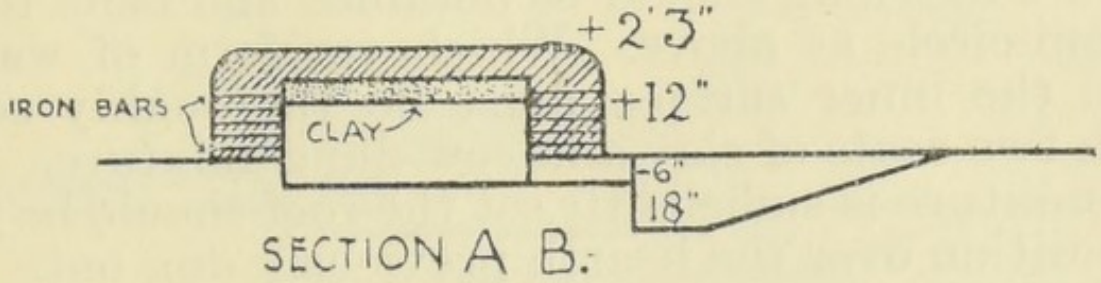


Fig. 10.

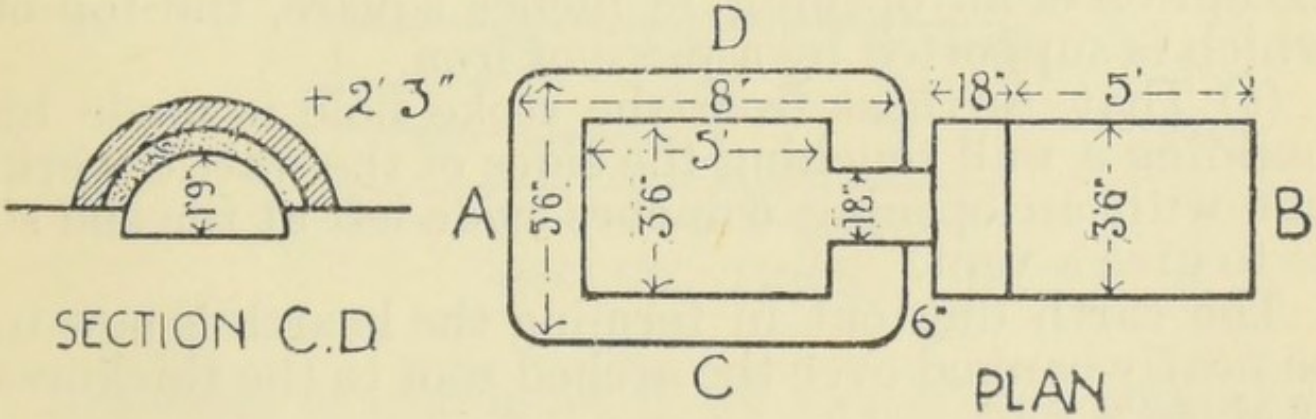


Fig. 11.—Elevation and Plan.

wide with a depth of 6 inches and smoothly plastered with three parts clay and one part cow dung, or of clay and chopped straw. A standing place for stoking should be dug to a depth of 18 inches and ramped as shown in fig. 10. At each end of the hearth a wall 1 foot 3 inches high in the centre, and 5 feet 6 inches

long is then made of sods. An opening 18 inches square is left at the ramp end. The next step is to make a roof, which is easily accomplished if a piece of sheet iron is at hand which can be bent into a semi-circle with a diameter of 3 feet 6 inches, but if sheet iron cannot be obtained, two wattle hurdles bent into semi-circular shape with a diameter of 3 feet 6 inches may be tried, or, better still, a piece of wattle work 6 feet long should be obtained and bent to form a semi-circle as above. Whichever form of wattle is used the inner surface must be thoroughly covered with two coats of clay and cow dung mixture. When the mixture is sufficiently set the roof should he placed in position over the hearth previously dug out.

The ends are made as follows :—

(*a*) That nearest the stoke hole is closed with the exception of an opening 18 inches square, the top of which is supported by a piece of iron.

(*b*) That furthest from the stoke hole is made by building a wall touching the sides of the wattle work, but with an opening 6 inches wide left at the end so as to give a vent.

The earth dug out in forming the hearth is now to be neatly banked over the arched roof to the thickness of about a foot.

To heat the oven a fire is made inside it, and when it is fairly alight the chimney hole is closed by a piece of sheet iron covered with earth. When the oven is thoroughly hot the fire is then raked out, and the material to be baked put in.

With the addition of a piece of sheet iron as a hearth this oven can be improved by making a fire-place under it with a chimney at the end (see figs. 12 to 14)

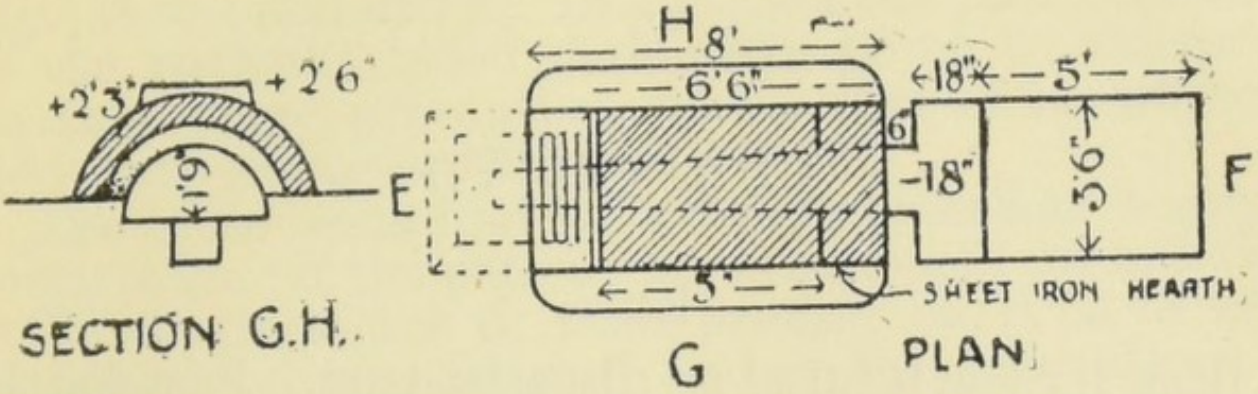


Fig. 12.

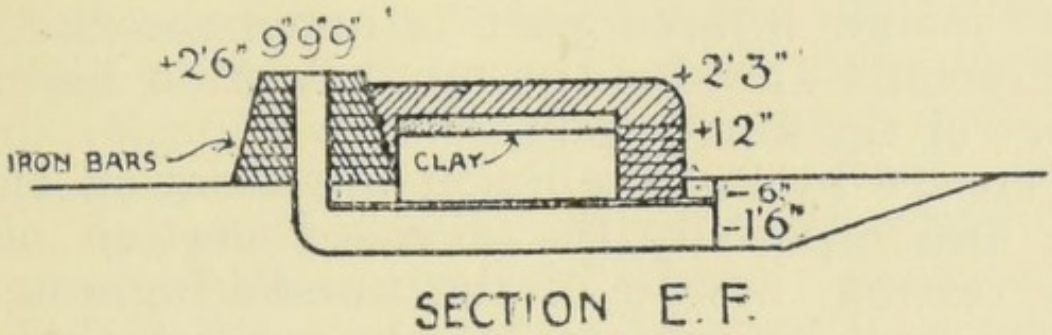


Fig. 13.

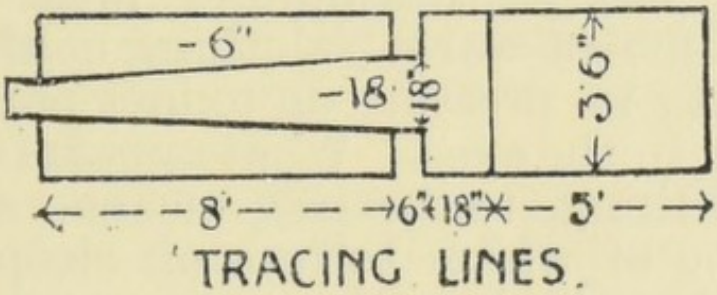


Fig. 14.

This sheet of iron must be at least 2 feet wide and 5 feet long, but a sheet 3 feet 6 inches by 6 feet is better. When heating this oven for the first time a fire is made inside it ; the embers are then raked out and placed in the fireplace below, and several bakings can be done without repeating the process. Overheating of the hearth must be avoided, or the bread or other food standing on it will be burnt at the bottom. The fierceness of the fire can be regulated by a tile or sod used as a damper to choke the top of the chimney.

CHAPTER VI.

Rest.

Rest for the injured or diseased part. Rest for the body and, if possible, rest for the mind.

Rest for an injured part is under the direction of the surgeon. That for the mind is often beyond the doctor's or the nurse's power.

To ensure by an intelligent appreciation that the body, and especially the diseased portion of it, is really resting, is one of the nurse's highest duties. The bed must be comfortable, the position that which gives most ease; the pillows must be properly arranged; the feet warm; clothing neither too heavy nor too light; no pressure on tender parts; no bright light shining in the eyes. What appears to the healthy a very small thing, to the sick means very much, and complete rest, of which refreshing sleep is an index often decides whether the patient tends towards recovery or not.

If one presses one's knuckles on a table for a few moments, the skin on them becomes white, and if the pressure were continued for a week the knuckles would become ulcerated. The reason for this is that the pressure on the skin deprives it of its proper blood supply, and that piece of skin dies. In like manner it is by pressure of the skin between a bone and a hard bed that bed sores are caused. Moreover, the skin when irritated is sure to become inflamed by anything

that is wet and dirty. In addition the poor condition of the patient's blood makes him prone to bed sores, so that every precaution on the part of the nurse is necessary to prevent them.

The cause being understood the prevention becomes more easy. If the patient be so arranged in bed that different parts are in turn pressed on, if he be kept absolutely clean and dry, and if the precautions be supplemented by the use of an air or water bed ; or an air or water pillow, 3 feet by 2 feet under the part, there will be no bed sores to cure, and a great step towards affording complete rest will have been taken.

Air beds are of various patterns, that used in military hospitals having three compartments, the smallest of which is put to the head. Each compartment is inflated separately, and care must be taken not to over-fill them, or the bed will be hard and uncomfortable. An air bed is placed on the top of an ordinary mattress, and should have two under blankets placed over it.

Water beds must be placed on the ordinary mattress of the bed before they are filled and no attempt is to be made to remove one before it has been emptied. Sufficient water to half fill the bed should be put in at a temperature of 90 degrees F.

Care must be taken not to injure an air or water bed with pins, etc., and it must be borne in mind that both are incapable of allowing the passage through them of air and moisture, so that the blankets and sheet above them must be frequently changed or they will become damp with perspiration.

It will often be found necessary to use bed slats with these beds.

Rest out of doors.

Bivouacs.—When there is no wind, spreading trees will keep off cold and dew.

On a still night the air in a slight hollow will be colder than that over the higher portions of ground.

When there is wind and no screen can be found, look for the sheltered spots (*those where you see that the grass does not wave when the wind blows*).

Sleep between large fires or between two rows of small fires, which can be made, when logs are not obtainable, of twigs, leaves, dried cattle dung, &c. If there is only one row of fires, men should sleep with their feet to them.

In very severe weather a bivouac, hut, or tent may be kept warm by burying the red well-burnt embers of a fire in a trench scraped in the ground, and covering them in with a little earth. Charcoal fires in closed tents or huts cause suffocation.

It is unwholesome to sleep rolled up tightly in a waterproof coat or sheet.

When lying on bare ground, scrape a slight hollow for the hip ; this may be enlarged and improved to fit the body.

Those who make the mistake of putting blankets, &c., over them, and nothing under them, will generally suffer from cold on the side on which they lie, from contact with the bare ground ; a bed may generally be made of straw, grass, leaves, heather, twigs, or rushes.

In cold weather or rain, where there is heather or grass, &c. ; part may be arranged as a bed for the party, who lie in a row ; their blankets are then spread over them, and then more heather, &c., by one of the party

for whom a place is kept, into which, last of all, he crawls.

In the absence of other material, screens to keep off the wind may be made of planks nailed to uprights or secured by ropes; or of grass, &c., nipped between pairs of rods tied together; or a light framework lashed together and interlaced with boughs.

When nothing but earth and brushwood is available a comfortable bivouac for twelve men can be formed by excavating a circle with a diameter of 18 feet or thereabouts and piling up the earth to form a wall 2 or 3 feet high. The men lie down like the spokes of a wheel, with their feet towards the centre. Branches of trees or brushwood stuck into the wall improve the shelter.

Shelters.—A wattle hurdle or a slat hurdle with branches or straw interlaced in it may be supported as shown in Fig. 15.

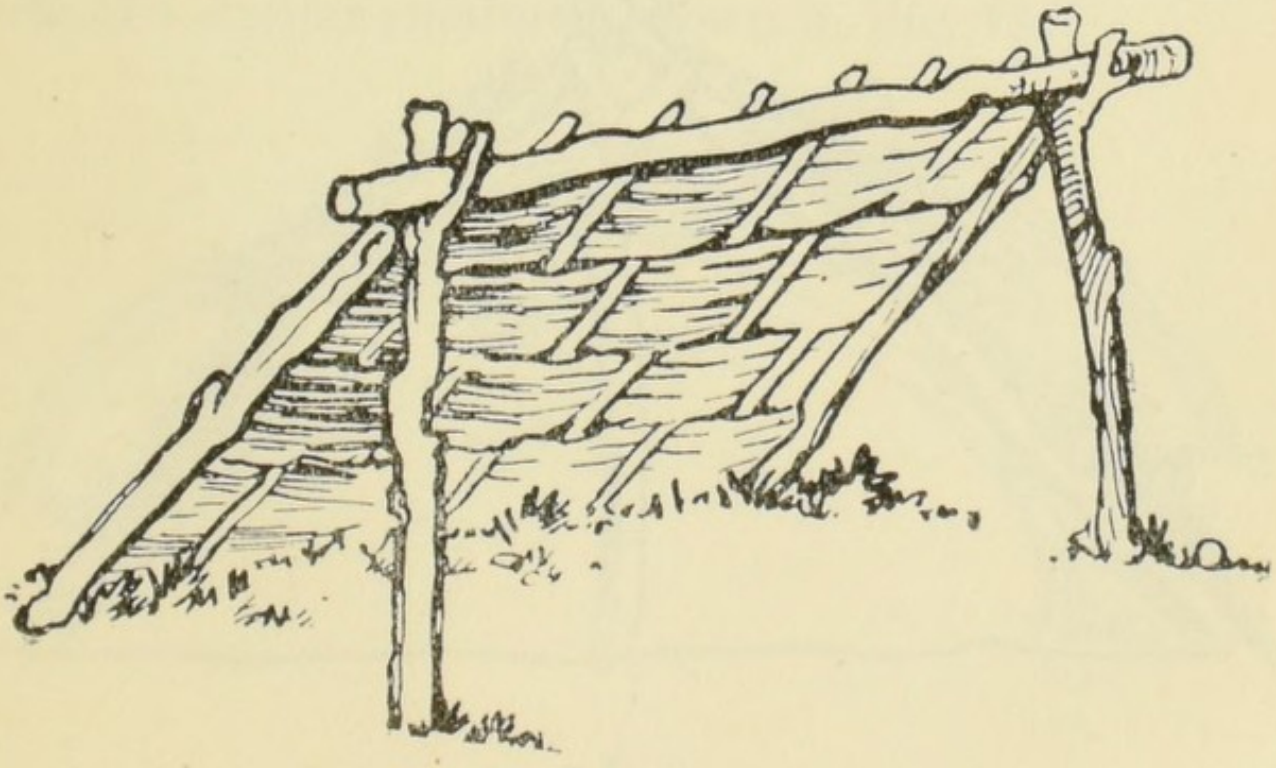


Fig. 15.

A waterproof sheet, blanket or piece of canvas may be supported by poles and cords (Fig. 16).

