Manual for the Royal Army Medical Corps

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FOR THE

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WAR OFFICE, 1904.

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PRINTERS IN ORDINARY TO HIS MAJESTY.

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CONTENTS.

SECTION I.—TRAINING OF THE MEN OF THE ROYAL ARMY MEDICAL CORPS IN FIRST AID AND NURSING.

SECTION II.—DRILLS AND EXERCISES.

MANUAL

FOR THE

ROYAL ARMY MEDICAL CORPS.

1904.

SECTION I.—TRAINING OF THE MEN OF THE ROYAL ARMY MEDICAL CORPS IN FIRST AID AND NURSING.

1. PRELIMINARY REMARKS ON THE GENERAL SCOPE AND OBJECT OF THE INSTRUCTION OF MEN OF THE ROYAL ARMY MEDICAL CORPS.

1. The Royal Army Medical Corps is organised for the performance of duties in connection with the hospital and ambulance service of the army. The duties of Royal Army Medical Corps.

2. In hospitals, both in peace and war, at home and abroad, the corps is responsible not only for the nursing of the sick and the dispensing of medicines, but is called on to perform various duties connected with the charge of equipment, the making timely requisition for fuel, light, provisions and all requisite supplies and repairs, the cooking and expenditure of diets, the custody of patients' kits, the cleanliness of the hospital and its surroundings, the exchange of soiled for clean linen, bedding and clothing, and the preparation of the necessary accounts, abstracts and vouchers of expenditure. The detailed instructions relating to these duties are contained in the Standing Orders for the corps. Duties in hospitals.

3. In the field, the corps is further charged with another duty. It supplies to the army an organisation designed expressly for the purpose of speedily collecting and succouring the wounded during and after an engagement, and removing them from the battle-field Duties in the field.

Bearer Companies.

to the field hospitals. The soldiers by whom this duty is performed are designated Stretcher Bearers, more briefly Bearers, and the unit of this organisation is called a Bearer Company. They are, moreover, charged with the attendance on the sick further to the rear: in sick convoys, hospital trains, &c., to stationary field hospitals or general hospitals on the lines of communication to the base.

Duties of bearers.

4. The duties of bearers are in the first place to search for and tend the wounded, by administering to them water or stimulants, by arresting bleeding, by applying splints or a temporary dressing if the nature of the case so require, and by removing them, their arms and accoutrements, to a place of safety; and secondly, to pitch tents and hospital marquees, to cook for the wounded, and to find guards for the wagons on the line of march and in camp.

Necessity for technical training.

5. To enable the men of the Royal Army Medical Corps to undertake even the most elementary of these duties, either in hospitals or in the field, it follows as a matter of necessity that they must undergo a course of technical training.

Preliminary training.

6. This technical training will commence as soon as the recruit has gone through a short preliminary training in squad and company drill, and the modified course of musketry instruction prescribed by the King's Regulations.

Duration of technical course.

7. The technical training will, as a general rule, occupy about three months.

2. ANATOMICAL AND PHYSIOLOGICAL OUTLINES.

Construction of the human body.

8. The human body is made up of:—(1) the skeleton or bony framework with its joints; (2) the muscles, which make every movement; (3) the nervous system, which receives impressions and governs all these movements.

As every movement of the body causes waste, some means are required for nourishing it. The following are concerned in supplying such need, viz.:—