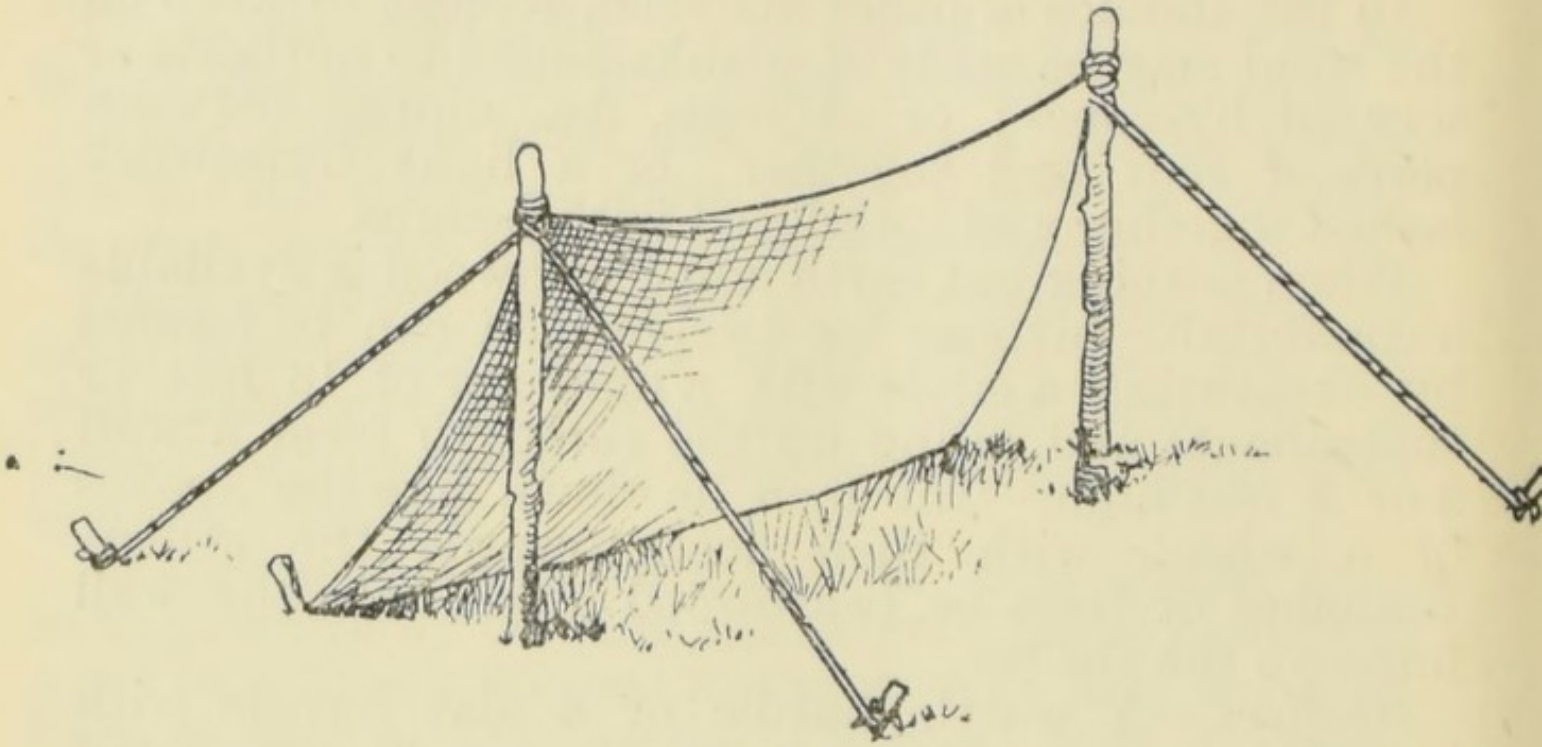


Fig. 16.

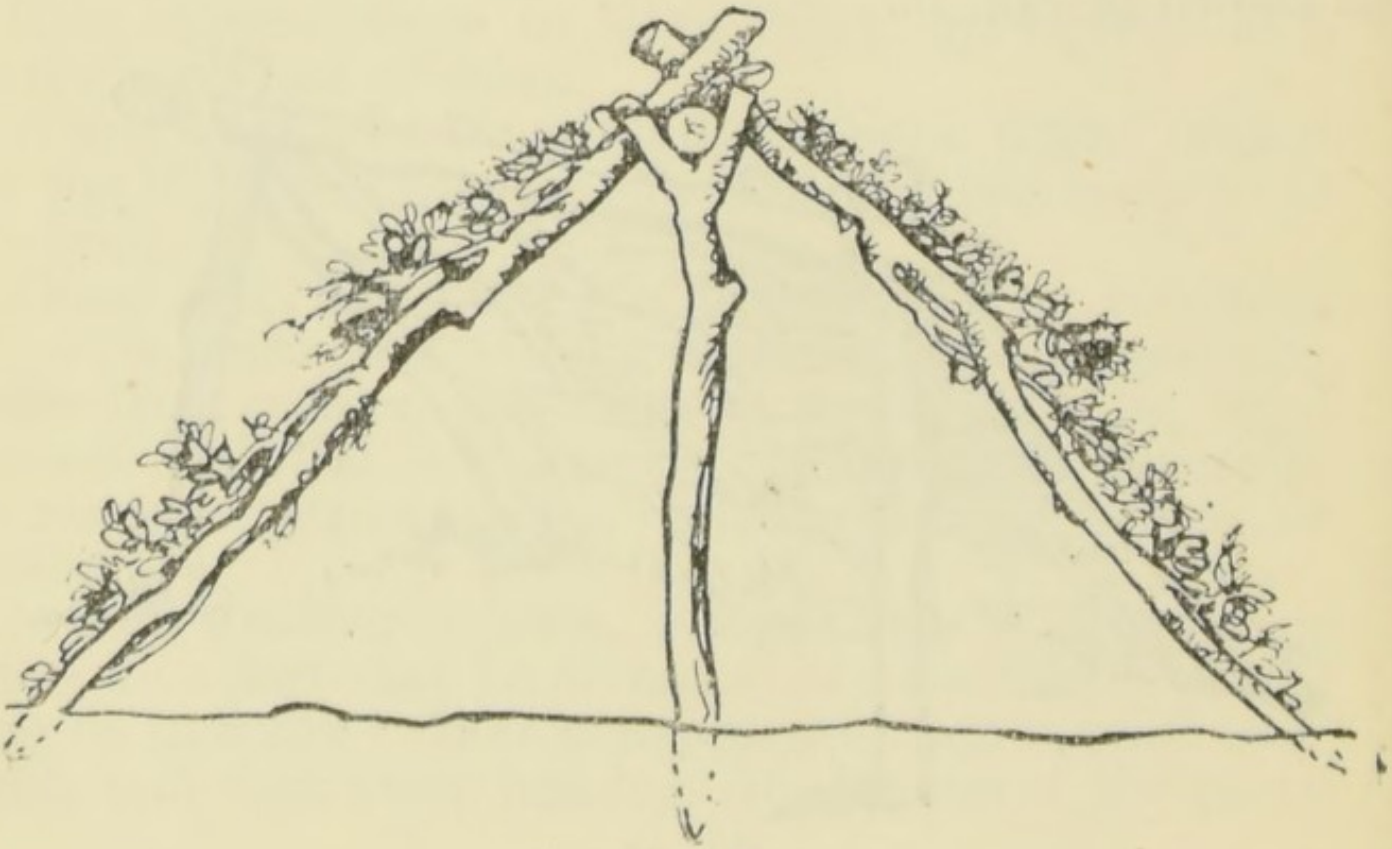


Fig. 17.

Two forked sticks driven into the ground with a pole resting on them ; branches are then laid resting on the pole, thick ends uppermost, at an angle of

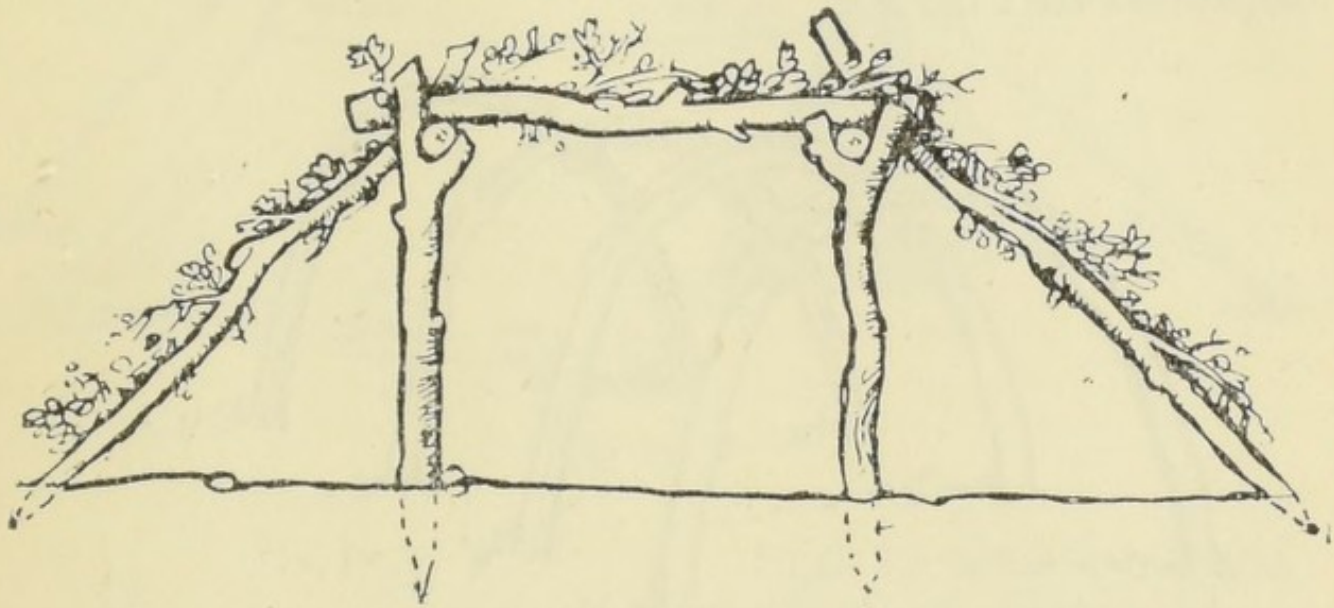


Fig. 18.

about 45°, and the screen made good with smaller branches, ferns, &c. (Fig. 17). A more convenient form of a similar shelter is shown in Fig. 18.

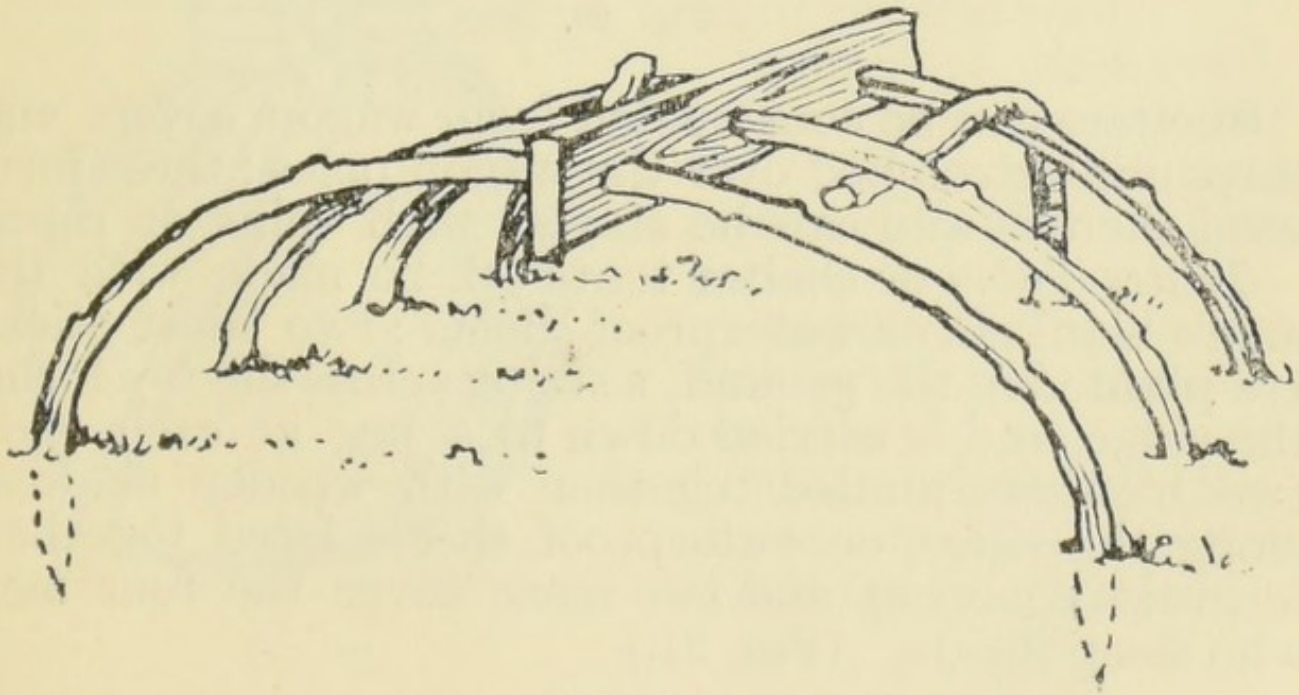


Fig. 19.

The framework of a gipsy shelter is shown in Fig. 19, and that of another form made by tying pliable branches together and inserting the ends in the ground is depicted in Fig. 20.

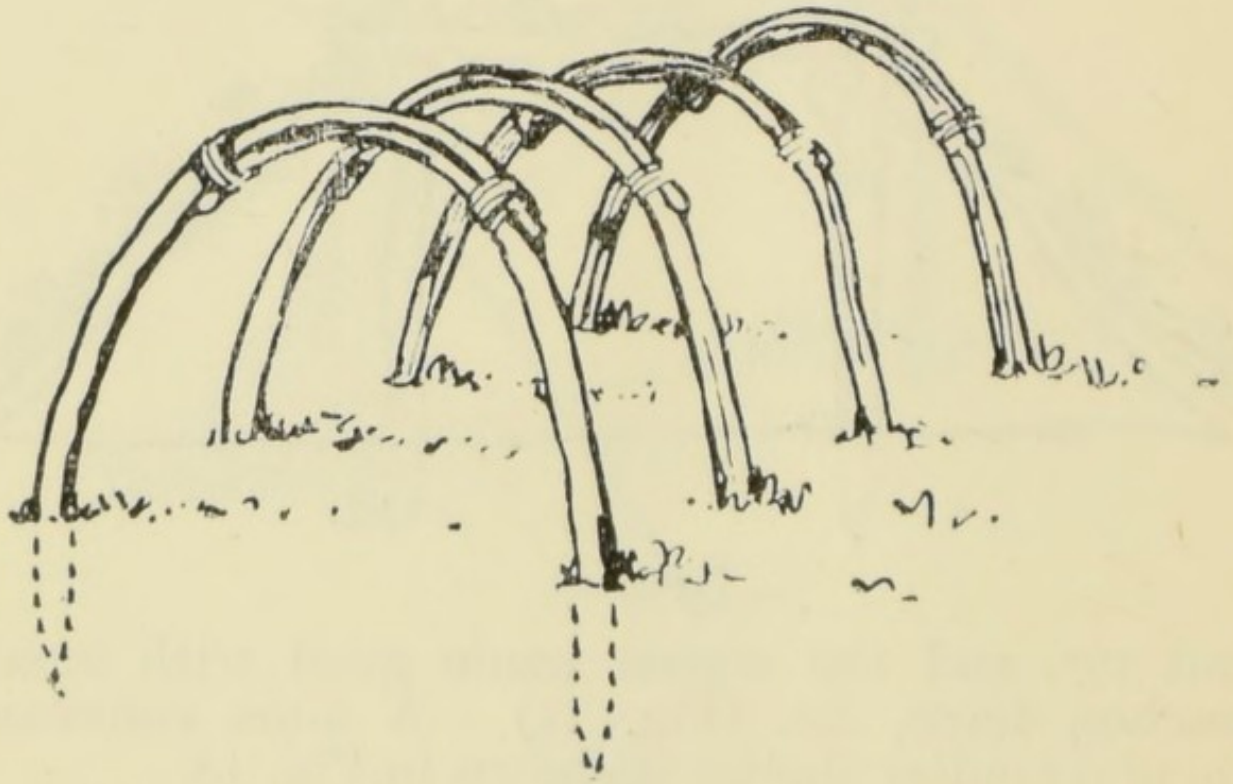


Fig. 20.

Shelters can be constructed from wagon covers and tarpaulins stretched over the wagon poles ; these form good shelters and can be stayed with reins or ropes.

Tentes d'abri or shelter tents can be made with the men's blankets or waterproof sheets ; two short sticks are planted in the ground, a string across the top forms the ridge, and is carried down to a peg at each end ; two blankets pinned together with wooden skewers along the ridge, or waterproof sheets laced together, form the covering, and two more cover the four men who sleep inside. (Fig. 21.)

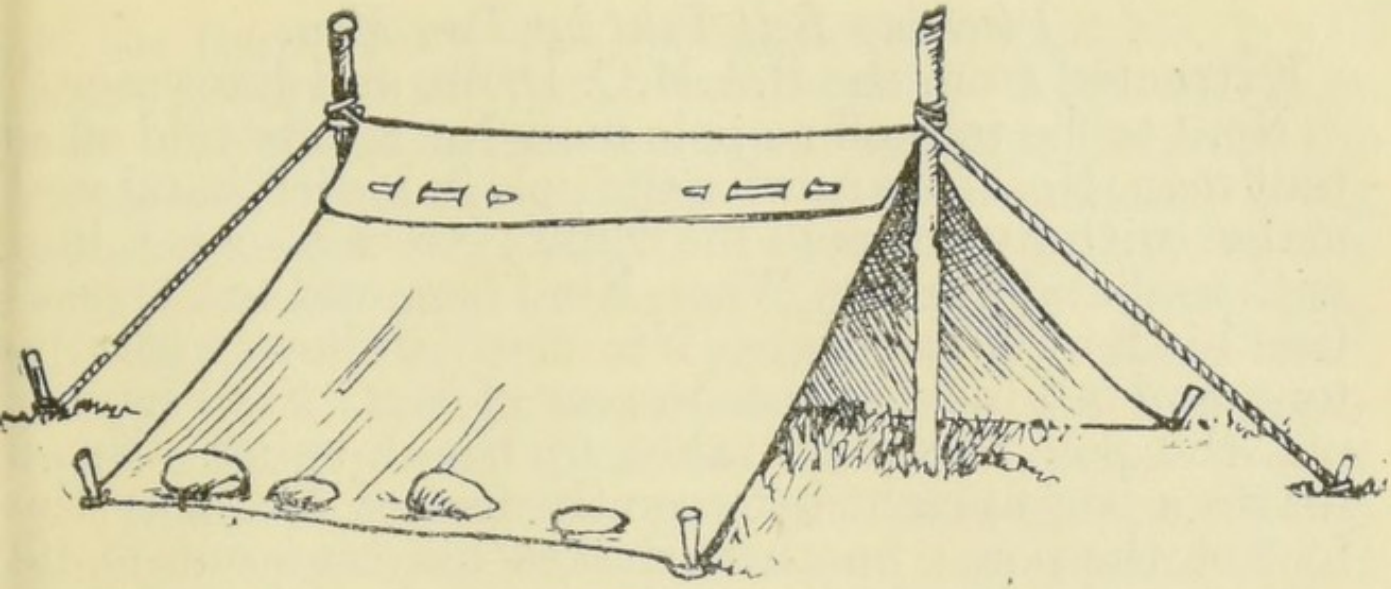


Fig. 21.

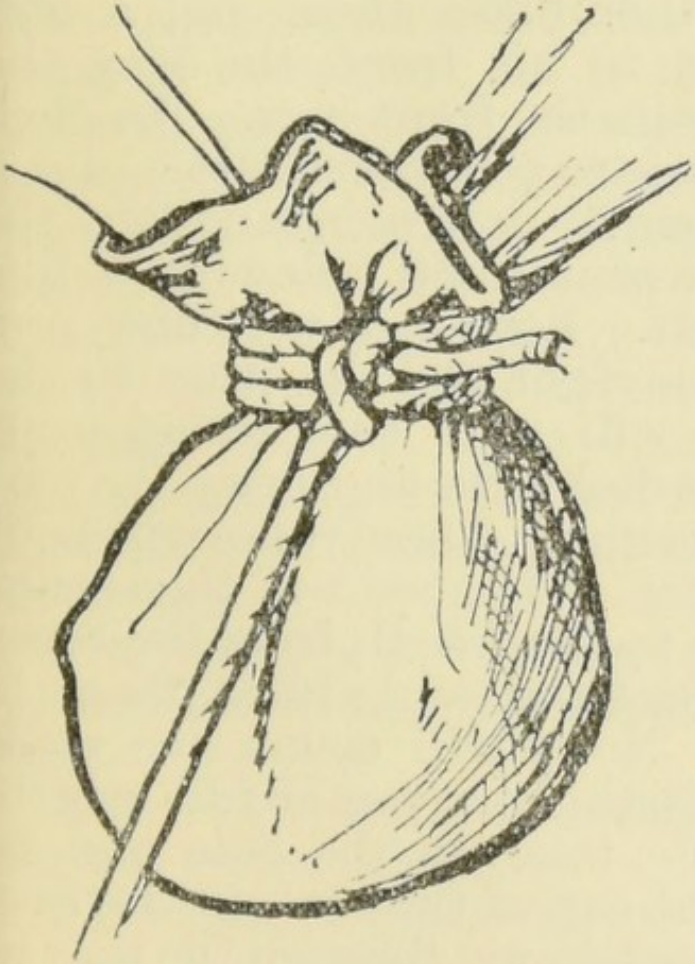


Fig. 22.

Fig. 22 shows a good method of fastening a cord to the edge or corner of a sheet or blanket, by wrapping up a small stone to form an attachment for the cord.

Stretchers, when available, make excellent beds; they can be used either with their rollers resting on the ground, or supported head and foot by biscuit boxes or packing cases placed beneath their handles, or on wooden trestles made for this purpose.

Pitching Bell Tent by Two Men.

Extracted from the R.A.M.C. Drills and Exercises.

No. 1 to be told off as pole man, No. 2 to be told off as tent man. No. 1 falls in with the pole in his left hand, and mallet with five pegs in his right; No. 2 to cover him with tent and pin bag. When No. 1 is moved to the position his tent is to occupy, No. 2 will follow with the tent, and fall in five paces in rear of him. No. 1 having put the pole together, takes up his dressing. No. 2 drives a peg upright between the feet of No. 1 at the foot of the pole; he then shakes his tent out of its valise, and spreads it on the ground with the door uppermost. No. 1, when the peg is driven, lays the pole on the ground. He then takes three and a half paces from the centre peg to his front, the way the door is to face, and drives in the front peg. He then turns about, goes to the centre peg, takes three and a half paces to the rear from it, drives in another, the rear peg, returning to the centre and following a like course to the right and left. Both men will now proceed to the tent, one to the right and the other to the left of the door. Each will take the second rope counting from the door on each side, and draw the tent on to the ground it is to occupy. These ropes will both be attached to the front peg. The men will then count the ropes until they come to the fourth from the ropes already fastened to the front peg, and attach them to the right and left pegs. No. 2 will count five more ropes, and fasten the last to the rear peg at full length. No. 1 will, in the meantime, take up the pole and fit the smaller end of it in the cap of the tent, in the case of a double circular tent, passing it through the hole in the inner lining, keeping the bottom of the pole to the front. No. 2 will assist in fitting the pole into the top

of the tent. No. 1 will get inside the tent, No. 2 will hook the fly of the tent over the pole. No. 1 will raise the pole about 3 feet from the ground, keeping the bottom of it on the ground. On the command being given to raise the tent, No. 1 works the bottom of the pole inwards until it comes against the centre peg, lifting the upper end of the pole at the same time. No. 2, when the tent is raised, tightens the five ropes which have been fixed to the four pegs. No. 1 continues to support the pole until this is done. When the tent is secure, No. 1 comes out and assists No. 2 in driving pegs and fastening ropes in the following manner :—The runner of each rope is slid half way up. The loop thus formed is drawn out in a line with the seam of the tent. It is then brought down to the ground, and at the spot where it touches the ground a peg is driven. This is continued until all the ropes have been made fast. Those to the windward should be first driven. The two second ropes, which were first fixed to the front peg, are now separated—a peg being driven for each. The curtain of the tent should now be pegged down. The door of the tent should be opened, the ropes attached to its lower corners being fastened to the second peg on the right and left of the doorway.

The mallets, spare pegs, pin bag, and valise are placed inside the right hand side of the door of the tent.

When the tent is correctly pitched the pegs should form a perfect circle.

Trenching a Tent.—Should it be necessary to trench a tent, it is done in the following manner :—Before the curtain of the tent is pegged down, a cut is made with a spade all round where the edge of the curtain touches

the ground. This cut is made with the spade held upright, about 6 inches deep. A second cut is made leading into it, about 6 inches from it all round. The turf, so cut out, is laid with the grass downwards round the outer* edge of the trench. The curtain is then pegged down into the inner side of the trench.

Striking a Tent.—To strike a tent, both men will take off and coil down all the ropes but those attached to the two front, right, left, and rear pegs. The fly is unhooked; No. 1 goes inside and takes hold of the pole; No. 2, in the meantime, draws out all the pegs to which the ropes are not fixed. The pegs holding the curtain will have been drawn out already. On the command to strike being given, No. 1 runs out of the door of the tent with the pole. The five remaining ropes are now cast off and coiled down. No. 2 now takes hold of the point of the tent and draws it to the rear, door upwards. Keeping the door upwards in the centre, the tent is spread out flat on its side. No. 1 places his foot on the point of the tent; No. 2, taking the edges, folds them over so that they meet at the door. This is again done, and then the right half of the tent is folded over the left. No. 1 now takes the point. and brings it half way down the tent. Nos. 1 and 2 then roll the tent as tightly as possible, from the smaller to the larger end, and put it into its valise. Mallets are taken apart, and their heads put into the peg-bag with the pegs. Their handles are put into the tent valise. The pin bag is then put into the valise on top of the tent, and valise laced up. No. 1 takes the pole to pieces, and holds it in his left hand. No. 2 falls in in rear of him with the valise.

* Laying the turf round the inner edge of the trench would appear to afford better protection, the object being to keep water out of the tent.—G.E.T.

CHAPTER VII

Cleanliness.

On the arrival of the wounded or sick soldier, his dirty clothing must be taken away, his body washed, his hair cut short and cleaned, and clean clothing put upon him. He must while in bed be kept scrupulously clean and when he is able to get up either his own or hospital clothing must be clean ready for him.

A patient too ill to go to the bath, must be washed all over in bed on admission, and at least once a week. The washing must be done between blankets with a piece of waterproof under the lower one. When washing a patient, any swellings, scars, scratches or sores should be noted and afterwards reported.

Every morning patients confined to bed should be washed back and front as far as the waist and over the buttocks and hips. The hands should be washed in the middle of the day, and the face and hands again washed at night. The hair must be brushed and combed twice a day, and the patient's brush and comb should be washed at least once a week. The teeth must be washed daily.

When the mouth has to be washed out a solution of boracic acid or lemon juice and glycerine may be used. The teeth, gums, roof, and sides of the mouth should all receive attention. The best sponges for the purpose are squares of white guaze or lint, which should be wrapped round the index finger, soaked with the wash, and inserted into the mouth. Immediately after use they should be burnt.

The kits of patients brought by them to hospital must be disinfected and washed as soon as possible. This will best be carried out by soaking in a suitable disinfectant and subsequent boiling.

The biscuit tins which are daily left behind by the army can well be utilized as boilers being built upon bricks or mounds of earth, and for solutions other than those of corrosive sublimate they can also be used for the preliminary soaking. If corrosive sublimate be used half barrels are most suitable for the soaking. Leather articles cannot be either soaked or boiled.

After boiling the articles should be well washed, and either a temporary washhouse can be put up, or in a small hospital the ablution place used for this purpose during certain hours each day. It is not essential that the washing should be done at the hospital provided it is ensured that it is well done.

The same procedure must be adopted for all articles of personal clothing and bedding used by patients while in hospital.

Cleanliness in its medical and surgical sense means, however, far more than its every day significance. In this sense it is usually called "*asepsis*," and on the amount of care taken to keep the sick, their surroundings and every person and thing with which they come in contact, in an aseptic condition depend to an enormous extent the chances of their recovery and the prevention of the spread of disease.

Infectious disease is spread by living things, called microbes or germs, which are so small as to be invisible without the aid of a powerful microscope. While the vast majority of microbes are of service to man, others

are harmful, and it is by these that infectious diseases are caused. Should these disease germs enter and establish themselves in man's body they multiply with extreme rapidity, principally in the blood and excrete a poison (*toxin*), which circulates and causes disease. Man is capable of making in his body an antidote to this poison, and his recovery depends on the issue of the battle between the toxin and the antidote (*anti-toxin*).

As soon as the disease germs are firmly established in a man's body he is able to communicate his disease to those about him, especially if they have not been rendered more or less safe by a previous attack or by inoculation. The common channels of infection are :— In enteric (also called typhoid) fever the stools, urine, and vomit ; in scarlet fever, the nose, ears and skin ; in diphtheria, measles, and whooping cough, the excretions from the throat and air passages.

Man can receive infection by cuts, scratches, or other wounds of the skin, by the air he breathes or by his food and drink. Tetanus or lock-jaw is caused by the fouling of wounds by earth, malaria, and yellow fever from the bites of mosquitoes, sleeping sickness from the bites of a fly found in Africa, and plague from the bites of fleas from rats. Infectious germs in the air are usually borne by dust, those of small-pox being capable of travelling a great distance. Milk and water are amongst foods the commonest means of conveying infection, but shell fish fed in water polluted by sewage and uncooked foods may act in the same manner. Milk may receive disease germs from the cow or from an infected person, while water may be polluted by sewage or by the excreta of even one person.

The liability to receive infection depends partly on the number and strength of the germs and partly on the person's power of resistance. This latter is governed by the vitality of certain corpuscles in the blood called lemocites which have the power of enveloping and destroying the microbes entering the blood. The strength of these corpuscles varies in different individuals, but is lessened by improper feeding, fatigue, and injury, the abuse of alcohol being the most detrimental of all.

Medical or surgical cleanliness includes :—

1. Absence of breeding places for disease germs.
2. The destruction as far as possible of all disease germs wherever they exist outside the body.
3. The destruction of any kind of insect life which may possibly act as a carrier of disease germs.
4. The prevention of other means by which disease germs are carried.
5. The protection of food supplies including water.

1. *Absence of breeding places for disease germs.*

Every grain of moist organic matter especially in a shady nook is a breeding place for disease germs.

If the fly has no other use he will at least point these out and indicate where, by using a strong antiseptic you may destroy these noxious colonies. It is not for a moment to be understood that a deodorant or even a powerful germicide should take the place, either of avoiding making dirty or subsequent absolute cleanliness with soap and water. Prevention if possible, the germicide if not prevention, soap and water to end all.

The cleanliness of bed pans, spit cups, urinals and commodes, is a matter of the greatest importance.

If arrangements can be made they should be boiled before being taken back to the ward; if not, after thorough cleaning they should be kept in an antiseptic solution. Solution of perchloride of mercury must not be used in metal utensils.

Outside the building we burn all kitchen refuse and all hospital refuse, in fact anything which is dirty or useless and will burn. We use dry earth and abundant disinfectants in and on every place which the fly indicates, and impress on all that no water either clean or foul is ever to be thrown from the hospital building or kitchen on the ground outside instead of being emptied down the drain.

Should there be no proper drainage system a 'filter" as shown in Fig. 23 should be prepared. A and B are pits connected by a tunnel C all being filled with loose stones. Slops and other dirty water are thrown into the open drain and are prevented by the obstruction D from running along the continuation of the drain without passing through the loose stones under the earth E above the tunnel. Antiseptics should from time to time be poured into pit A. Instead of loose stones, brushwood may be used in the pits and tunnels and should be changed and burnt periodically.

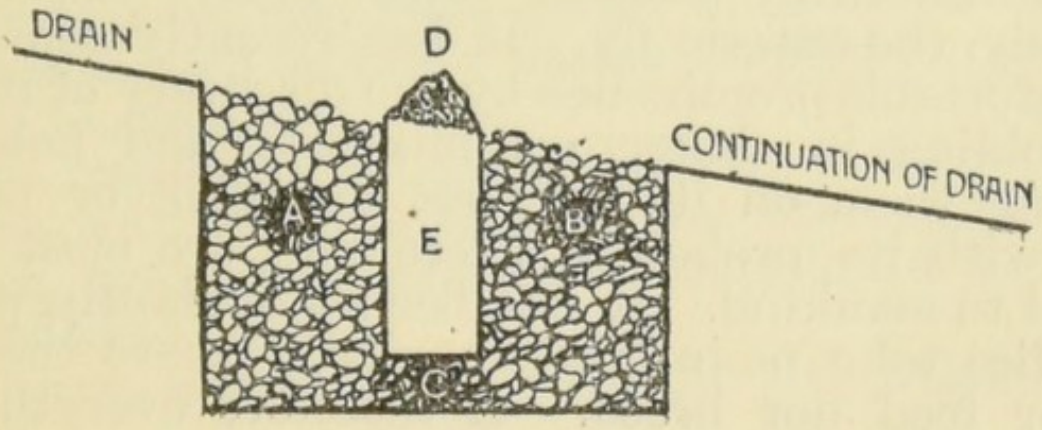


Fig. 23.

2. *The destruction as far as possible of all disease germs wherever they exist outside the body.*

This means that all discharges from the patient while in bed must be passed into a germicidal fluid and that such discharges and all soiled surgical dressings shall be burned.

That all utensils, etc., used by him must be thoroughly disinfected.

That all clothing of any sort which the patient has soiled, or has even been in contact with, must be soaked in an antiseptic solution or boiled, or preferably both.

That all latrines and urinals must have constant supervision so that they may not become either directly or indirectly centres of disease.

That all places which harbour dust and germs must be kept scrupulously clean so that disease germs may not find new hosts by this dust being blown about. To this end not only must dusting be done with a cloth damped with antiseptic fluid but the floors should be sprinkled with such a solution from a watering pot not only before being swept but morning and evening daily as well.

3. *The destruction of any kind of insect life which may possibly act as a carrier of disease germs.*

Our American cousins have aptly called the house fly, the enteric fly. It has recently come into uncomfortable prominence by the discovery of its way of dabbling in dangerous mixtures and not only carrying them on its feet but dropping or placing them with its proboscis where they are most detrimental to mankind. It has been adundantly proved that flies take no interest in places where they can neither feed nor breed. If therefore everything is

kept scrupulously clean, refuse of every kind is at once burned and all food supplies protected, the fly will not come to our hospital. The task of getting rid of flies in this way is by no means an impossible one and on its accomplishment depends the safety of many.

It is now definitely known that different varieties of mosquitoes practically inoculate human beings with malaria and yellow fever. It is then safe to infer the possibility of other diseases being so carried from man to man by all insects which feed on mankind. This is an extra reason, if one were needed, for every care that lice, fleas and bugs be not found in our hospital.

Akin to the mosquitoes are many kinds of gnat and like them they breed rapidly in standing water. The measures which have proved effective against the mosquitoes' breeding places are equally so against these possible carriers of disease. If possible no shallow pools or stagnant water must be allowed; paraffin must be poured on those which cannot be removed; izal or other strong disinfectants must be mixed with the water kept in the fire buckets.

4. *The prevention of other means by which disease germs are carried.*

The ward dust has already been spoken of but the outer dust too may have germs in it and water carts should be used or other means adopted to prevent its being blown about.

The freedom of this outer dust from disease causing germs will much depend on the thoroughness with which the points previously mentioned have been attended to.

Disease is too often carried to sick attendants by

their own hands and it cannot be sufficiently impressed on all those dealing with the person, clothing or dejecta of a case of contagious disease that after contact their hands must immediately be washed and disinfected.

It is sad to see how often familiarity with disease breeds contempt, a contempt the result of which is often death.

5. *The protection of food supplies including water.*

Food of every kind must be protected not only from the fly, but also from contamination by dust either from the ward or outside.

All food and drink which may have been exposed to such contamination before its receipt at the hospital must be rendered safe either by boiling in the case of water and milk, or by cooking at such heat as to destroy germs.

Apart from trying to ensure the absence of the fly all supplies should be protected by gauze or wire screens, and no food should be kept in a ward.

It may seem hard to expect the nurse to take the extra trouble which fetching the food even from a little distance involves, but unquestionably the gain in life will more than compensate the energy expended.

By *disinfection* is meant the actual destruction of disease germs. The true disinfectant must therefore be carefully distinguished from the *deodorant*, which merely consumes the smell, for example, earth thrown over stinking filth, and from the *antiseptic* used to check the growth of germs. As burning necessarily kills germs, everything infected and not again required, and all infected stools and urine should be mixed with

sawdust, or other combustible substance, and paraffin and *burned.*

Disinfection should be applied :—

1. To the discharges from infected persons.
2. To the bedding and clothing soiled or used by infected persons.
3. To the rooms occupied by and the surroundings of infected persons
4. To the hands etc.,of those in contact with infected persons.

1. *Disinfection of discharges from patients.*—Stools or motions should be received into a bed pan containing a five per cent. solution of carbolic acid, a three per cent. solution of cresol, or a two per cent. solution of cyllin, izal or kerol. The urine or vomit, if any, should be treated in exactly the same way, taking care that an amount of the disinfectant solution equal in bulk to that of the material to be disinfected be added and mixed with the excreta by means of a stick. In the case of motions or stools, this may be taken to be quite eight fluid ounces, and urine and vomit to be at least four fluid ounces. Urine from enteric patients must always be disinfected.

Discharges from the throat, nose and mouth of patients should be wiped away with Japanese paper handkerchiefs or pieces of linen rag, which should be afterwards immersed in one of the above solutions or burnt.

The minute flakes of skin from patients suffering from such diseases as small-pox and scarlet fever are very liable to spread infection, and such patients should be bathed frequently or oil or vaseline smeared on their skin.

2. *Disinfection of bedding or clothes soiled or used by*

infected persons.—Boiling is the best method of disinfecting linen and cotton goods, but to avoid risk of infection while they are being handled in the laundry they should be soaked in one of the above mentioned solutions for an hour. The addition of a little ordinary washing soda to the water hastens the process of disinfection. Bichloride of mercury is apt to fix, stain, and darken linen, so where it is desired to retain the colour of the articles it should not be used.

The disinfection of woollen articles, blankets and mattresses is best effected by exposing them to hot air or steam as they are liable to shrink if boiled. In removing these articles to the place of disinfection they should be enclosed in canvas bags or in sheets which should be disinfected with them. When it is impossible to disinfect mattresses and pillows by steam, they should be taken to pieces very carefully, the covers boiled and the stuffing exposed to formalin vapour and then to sun and air.

Furs, boots, shoes and gloves are spoilt by steam. If they need disinfection they should be exposed to the vapour of formaldehyde.

Bedding and clothing for the use of patients suffering from infectious diseases should be kept apart and clearly marked with the letter "I."

3. *Disinfection of rooms occupied by and the surroundings of infected persons.*—Rooms which have to be disinfected can only be treated when the patient has left them. There are four chief means of disinfecting room surfaces (on which germs are liable to be logged).

(*a*) Dry rubbing the walls by means of bread or dough. The crumbs should be afterwards collected and burnt *in the room.*

(*b*) Washing or scrubbing with soap and water or some ordinary disinfectant solution.

(*c*) Spraying with a disinfectant solution preferably formalin and glycerine. This method may be applied to the floor, walls, ceiling and furniture, and is usually found suitable for the purpose. When spraying is the method adopted the room must be left closed at least three hours so as to allow the disinfectant to take full effect.

(*d*) Fumigation is probably the most easy and least troublesome method. The chemical agent usually employed is sulphur dioxide. All cracks, crevices, apertures and holes by which gas or air can escape must be carefully pasted over and closed. If this is neglected, fumigation is more or less useless. Sulphur dioxide is generated by burning 1 lb. of sulphur in a metal dish for every thousand cubic feet of space in the room, but it can also be obtained in specially prepared cans. The sulphur is placed in a saucepan supported over a bucket of water, and its ignition aided by pouring some methylated spirit over the sulphur and then setting it alight. The room must be carefully closed and kept so for at least three hours.

4. *Disinfection of the hands of those in contact with infected persons.*—The disinfection of hands is most important for all attendants on the sick. A solution of bichloride of mercury 1 in 1,000 or one of the solutions already mentioned may be used for this purpose, but these must be supplemented by a free use of a nail-brush and soap and water. A solution of bichloride of mercury can be prepared by dissolving half an ounce of the bichloride in three gallons of water and then adding one ounce of strong

hydrochloric acid. To avoid accidental poisoning this solution should be coloured with either a little fuchsin or aniline blue.

Water to be drunk by human beings should stand the following tests :—

1. It should have no taste or smell.
2. It should show no colour when put into a glass vessel twelve inches high placed on a sheet of white paper and looked down upon.
3. It should throw down no sediment on being allowed to stand for twelve hours.
4. It should not become milky on the addition of a solution of lunar caustic (nitrate of silver), but even these qualities do not *prove* the absence of disease germs.

Our water supplies are primarily derived from rain, which, on falling either lies on the surface of the ground or soaks into the earth. The latter is the underground water which either again comes to the surface by means of springs or can be reached by wells. Water supply can therefore be divided under three heads :—

(1) Rain.

(2) Surface water which lies on the earth in puddles, pools, ponds, etc., or flows in rivers, and

(3) Underground water rising as springs or reached by wells.

The water from either of these sources may be either clean or unclean.

Rain Water collected from roofs, etc., is nearly always dirty owing to the surfaces over which it passes

Surface Water varies in quality, that flowing from

high ground over country where men and animals are absent is naturally cleaner than surface water exposed to contamination by men, animals, and their excretions. Water in pools, ponds, etc., should always be viewed with suspicion.

Underground water is generally pure, especially when it rises to the surface by means of a spring. The purity of underground water reached by wells depends upon the nature and cleanliness of the surrounding soil and on the safeguarding of the well from surface washings.

The safest water is that from springs, and deep properly protected wells. Next follows water collected from hills above the haunts of men and animals. These three may be considered safe, while all other forms, especially that from rivers polluted by sewage, and from shallow wells and through improper filters are dangerous.

Impurities of water may be divided into two classes ; those which are dissolved, and those which are in suspension. As a rule dissolved substances are harmless, and the suspended matter is generally the real impurity. This suspended matter may be visible to the eye, in which case it would probably be sand or mud, or it may consist of germs and living things so small as to be invisible without the aid of a microscope, although the water appears absolutely clear and crystal-like. It is, however, unusual for germs and other invisible impurities in water not to be associated with matter that can be seen. It has already been shown what mischief is worked by the invisible germs, but sight must not be lost of the injury done by the coarse matter such as sand and grit, which acts as an

irritant to the bowels. In connection with this irritation must be considered the probability of germs being associated with the coarser matter, and it becomes apparent that no water that is not clear can be regarded as fit to be drunk by human beings. The methods by which to attempt to purify water are :— (1) Filtration ; (2) Precipitation ; (3) Sterilization.

Filtration is nothing more or less than straining, and its success depends on the thoroughness with which the suspended matter is separated and kept back from the water passing through the filter, or in other words, on the fineness of the material used as the filtering medium. No filter can be considered efficient unless it is capable of stopping the passage through it, not only of the visible, but also of the invisible suspended matter. The more nearly the type of filter corresponds with that consisting of a porcelain cylinder through the porous substance of which the water has to pass, the more efficient it will be, but it must be remembered that these cylinders must from time to time be sterilized, otherwise the germs kept back will find their way through, and the filter will be worse than useless. Water that has passed through an efficient filter is usually flat, but may be aërated by pouring it from a height from one vessel into another two or three times.

Precipitation.—Alum if added to muddy water in the proportion of a tablespoonful to a bucketful will form a cloud which will slowly fall and carry with it most of the mud and other suspended matter leaving a clear liquid. It acts best in water containing lime; rain and other soft waters are not readily cleared by its use. The process takes an hour or more, but when

no filters are available alum makes a useful substitute. Alum will not kill the germs and to make certain that this is done the cleared water should be boiled.

Permanganate of Potash, if added to water in sufficient quantities to make it pink has like alum a precipitating action, and also a slow and mild destructive effect on germs, but it cannot be relied on to purify very foul water. The germ most readily killed by permanganate is that of cholera. Permanganate of potash gives no taste to the water, and is quite harmless to anyone drinking the water in which it is dissolved. For cleaning out barrels, tanks, cisterns and other receptacles for storing water, the addition of permanganate of potash is extremely useful. Sufficient should be added to the water to keep it a good rose pink which should then be well stirred in the receptacle to be cleaned and allowed to stand for three hours.

Sterilization.—Boiling the water destroys germs contained in it, but renders it flat, and the water should be aerated as mentioned above to improve its taste.

The acid Sulphate of Soda is practically sulphuric acid in a solid form. It is supplied in tablets one of which dissolved in $1\frac{3}{4}$ pints (the quantity contained in a soldier's water bottle), will kill in half-an-hour any disease-producing germs which may be in that water. The water will taste slightly acid, but not unpleasantly so, and is quite fit to drink.

When a temporary camp is pitched near a river or stream, the direction of the flow of water must be noted and the following arrangements made.

1. Men's drinking and cooking water should be pumped into the water carts from the highest available part of the stream.

2. Somewhat lower down buckets and waterbottles should be filled.

3. Horses may be allowed to enter the stream to drink still lower down, going in at a point lower than that at which they come out.

4. Beyond this the men may wash and bathe.

CHAPTER VIII.

Enemata.

An enema is a liquid preparation introduced into the rectum, usually by means of a syringe but sometimes with a catheter provided with a funnel.

Enemata are either (*a*) *Purgative*, to produce an action of the bowels; (*b*) *Medicinal*, to relieve pain or to act as a stimulant or astringent; (*c*) *Nutrient*, to feed the body or to relieve thirst.

When administering an enema it is most convenient to place the patient on his left side, but it may be necessary he should lie on his back.

With the patient lying on his left side the hips are brought to the edge of the bed and the lower limbs are bent at the hips and knees. A waterproof sheet previously warmed and covered with a towel is then placed under him, and the bedclothes all but one blanket are turned back. The first finger of the left hand is placed lightly on the anus and the tube, which has been previously lubricated, is passed beneath it into the rectum first upwards and then upwards and backwards without using force. When a Higginson's syringe is used the liquid is contained in a vessel suitably placed and is pumped in with the right hand. Hurrying should be avoided, five minutes being allowed to inject a pint.

With the patient on his back he is brought to the edge of the bed and the right knee bent. Placing the first finger of the left hand lightly on the anus the

tube is passed with the right hand into the rectum backwards and slightly downwards.

In both cases when the injection is finished the tube must be gently and gradually removed from the rectum. A folded towel is then pressed upon the anus and the buttocks closed to assist retention of the liquid.

Air should be expelled from the tube before it is used by pumping some of the liquid through it. When giving a purgative enema a wise precaution is to have a warmed bed-pan at hand.

Many of the following recipes are abridged from the R.A.M.C. Training.

Purgative Enemata.

Soap and water.—Dissolve an ounce of soft or common yellow soap in a pint of water and administer at a temperature of about 100° with a Higginson's Syringe often with a No. 12 catheter attached to the nozzle. The enema should be retained from eight to ten minutes.

Glycerine.—This is usually given by means of a special vulcanite syringe holding half an ounce, the usual quantity being from one to two drachms.

Turpentine.—When given as a purgative, one ounce of oil of turpentine is mixed with fifteen ounces of thin starch.

For the relief of abdominal distension, half an ounce is usually given in two ounces of thin starch.

Olive-oil.—An olive-oil enema consists of four ounces of oil with eight ounces of thin starch or four ounces of olive-oil run into the bowel by means of a glass funnel and long piece of rubber tubing, followed in

half an hour's time by an ordinary soap and water enema, or four ounces of oil can be beaten up with sixteen ounces of soap and water and injected.

Castor-oil.—This consists of one ounce of castor-oil mixed with ten ounces of thin starch, or one ounce of castor-oil mixed with three ounces of olive-oil may be warmed and injected, and followed in half an hour by a soap and water enema.

Medicinal Enemata.

Chloral or chloral and bromide is given as a sedative in an enema of from one to two ounces in bulk in cases of fits or delirium when the patient is unable to swallow.

Brandy and water (one ounce of each) is given slightly warmed when collapse is feared.

Starch and opium.—This is given for the relief of pain or to check excessive diarrhœa.

Two ounces of thin starch are mixed with the prescribed amount of laudanum and heated to a temperature of 100° F. It is then slowly injected into the bowel by means of a glass syringe and a rubber tube.

Nutrient Enemata.

These are given when a patient is taking insufficient food by the mouth, or when the stomach must be kept completely at rest. The powers of digestion possessed by the rectum being limited, any food given in this way must be thoroughly digested by means of "Peptonising powders" before use. Four ounces administered every four hours is the usual quantity for an adult.

Peptonised milk is usually the chief constituent of

these enemata. The enema should be strained before administration and be at a temperature of 100° F.

Patients systematically fed by the bowel should have a plain water enema once in every twenty-four hours, and in addition, before each enema is given, the rectum should be gently washed out with warm water or warm boric lotion. To do this a soft catheter, well oiled, to which a piece of rubber tubing with a glass funnel at the other end is attached, is passed into the bowel. By pouring warm water or boracic lotion slowly into the raised funnel, and then lowering it before it is quite empty to allow the water to run out again, the bowel is well washed. The enema would be given by means of the same apparatus. The time taken in administering four ounces should be at least five minutes.

A nutrient enema containing as much as one pint is sometimes ordered. The tube which must be fairly large, must be passed not more than seven inches into the rectum and half an hour at least must be expended in giving one pint.

A large quantity can also be given by means of an irrigator suspended above the bed, and connected by means of rubber tubing with a catheter in the rectum. The tubing is compressed by a clip so that fluid from the irrigator can only be passed through it very slowly and thus enter the rectum drop by drop, where it is absorbed before any quantity can accumulate.

CHAPTER IX.

Transport.

General Rules for the Carriage of Stretchers. From the R.A.M.C. Drills and Exercises.

Position of Patient, &c.

Consideration of the Nature of Injury.—Special care should always be taken to notice the part injured and the nature of the injury, as these determine in a great measure the position in which the patient should be placed during transport. In all cases the head should be kept low, and on no account pressed forward on to the chest. In wounds of the head care should be taken that the patient is so placed that the injured part does not press against the conveyance.

In wounds of the lower limb the patient should be laid upon his back, inclining towards the injured side; such position being less liable to cause motion in the broken bone during transport in cases of fracture.

In wounds of the upper limb, if the patient require to be placed in a lying-down position, he should be laid on his back, or on the uninjured side, as in cases of fracture there is less liability in these positions of the broken bones being displaced during transport.

In wounds of the chest there is often a difficulty in breathing. In such cases the patient should be placed with the chest well raised, his body at the same time being inclined towards the injured side.

In transverse or punctured wounds of the abdomen, the patient should be laid on his back, with his legs drawn up, so as to bring the thighs as close to the belly as possible, a pack or other article being placed under his hams to keep his knees bent. If the wound is vertical his legs should be extended.*

(2) *Adjustment of Slings.*—Care should be taken at starting that the slings are buckled so that the parts supporting the poles are all at equal distances from the surface of the ground.

(3) *Carriage of Patient.*—The patient is usually carried feet first, but in going up hill the position is reversed, and the patient is carried head first. To do this the bearers will lower the stretcher and turn about. If the patient is suffering from a recent fracture of the lower extremity, he will in all cases, be carried with his head down hill.† The stronger and taller bearer should be down hill.

(4) *Carriage of Stretcher.*—Under all circumstances the stretcher should, as far as possible, be carried in the horizontal position which may be maintained in passing over uneven ground, by raising or lowering the ends of the stretcher. ‡

* If there is protrusion of the intestines the position on the back with the legs drawn up should be maintained whatever the direction of the wound is.—G.E.T.

† There is much to say in favour of the patient being carried head first in all cases of injury to the lower extremity. This plan enables No. 3 to watch the injured part and avoids the risk of the buttocks of No. 1 touching the limb in raising and lowering the stretcher.—G.E.T.

‡ Care must also be taken that the stretcher is neither swayed from side to side or given an up and down movement

Royal Army Medical Corps Drills and Exercises.

Abridged from R.A.M.C. Training.

Squad and Company Drill.

The Squad and Company Drill in use in the Royal Army Medical Corps is contained in "Infantry Training":—

Part I. Sections 3-44. (Squad Drill).
Part II. Sections 59 (3), 60-69, 71, 74, and 75, (Company Drill.)
Part VI. Sections 184, 185, and 187. (Ceremonial.)

Stretcher Exercises.

Note.—As in the great number of instances only four men will be available for each stretcher, the following drill can be easily modified for such working in this way. Instead of by sixes number, etc., "form fours." The first rank are Nos. 1, 2nd, No. 2; 3rd, No. 3; 4th, No. 4.

In the subsequent drill, there is no change except leaving out 5 and 6, till loading and unloading stretchers is reached, where No. 4 does the work laid down therein for No. 5.

Formation.

Previous to the parade the stretchers will be laid in a heap on the ground.

The section will be sized and formed in single rank as in "Infantry Training."

By Sixes—Number. — The section will number by sixes from right to left. (Six bearers form a stretcher squad.)

Squads at the Halt—Right Form—Quick March—Left Turn—Right Dress. — As in "Infantry Training."

The bearers are now proved.

STAND TO STRETCHERS.	On the word STRETCHERS, the No. 1 place themselves with their toes in line with the front ends of the poles. Nos. 3 with their heels in line with the rear ends of the poles, close to and touching the stretcher with their right foot. Nos. 2, 4, 5, and 6 will take up their positions one pace behind, and covering off the bearer in front of them.
LIFT STRETCHERS.	On the word STRETCHERS, Nos. 1 and 3 stoop, grasp both handles of the poles with the right hand, rise together holding the stretcher at the full extent of the arm, rollers to the right.
LOWER STRETCHERS.	On the word STRETCHERS, Nos. 1 and 3 stoop, place the stretcher quietly on the ground, and rise smartly together.

DISMISSING.

LOWER STRETCHERS. BY THE RIGHT—QUICK MARCH. SQUADS—HALT. STAND EASY.	The squads are marched clear of the stretchers.
REMOVE KNEE-CAPS.	Knee caps are removed and collected.
SQUADS—ATTENTION. DISMISS.	As in Infantry Training.

EXERCISES WITH CLOSED STRETCHERS.

LIFT STRETCHERS.	As before detailed.
BY THE RIGHT (OR LEFT)—QUICK MARCH.	The squads will advance.

SQUADS—ABOUT TURN. The whole turn about, the stretchers being passed from one hand to the other by the Nos. 1 and 3.

CHANGE STRETCHERS. If the squads are advancing, the Nos. 1 will pass the stretchers from one hand to the other behind them. The Nos. 3, seeing this done, will pass the stretchers from one hand to the other in front of them, the Nos. 2 moving diagonally to their places. If the squads are retiring, Nos. 1 act as detailed for Nos. 3, and the Nos. 3 as for Nos. 1, Nos. 4, 5, and 6 in each case continue in their respective places.

MOVING TO A FLANK.

When it is necessary to move to a flank, the command *Right* (or *Left*) *Turn* is given. When a squad is marching to the right, and the command *About Turn* is given, the Nos. 1 and 3 will seize the handles of the stretcher with the left hand and cut away the right while turning about, resuming the grasp with the right hand after the turn has been completed.

CHANGING DIRECTION.

AT THE HALT—RIGHT (OR LEFT) FORM. On the word FORM, the No. 1 of the squad on the flank named will make a full turn, the remainder of the Nos. 1 a partial turn in the required direction, the remainder of the bearers a partial turn in the opposite direction.

QUICK MARCH. — On the word MARCH, the No. 1 of the squad on the flank named stands fast, the remainder step off, and glancing to the right (or left), move by the shortest route to their places in the new alignment, halt, and take up their dressing independently.

EXTENDING.

FROM THE RIGHT LEFT, OR ANY NAMED SQUAD TO FOUR PACES EXTEND. — *On the March.*—On the word extend, the named squad will continue to move on in quick time, the remainder will make a partial turn outwards, double to their places, turning to their front, and breaking into quick time as they arrive there.

ON THE RIGHT (LEFT, OR ANY NAMED SQUAD), CLOSE. — On the word CLOSE, the named squad will continue to move on in quick time; the remainder will make a partial turn towards it, double to their places, turning to their front and breaking into quick time as they arrive there.

EXTENDING AND CLOSING AT THE HALT FOR STRETCHER DRILL.

It not infrequently happens that the space available in which to drill stretcher squads is not large enough to permit of extending and closing while on the move as has been brought in for Infantry in their attack.

I therefore insert the following and it will be noticed that the extension is always from the right to four paces and the closing on the right.

FOR STRETCHER EXERCISE. NUMBER.

No. 1 of the squads on the right numbers 1.
No. 1 of the next squad 4.
No. 1 of the next squad 8; and so on.

EXTEND.

No. 1 squad stands fast, the remaining squads turn to the left, march the number of paces which has been called out by their Number 1, halt, turn to their right, and take up their dressing by the right. Nos. 4 then move up opposite their No. 2.

The preparing, etc., of stretchers having been practised, stretchers are closed.

AT THE HALT CLOSE.

Nos. 4 fall back to their places behind No. 3.
No. 1 Squad stands fast, the remainder turn to their right, march to their original formation, each squad halting, turning to the left, and taking up its dressing, as it reaches its place.

EXERCISES WITH PREPARED STRETCHERS.

Preparing and Closing Stretchers.

The preparing of stretchers and all movements with prepared stretchers will be performed in extended order.

PREPARE STRETCHERS.

Nos. 1 and 3 turn to the right, kneel on the left knee, unbuckle the tranverse straps, and place the slings on the ground beside them, separate the poles, and straighten the traverses.

Two. — On the word Two, each takes a sling, doubles it on itself, slips the loop thus formed on the near handle, and places the free ends over the opposite handle, buckle uppermost. They then rise, and turn to the left together.

CLOSE STRETCHERS. — Nos. 1 and 3 turn to the right, kneel on the left knee, remove the slings, and place them on the ground beside them, push the traverses in, raise the canvas, and approximate the poles.

Two. — On the word *Two* they rise, lifting the stretcher, face one another, place the handles of the poles between the thighs, rollers to the right, and roll the canvas tightly round the poles to the right.

Three. — On the word *Three*, each takes up a sling, passes the buckle end to the other, threads the transverse strap through the loop of the other sling, and buckles tightly close to the racket. Grasping both handles in their right hands, back of the hands to the right, they turn to the right in a slightly stooping position, rise, and turn to the left together.

LIFTING AND LOWERING STRETCHERS.

LIFT STRETCHERS. — On the word STRETCHERS, Nos. 1 and 3 stoop, grasp the doubled sling midway between the poles with the forefinger and thumb of the right hand, sweep it off the handles, rise, holding the sling at the full extent of the arm, buckle to the front, take a side pace to

the right between the handles, and place the sling over the shoulders, dividing it equally, buckle to the right.

LIFT STRETCHERS. The slings should be placed so that they lie well below the collar of the frock behind and in the hollow of the shoulders in front.

Two. On the word *Two*, stoop, slip the loops over the handles, commencing with the left, and grasp the handles firmly.

Three. On the word *Three*, rise slowly together, lifting the stretcher, No. 3 conforming closely to the movements of No. 1.

LOWER STRETCHERS. On the word STRETCHERS. Nos. 1 and 3 slowly stoop and place the stretcher gently on the ground, slip the loops from the handles and stand up, remove the slings from the shoulders, holding them as before described.

Two. On the word *Two*, they stand to stretchers, stoop, place the slings on the handles, as in prepared stretchers, and rise together.

ADJUSTING SLINGS.

In the event of the slings requiring to be adjusted, either as regards length or for the greater comfort of the bearers, the Instructor or bearer in charge of the squad will detail a bearer to carry this out, the length of the sling being adjusted, when necessary, by means of the buckles.

Changing Numbers.

When it becomes necessary to change the numbers, either for the purposes of instruction or to relieve Nos. 1 and 3 from carriage of the stretcher, the Instructor or bearer in charge of the squad will give the command *Nos.* — *and* — Change Over, the numbers, moving by the shortest route, will carry out the exchange of places, care being taken to move clear of the stretcher.

Movements.

For instructional purposes only two bearers in turn will be practised in the method of carrying the prepared stretcher. The Nos. 2, 4, 5, and 6 will stand at ease. The remainder will be ordered to advance.

Advance.	Nos. 1 step off with the left foot, Nos. 3 with the right, stepping short, knees bent, feet raised as little as possible. The Instructor will see that the bearers march on the point given, take the correct pace as regards length, &c.
Retire.	Each No. 1 will move round on the circumference of a circle of which No. 3 is the centre. No. 3 will mark time, turn gradually in the direction named. The whole move forward when square.
Advance.	Each squad will resume the original direction to the front, by a movement similar to that detailed for retiring. On arriving at the position of the squads the stretchers will be lowered and the bearers changed.
Right (or Left) Incline.	As detailed for Retire, but only one-eighth to the right or left.

Loading Stretchers.

Collect Wounded, Advance. — Each squad doubles by the shortest route to its corresponding patient, and halts without further word of command one pace from the head of and in a line with the patient (see Fig. 25).

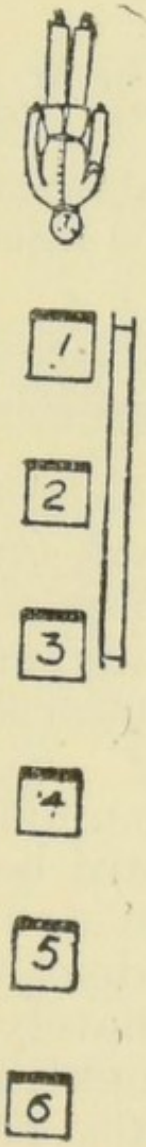


Fig. 25.—"Collect Wounded—Advance."

The Squad has advanced, halted, and lowered Stretcher.

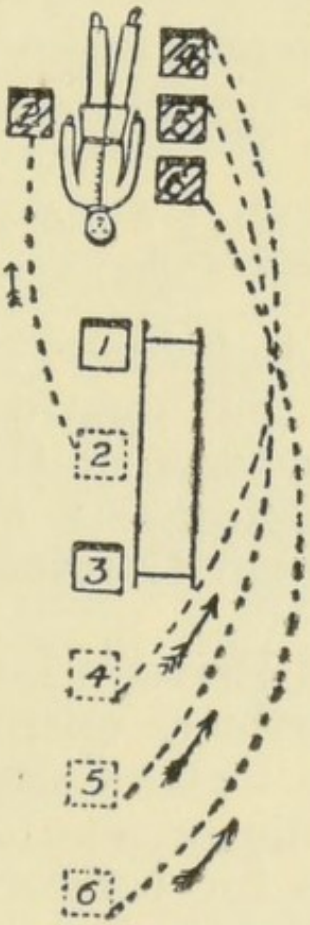


Fig. 26.—"Prepare Stretcher."

Disengaged bearers advancing and rendering assistance to Patient.

The Nos. 4 will then proceed to the patient and examine his injury and if his carriage on the stretcher is necessary will give the commands *Lower Stretcher—Prepare Stretcher.*

Whilst the stretcher is being prepared by Nos. 1 and 3, the disengaged bearers will advance and render to the patient such assistance as may be required (see Fig. 26).

The necessary assistance having been rendered, the Nos. 4 will give the command *Load Stretcher.*

NOTE.—The directions for loading and unloading stretchers are given in the Manual "First Aid to the Injured."

LOADING AND UNLOADING AMBULANCE WAGONS WITH PATIENTS ON STRETCHERS.

Mark V, Ambulance Wagon.—Is constructed to accommodate four men on stretchers (two stretchers on the floor and two on the seats immediately above) or 12 men sitting (six on each side) or two men on stretchers (above the floor) and four sitting (at the rear end).

Medical and Driver's Lockers are under the driver's seat, and have doors opening outward below the foot-board. Three lockers are also provided at the front end of the interior, one on each side of the floor, and a narrow one for comforts immediately beneath the centre of the driver's seat. Fittings to carry thigh splints above the front lockers are also provided.

The stretchers placed on the floor of the wagon, rest on rubber pads to prevent slipping, and those on the lifting seats are supported on iron brackets. Above the seats are rails on hinges upon which the stretcher

wheels run, the ends of the stretcher pole passing through the heel board on driver's seat. These rails are also fitted with rubber pads to prevent sliding.

The vehicle is fitted with a pole and swingle-trees for long rein driving. There is a sliding step to the back of the wagon, which when not in use, can be

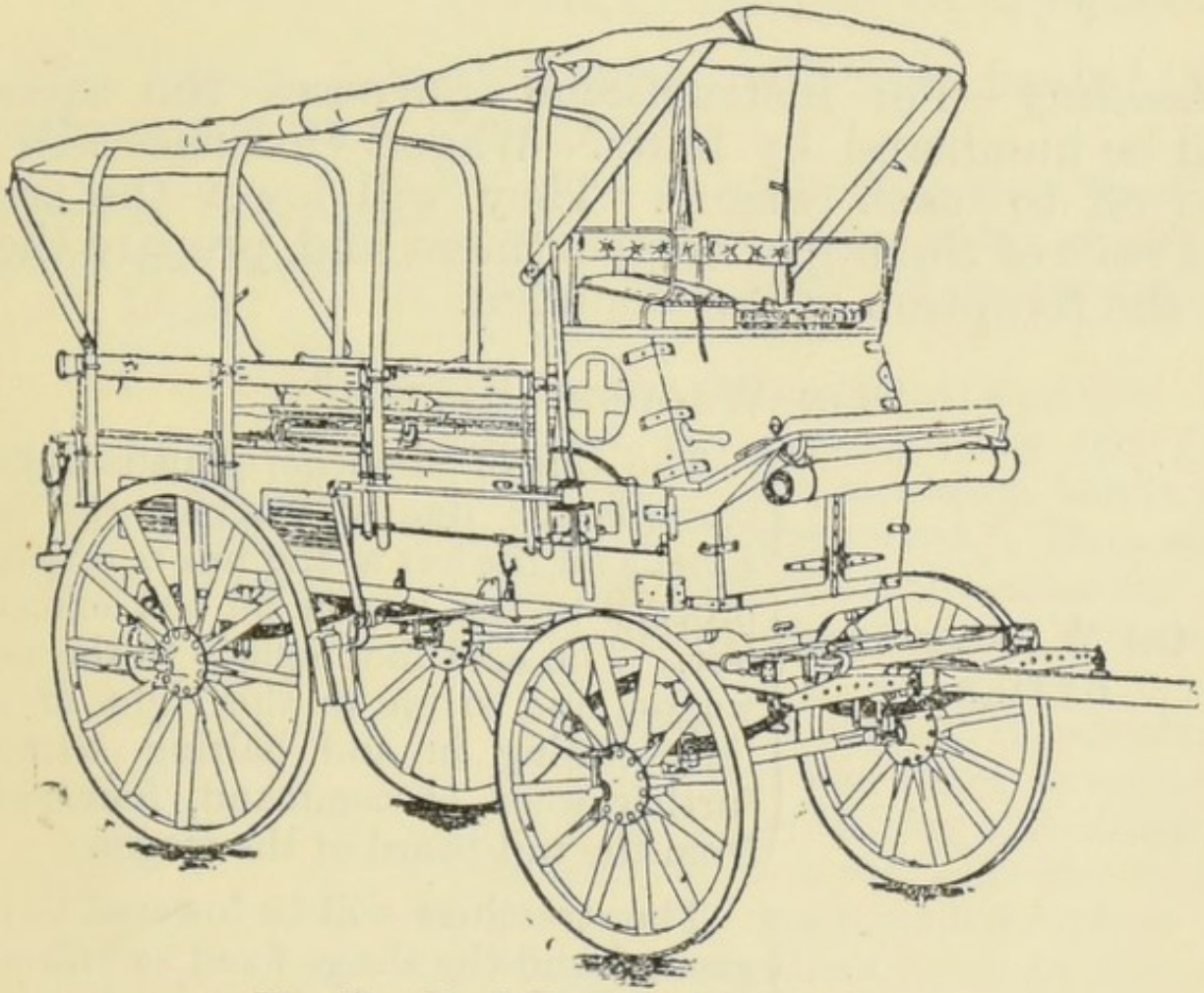


Fig. 27. Mark V. Ambulance Wagon.

raised and pushed close up to the tailboard in guides fixed along the bottom for that purpose. The sides are fitted with ventilators. Fittings are attached to the back rails and under the seats for carrying rifles, and there are two straps attached to the back rails for the safety of the patients.

A wooden ladder to assist the patients in mounting is carried, and is strapped to the underside when not in use. A water cask, capable of carrying 10 gallons, is secured under the rear by iron bands, and a small tackle is fitted just above it to help lifting it into position when not required.

Loading—For instructional purposes the squads will be numbered by fours. Wagon Orderlies will be told off to each wagon. They will lower the seats and rails of the upper compartment and prepare them for the reception of the wounded.

"ON WAGONS—RETIRE."

ON WAGONS—RETIRE.

The line of Stretcher Squads retires towards the line of wagons, the four squads on the left as the line is retiring, proceed to the wagon on the extreme left. The next four squads to the next wagon, and so on to the right of the line, closing in and halting without further word of command, four paces from the tail-board of the wagon.

LOWER STRETCHERS AND FIX SLINGS.

The stretchers will be lowered to the ground and the slings fixed as follows: Nos. 1 and 3 turn to the right, kneel on the left knee, pass the loop of the buckle end, buckle downwards, over the near handle, carry the sling under and round the opposite handle close-up to the canvas, back to the near handle, round which two or three turns are made, pass the transverse strap round

LOWER STRETCHERS AND FIX SLINGS. — the pole between the bracket and traverse and fasten the buckle outside the sling between the poles and stand to stretchers; whilst this is being done the Nos. 2 and 4 will fix the rifles and put away the patients' kit in the wagon, and rejoin their squads, the numbers taking up their position facing inwards.

The upper compartments will be loaded first commencing with the Off-side.

SQUADS IN SUCCESSION FROM THE RIGHT—LOAD. — Each No 4 in succession from the right assumes charge of his squad and gives the word of command, as follows:—

NO. SQUAD—ATTENTION. LOAD WAGON. — On the command by numbers *Load Wagon*, the bearers stoop and grasp the poles of the stretcher, hands wide apart, palms uppermost. Then acting together, slowly lift the stretcher and stand up holding it at the full extent of the arms.

Two. — On the word *Two* they advance to the wagon by side-steps, crossing the feet alternately, halting and lifting the stretcher on a level with the floor of the upper compartment, place the front pair of rollers on it, at the same time Nos. 3 and 4, slightly raising the head of the stretcher. The stretcher is then gently pushed into its place, the bearers successively making way for each other.

When loading the upper compartments the stretcher is gently pushed

Two. — into the wagon, until the handles at the head end are plumb with the tailboard. Nos. 3 and 4 will then enter the wagon, No. 3 proceeding to the foot, No. 4 to the head end of the stretcher, gently push it into its place and secure it there.

REFORM SQUAD. — As soon as the stretcher is in its place and Nos. 3 and 4 have rejoined, the bearers break off and re-form squad as in file, facing the field three paces behind and to the right of the remaining squads.

As soon as the off upper compartment is loaded, the next squad will be ordered to load the near upper compartment. As soon as this is completed the lower compartments will be loaded in the same way. When loading the lower compartments, it will not be necessary for Nos. 3 and 4 to enter the wagon.

When the wagon is fully loaded the upper back seats will be securely strapped to the side of the wagon by the Wagon Orderly, and the tailboard of the wagon lifted and secured in its place.

Unloading.—The requisite number of squads will be drawn up 10 paces from and facing the tailboards of the wagons.

The squads will be numbered by fours.

The wagon orderlies will prepare the wagons as for loading. The lower compartments will be unloaded, commencing first with the off compartment.

SQUADS IN SUCCESSION FROM THE RIGHT—UNLOAD. — The Nos. 4 in succession from the right assume charge of their squads as in loading and give the words of command as follows:—

No. Squad—Attention. For Unloading—Take Post.	The squads move off towards the wagon ; Nos. 1 and 4 take a side pace to the right ; Nos. 1 and 3 step short to allow Nos. 2 and 4 to get in alignment with them respectively, the whole then move forward in quick time, halting without further word of command opposite to and one pace from the off compartment.
Unload Wagons.	Nos. 3 and 4 move up, Nos. 1 and 2 making way for them, lay hold of the handles raising the head of the stretcher about 6 inches, and gently withdraw it, Nos. 1 and 2 assist in taking the weight and withdrawing the stretcher, lower it to the full extent of the arms, Nos. 1 and 2 being careful to avoid jarring the patient, as the stretcher leaves the compartment.
Two.	The squads will retire and place the stretcher on the ground selected for this purpose, then stand to stretchers.

In unloading the Upper compartment Nos. 3 and 4 enter the wagon as in loading, withdraw the stretcher until the handles at the head end are plumb with the tail-board of the wagon ; they now rejoin their squad and the stretcher is withdrawn as in previous detail.

When all the compartments are unloaded the Nos. 2 and 4 will return, collect and remove the kits and arms of the patients and rejoin their respective squads.

Exercises with Country Carts, General Service Wagons, &c.

General Remarks.

It may be necessary to employ country carts or General Service wagons for the transport of the wounded. When used for this purpose the floors of such conveyances should be thickly covered with straw, on which the stretchers conveying the wounded requiring the recumbent position should be placed.

In practising loading these carts or wagons, stretchers and patients will be drawn up on the parade ground, as detailed for Ambulance Wagon Drill, and the same steps taken to load and unload as in the case of ambulance wagons. In loading, however, the Nos. 1 and 4 of each squad, after the end of the stretcher has been placed on the floor, will spring into the wagon, and with the assistance of the other Nos. on the ground, lift the stretcher into position.

Sometimes the recumbent wounded have to be put into the wagons without stretchers, none being available. When this happens, the bearers, following as far as possible the instructions given for lifting wounded in Stretcher Exercises will lift each wounded man, and carefully carry him to the wagon. On arriving at the back of the wagon, No. 4 will get into it, and supporting the wounded man under both shoulders will lift him in, assisted by the other Nos., who will subsequently get into the wagon and help to place the wounded man in the most advantageous position possible.

Unloading is the converse of this proceeding.

In the case of mounted men, if no bearers are near, a wounded man can be taken out of action by a comrade who places him on his horse. If only slightly wounded and he can sit in the saddle the comrade should sit behind; if badly hit, he should place the wounded man in front of him, with his face to the horse's tail and hold him in his arms, the wounded man able to assist, holding on to the cantle of the saddle with both hands, or he might be laid across the saddle face downwards, and supporting himself with one foot in a lengthened stirrup, could be led by a comrade.

To carry an insensible man on a horse, place the man astride over the horse's withers, his head facing the horse's tail, if possible make a pad with horse blanket on the saddle, cross the stirrup leathers over the man's back, and secure by the head rope to the stirrup irons from the off to the near side under the horse's belly. His legs would naturally hang clear of the horse's shoulders, and in this way he could be led or galloped out of action.

To tie up a horse so that he cannot move.—Unbuckle the near stirrup leather and pass one end of it through the ring of the snaffle bit on the same side, draw the horse's head gently round and rebuckle the strap. The stirrup iron should be run up to the flap of the saddle.

To couple two horses together put them side by side facing in opposite directions and tie the snaffle rein of each to the arch of the saddle of the other. The reins when tied are not to be more than six or eight inches long so that the hind-quarters of each horse are clear of each other.

To remove a wounded man from a horse with three bearers.—In the case of an injured lower limb the bearer passes his hand round the pelvis and approaches on the wounded side. On the words "*Lay hold*" (given by No 1) No. 1 from behind catches hold of the sound leg. No. 2 is held round the neck by the wounded man, and No. 3 holds the wounded limb. On the words "*Ready*" "lift off," the "patient" is taken off and held over the stretcher placed alongside, and on the word "*Lower*" is laid on it. In the case of an injured upper limb, the wounded man is approached on the sound side. No. 1 supports pelvis and legs, No. 2 is held round the neck by the "patient's" sound arm, No. 3 supports the wounded limb. Words, same as before.

Zavodovski's method of arranging a covered railway truck for sick transport.—Assuming the covered truck to be of the following dimensions. Length 18 ft., width 7 ft., height on the square 6 ft. 6 in., and that it is provided with a doorway 4 ft. 9 in. wide, in the middle of each side, eight men on stretchers can be carried. The materials required to fit up the truck are:—

8 large hooks, capable of being passed through the sides of the truck and fitted with nuts and washers. It will be seen later that each hook will have to bear considerably more than the weight of a man.

4 cables 1½ in. thick, provided with an eye at each end strengthened with a metal lining, the total length being 7 ft.*

* Some authorities give 9 ft. as the length of these cables; it appears that the effect of using a longer cable than is actually necessary is to reduce the space available for stretchers.

4 round ash poles 2 in. thick and 6 ft. 6 in. long.
16 ropes $\frac{3}{4}$ in. thick and 12 ft. long, with the two ends spliced together, to form endless cords.
32 small ring bolts.
28 cord lashings.
$4\frac{1}{2}$ yds. of cord $\frac{1}{2}$ in. thick ; a ball of twine and some cobbler's wax.

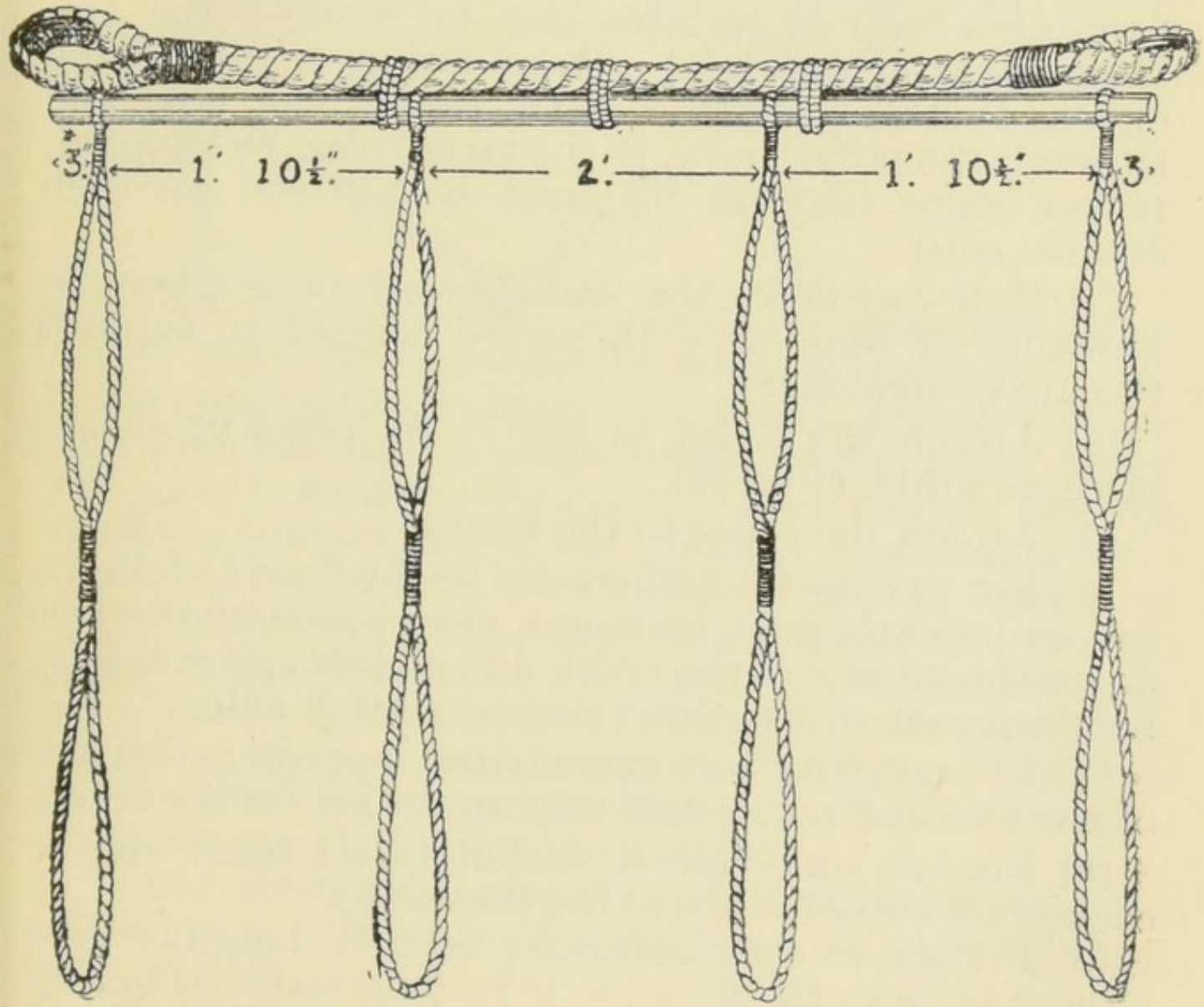


Fig. 28. Showing one of the four sets of slings to be hung across the wagon.

To fit up the truck.—(1) Insert four hooks on each side of the truck opposite each other, one at a distance of 1 ft. from each end of the truck, two on the beam above the middle of the doorway 3 ft. apart.

(2) Attach four of the endless cords to each pole. One three inches from each end, and one on each side of the middle of the pole, leaving a clear space of two feet between them. The attachment may be made by forming a loop of suitable size by binding the two thicknesses of rope with waxed twine, or by slipping one end of the endless band round the pole and through the other end. If the latter plan be adopted, rather more than 12 ft. must be allowed for each endless cord.

(3) Half way down the endless cord make a loop by knotting or binding with waxed thread to support the upper stretcher.

(4) Attach the poles to the $1\frac{1}{2}$ in. ropes by means of three cords. (Fig. 28).

(5) Attach the ropes to the hooks.

(6) Fix twenty-four ring bolts in the floor as follows. Six under each pole, leaving a clear space of two feet down the middle of the truck and a clear space of 9 in. between each of the three rings on either side.

(7) Fix one ring bolt immediately opposite each end of the two end poles, half way up the side of the truck.

(8) Fix one ring bolt immediately on inner side of each hook on beam above the doorways.

(9) Fix the 28 cord lashings ; 24, 5 ft. long fastened to ring bolts in the floor ; 2, 12 ft. long fastened to ring bolts above doorways ; 2, 12 ft. long tc ring bolts at the ends of the poles.

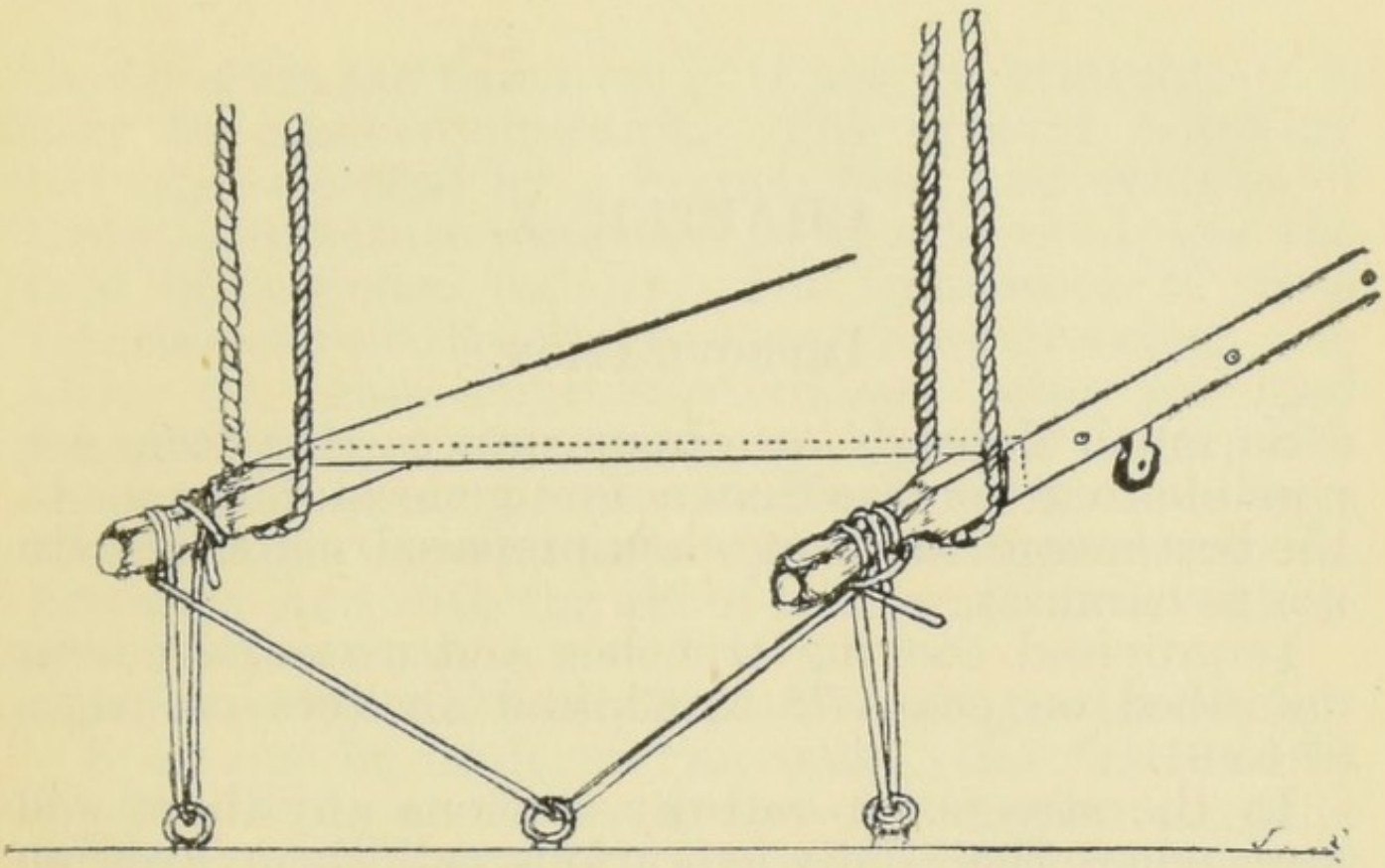


Fig. 29. Showing method of securing end of stretcher.

Many other plans have been tried, amongst which may be mentioned a large bogie wagon fitted up by the North Eastern Railway. Two rubber covered hooks to support one of the poles of a stretcher were fixed to the sides, about half way up, and two suitably hooked rods were hung from the roof to support the other pole. Underneath stretchers were supported a foot or so from the ground on platforms. The plan adopted with regard to the upper stretcher is capable of being used for two or in an exceptionally high wagon, three tiers of stretchers.

Cords stretched across wooden supports may be placed under the ends of a stretcher to raise it from the ground.

The necessity for packing into a small compass the materials for adapting a goods truck for sick transport must not be overlooked, as the same truck will probably be used to convey stores one way and sick and wounded the other way.

CHAPTER X.

Improvisation.

So much depends on circumstances that it is not possible to give more than a few general hints as to the best means to adopt when prepared materials are not to hand.

Improvised cooking trenches and ovens have been described on pages 78 to 83, and shelters on pages 87 to 91.

In the streets, in railway stations anywhere and everywhere their daily avocations call them, even on their holiday, members of companies should plan converting what they see for the use of sick and wounded, remembering that a stretcher or hammock slung, transmits less jar to the patient than when otherwise supported.

Empty tins may be converted into vessels from the size of a drinking cup to that of a bath.

Everything that has wheels, from a wheel-barrow to a railway wagon will carry stretchers and these wheeled carriages will include perambulators and every variety of vehicle propelled by men, drawn by horses, or driven by steam, electricity or petrol.

The well-known Ashford litter consists essentially of a pair of wheels, axle, and a framework for supporting a stretcher, and may be taken as a type of much value. Any pair of wheels can be used, the axle may be cranked down as in the Ashford litter, so

that bearers can pass over it, it may be straight or it may be cranked upwards. The upward cranking has been adopted by a French firm, and vehicles of their manufacture were used by the Boers to clear the field of wounded rapidly. The framework of these vehicles was constructed to carry three stretchers one above the other, suitable windlasses being provided for raising them when lying on the ground underneath the frame to their proper positions where they were then fixed. Good designs on these lines should be produced, and with the aid of local craftsmen vehicles actually prepared.

A fish kettle will make an extremely good sterilizer.

Beds can be made of two sacks, the first nearly filled with hay or straw, the two then sewn together by their mouths, and the contents evenly spread out in them.

The method of fitting up railway vans can be made to apply to large furniture vans and canal boats.

There is no beginning and no end to the art and its exercise should be here as in other countries a study, and indeed, a recreation for our members.

The commandant informs his company that at the next meeting he expects each member to bring him a written report of any one article for hospital or transport use which he has improvised. At that meeting he reads aloud the reports and criticises them, and thereby both he and the other members have gained useful knowledge.

A frequent exercise may well be the transport of supposed wounded to the place laid down as a temporary hospital ; and the marking out with chalk of its arrangements, external and internal.

The following notes, partly extracted from the R.A.M.C. Training, will, it is hoped, prove useful as a guide to what is required.

Dressings.—Linen, cotton, flannel, blankets, clothing, teased out wool, and tow, can be all used for improvised dressings. Any materials used should be selected from as clean a source as possible. If time and circumstances allow, they should be thoroughly washed and boiled, then baked or sun dried, and when cool used at once. When not required for immediate use they should be preserved in covered receptacles, which have themselves been previously sterilized as far as practicable; for instance, in tin biscuit boxes hermetically sealed with resin, or strips of rubber plaster; in earthenware jars, &c.

Splints.—A man's equipment and accoutrements, rifle, bayonet, or sword and scabbard, all form excellent material to improvise splints from. Or they can with a little ingenuity be made from wooden and cardboard boxes, backs of books, folded newspapers, telegraph wire, brush wood, lengths cut from corrugated iron in which the edges have been rounded off, folded sheet iron cut from biscuit boxes, or any available sticks or pieces of wood. Old packing cases can be purchased cheaply from grocers and others, and provide useful wood for making splints. To avoid splitting the boards the nails with which the case is held together should be punched nearly through the wood, which should then be prised up with a chisel. The nails will thus be left standing up sufficiently to be withdrawn with pincers or a claw hammer. A very convenient set of splints can be made of such wood as follows: select pieces of wood

of the same thickness (about three-eighths of an inch) and cut them into strips 3 inches wide and about 15 inches long, as well as a few shorter strips, avoiding knots at the ends. At distances of an inch and half an inch from the end of each strip make cross cuts two-thirds of the thickness of the wood, and clear away the wood between them. This will leave a piece standing at the end which must be reduced to two-thirds the thickness of the wood. (Fig. 30A). Now repeat the process at the other end of the strip. The next step is to make or obtain zinc sockets to fit closely over the prepared strips. Two strips are now placed together with the prepared ends overlapping, and a zinc socket is passed over the joint. A close fit will be insured by not making the cuts quite as deep as indicated above and by slightly rounding the ends of the strips; the zinc sockets forced over the joints will bind the two strips firmly.

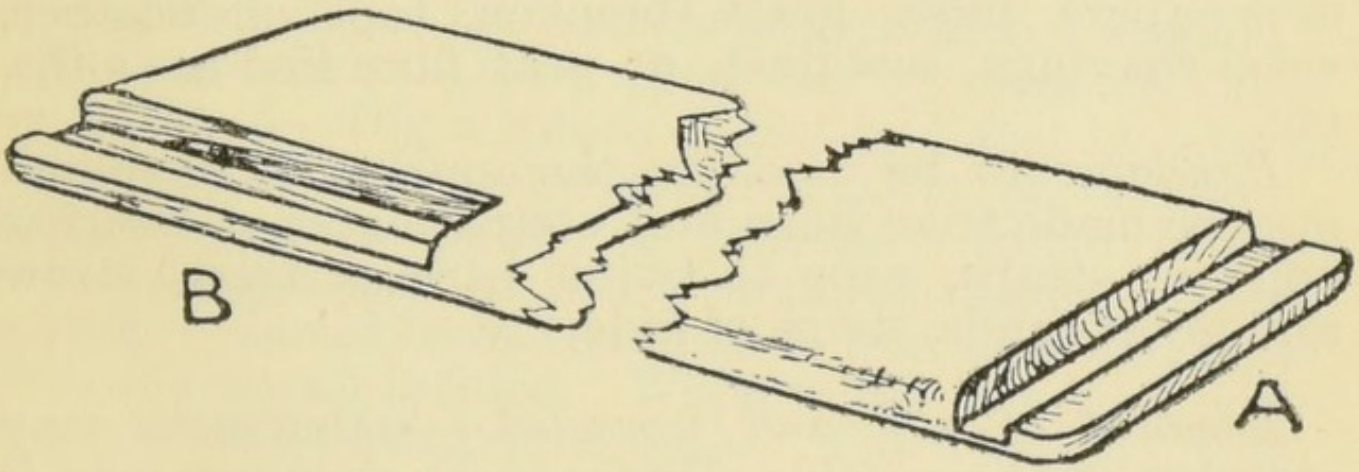


Fig. 30.

An angular splint can be made on the same principle by means of a socket as shown in fig. 31, and by cutting one of the shorter lengths as shown in fig. 30 B.

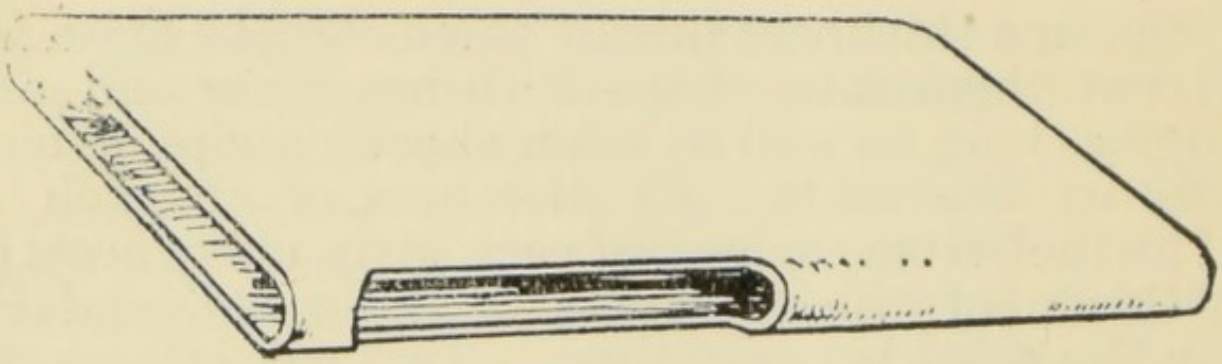


Fig. 31.

The socket is slipped over a piece cut as Fig. 30 A far enough to allow the piece cut as Fig. 30 B to pass through the side opening in the socket and engage with the first piece.

Any splint can with a little practice be made from the perforated zinc (carried in No. 2 Field Medicine Pannier).

Padding for splints.—Padding for splints can be made from the clothing of the individual, animal wools, tow teased from lengths of rope, folded newspapers, moss, grass, bracken, tops of heather, wood shavings, saw-dust, or peat fibre tied in cloths, etc.

Bandages to be used for the application of splints may be made from linen and cotton material, wearing apparel, straps, rope or twine, bark of trees, straw and grass bands, strips of hide, etc.

Removal of sick and wounded.—Ambulances may not always be available. Under such circumstances it will be necessary to take into use such suitable local transport as exists and can be procured.

The suitability of the conveyance for the patients to be carried should be the first consideration.

When wagons and country carts are used they should have a plentiful supply of straw, hay, dried leaves, or bracken strewn over the floor and sides. With a little ingenuity, bundles of the material used can be tied up and fashioned into pillows. If mattresses and bedding are available, these should be laid on the top of the straw for the patient's use in transit.

If possible, all wagons and carts should, prior to their being taken into use, have covers fitted to them. This ensures at least a partial protection from sun and weather. They should be thoroughly overhauled, special attention being paid to the working of the brakes, and condition of "lynch pins" where these are used. When seriously wounded, or patients who are dangerously ill, have to be carried, heavy slow draught wagons are recommended for the purpose, in preference to vehicles of light construction, which jolt and sway over rough tracks. A greater supply of comforts, water and food for the sick, spare tentage, etc., can be carried fastened to the outside of such heavy wagons.

To improvise a raft on which one or more stretchers can be placed.—Dig a trench 7 feet by 7 feet by 3 feet, and place in it a large tarpaulin or cover of a wagon ; fill the trench as tightly as possible with cut brushwood, which should be firmly stamped down ; enough tarpaulin should have been left to fold over and bind when the trench is filled. When taken out bind with strong ropes and fasten securely. The whole can then be floated across a river or canal with the assistance of the bearers.

Housing of sick and wounded.—The housing of sick and wounded may under service or other condi-

tions have to be arranged for. Much of the success of the undertaking, both as regards the comfort of the individuals and the maintenance of proper sanitation, depend upon an intelligent use being made of the buildings or sheds available. In selecting a building for the housing of sick and wounded, special attention must be paid to its general construction and approaches; its water supply, the means of arranging for cooking and latrine accommodation, and the disposal of refuse.

Latrines.—The site of them should be selected in accordance with the direction of the prevailing winds, a leeward position as far as possible from the kitchens

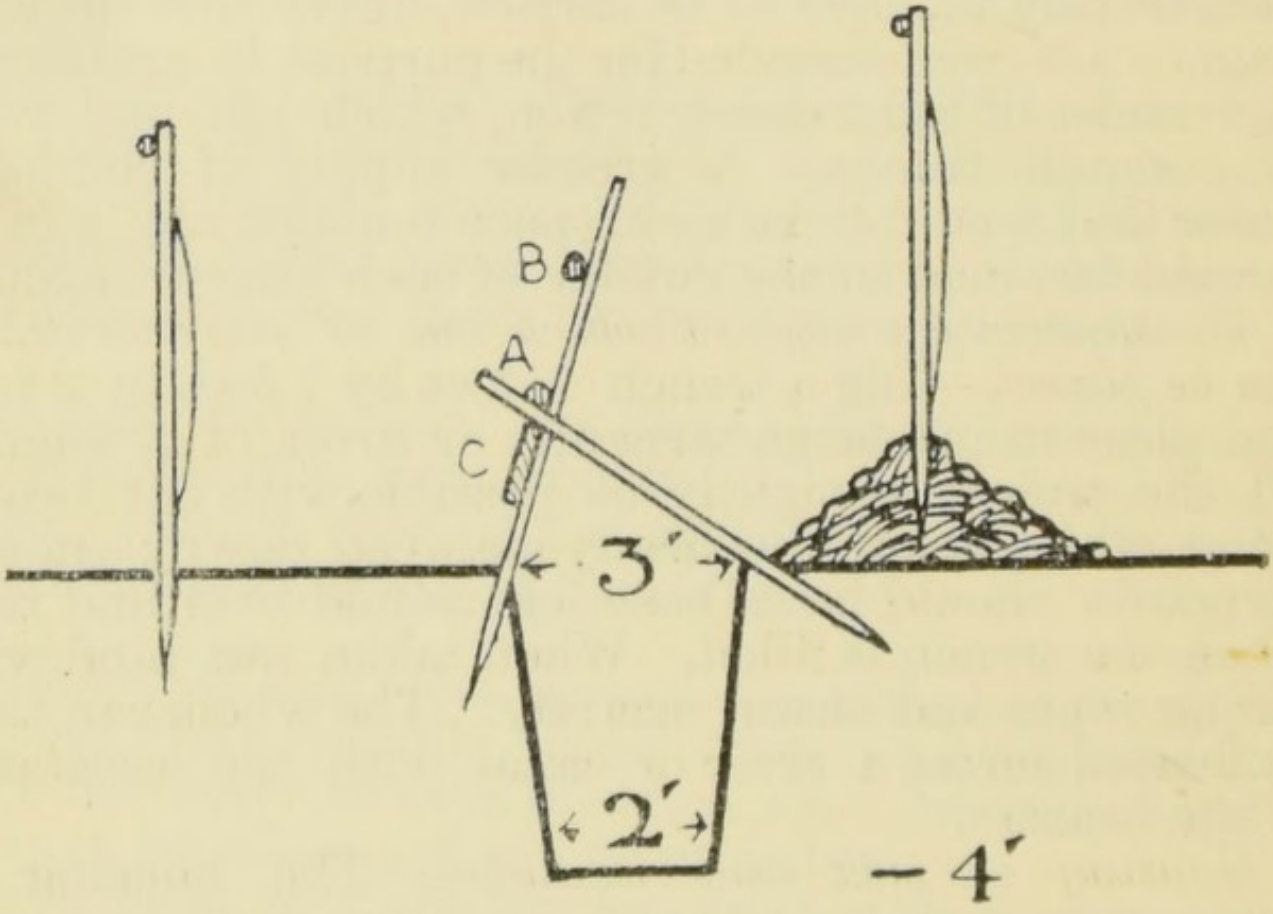


Fig. 32.

and water supply being selected. What has been said about the fly (pages 100 and 101) must be specially borne in mind, and no precaution against contamination of the water supply by filtration from the latrine must be neglected.

To make a latrine, dig a trench 3 feet wide at the top, 2 feet wide at the bottom, and 4 feet deep. The excavated earth is to be thrown to the side of the trench, that will be the back of the latrine. Drive poles into the ground at intervals of 3 feet, as shown

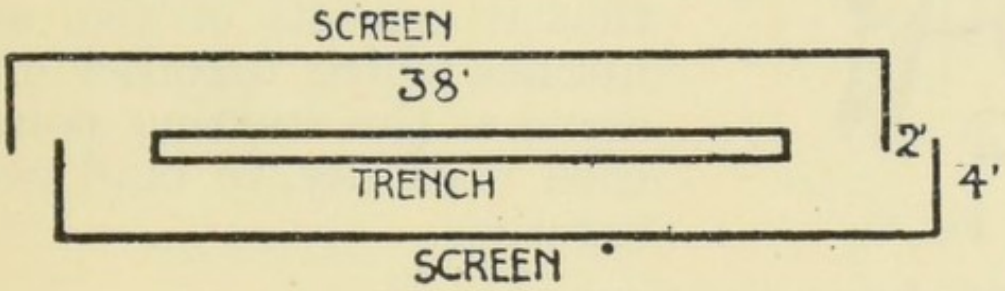


Fig. 33.

in Fig 32, and on the point A when they cross a pole is to be secured at B and a board at C. The latrine should be concealed by being placed with a hedge or wall and by means of canvas on poles, or canvas screens may be arranged as shown in Fig. 33.

A couple of inches of dry earth, mixed, if possible, with lime or charcoal should be thrown twice daily over the soil in the trench. When the trench is filled up a fresh one should be dug near it.

The site of a disused latrine should be invariably marked to avoid a trench being again dug there.

Knots are of such general utility as to render the description of a few desirable.

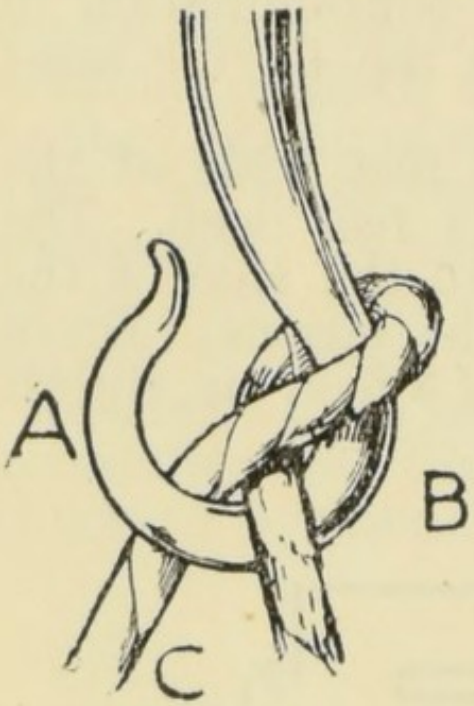


Fig. 34.

Essentially a knot depends on the friction between two pieces of cord, and the simplest illustration of this is the Blackwall hitch (Fig. 34), which holds as long as tension on C pressed against the hook A on which the hitch is placed.

The clove hitch shown in Fig. 35, is very useful; note that it consists of two separate hitches which together or singly serve as the starting point for a cord used say, to bind two poles together.

Fig. 36 shows the timber hitch, which may be used for attaching a cord to the branch of a tree, &c.

The weaver's knot, Fig. 37 is useful for joining two cords of unequal thickness.

To form a non-slipping loop at the end of a cord the Bow-line is probably best. The method of tying it is shown in Fig. 38, make a loop at A, pass B through it round C and back through the loop as shown (D)

A modification of the bow-line is made by first doubling a sufficient portion of the cord, and

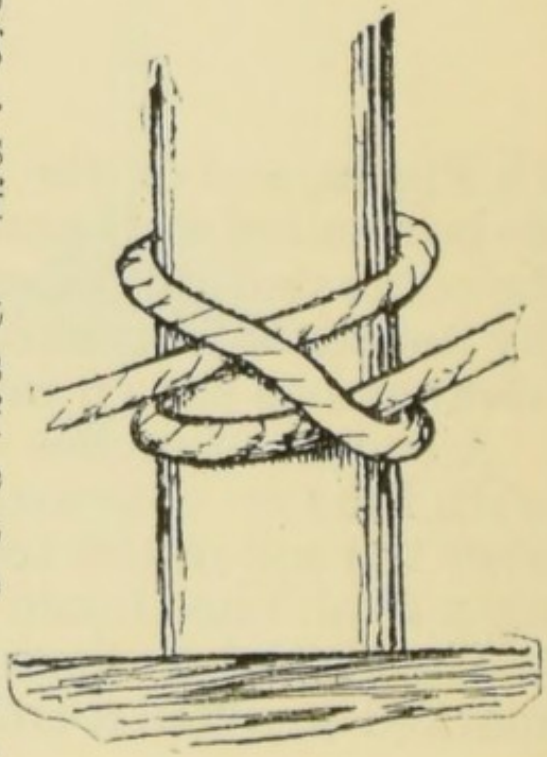


Fig. 35.

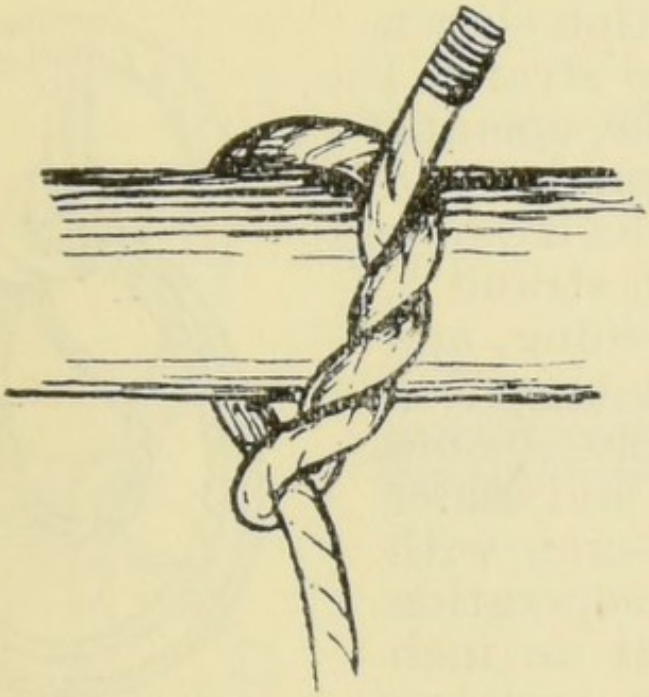


Fig. 36.

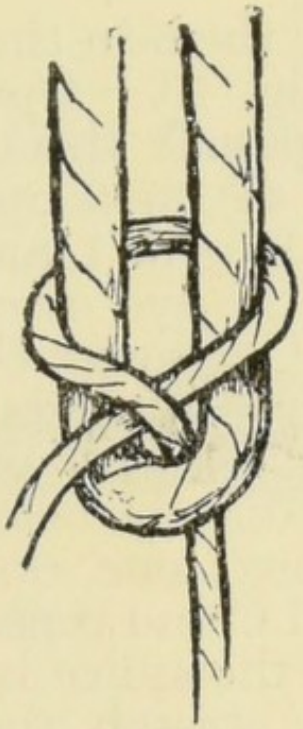


Fig. 37.

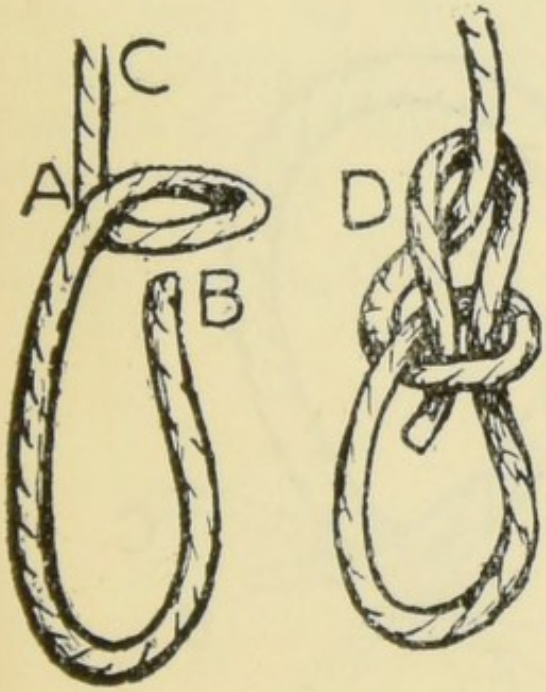


Fig. 38.

then proceeding as above, with the result appearing in Fig. 38. This may be used for raising or lowering a person who sits on the double loop A with loop B passed round his armpits.

A much neater loop than the bow-line is called the eye-splice. To make this a hard piece of three strand rope and a pointed instrument (a small marling spike) with which to open out the strands of rope are necessary. Unwind the strands at the end of the rope, and

place them in the position shown at Fig. 40. Open the strand 1 and pass A through the opening (Fig. 41), next open strand 2 and pass B over 1 and under 2 : now turn the eye over open strand 3, pass C through the opening, and pull the strands tight (Fig. 42). Then pass A over the strand immediately below it and under the next one, do the same with B and C and repeat the operation until the splice is about an inch long ; stretch the rope and eye to make everything taut, and trim the ends.

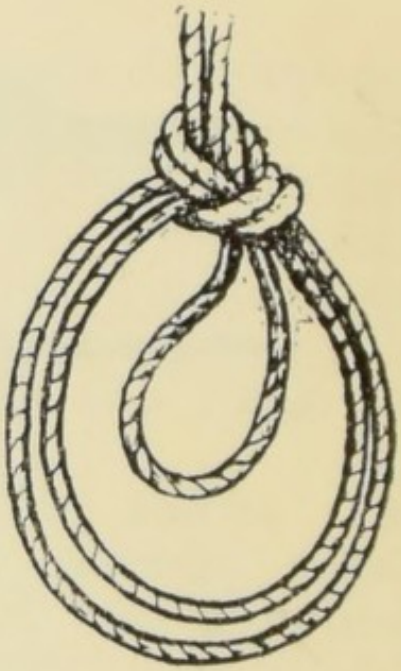


Fig. 39.

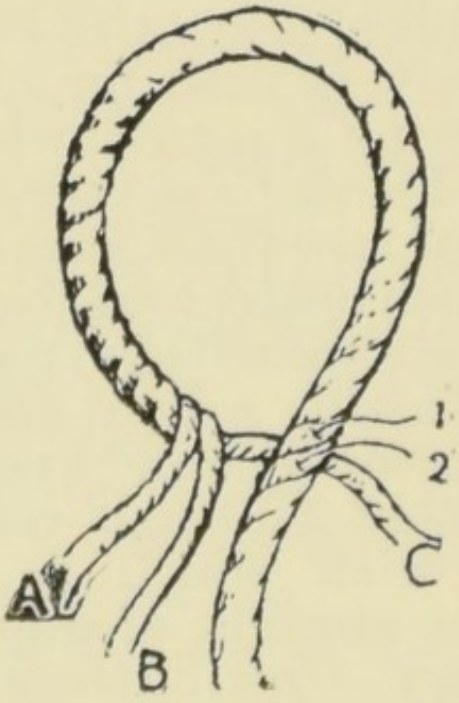


Fig. 40.

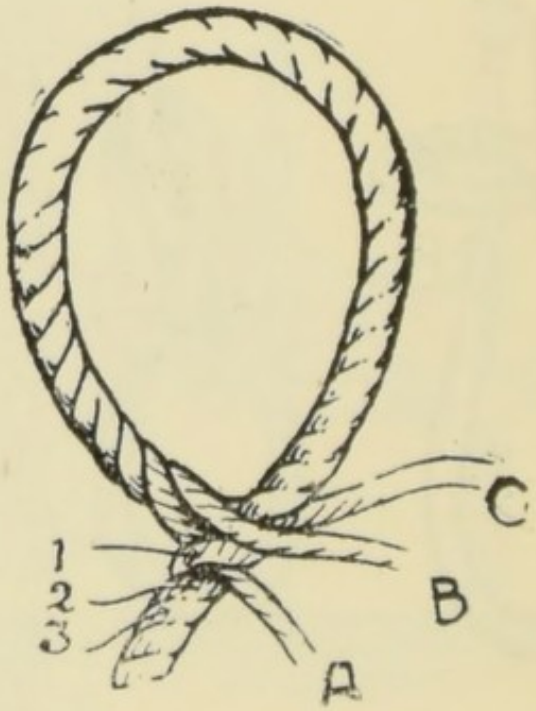


Fig. 41.

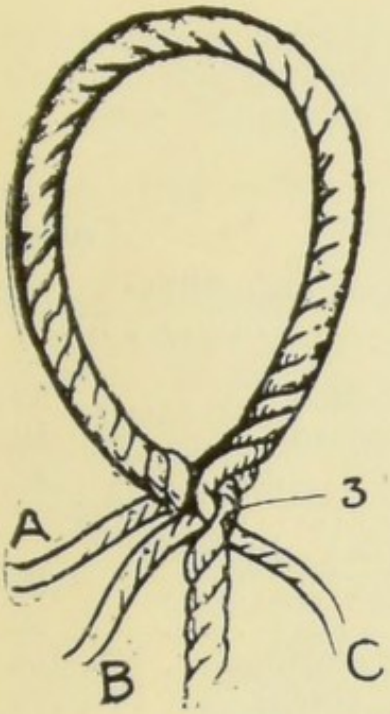


Fig. 42.

The sheepshank (Fig. 43) is used for shortening a piece of rope temporarily.

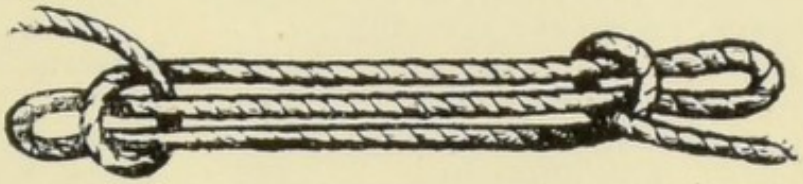


Fig. 43.

It is hoped that the suggestions made will be of service to the St. John Ambulance Companies and will lead to many new and ingenious ideas. Descriptions of improvised appliances, methods of transport, &c., found to answer will be gladly received and considered at St. John's Gate, with the result, it is hoped, of greatly improving the few notes on improvisation that have been given in this chapter.

INDEX.

Cull & Son, Houghton Street, Aldwych, and at Chiswick.

NOTES.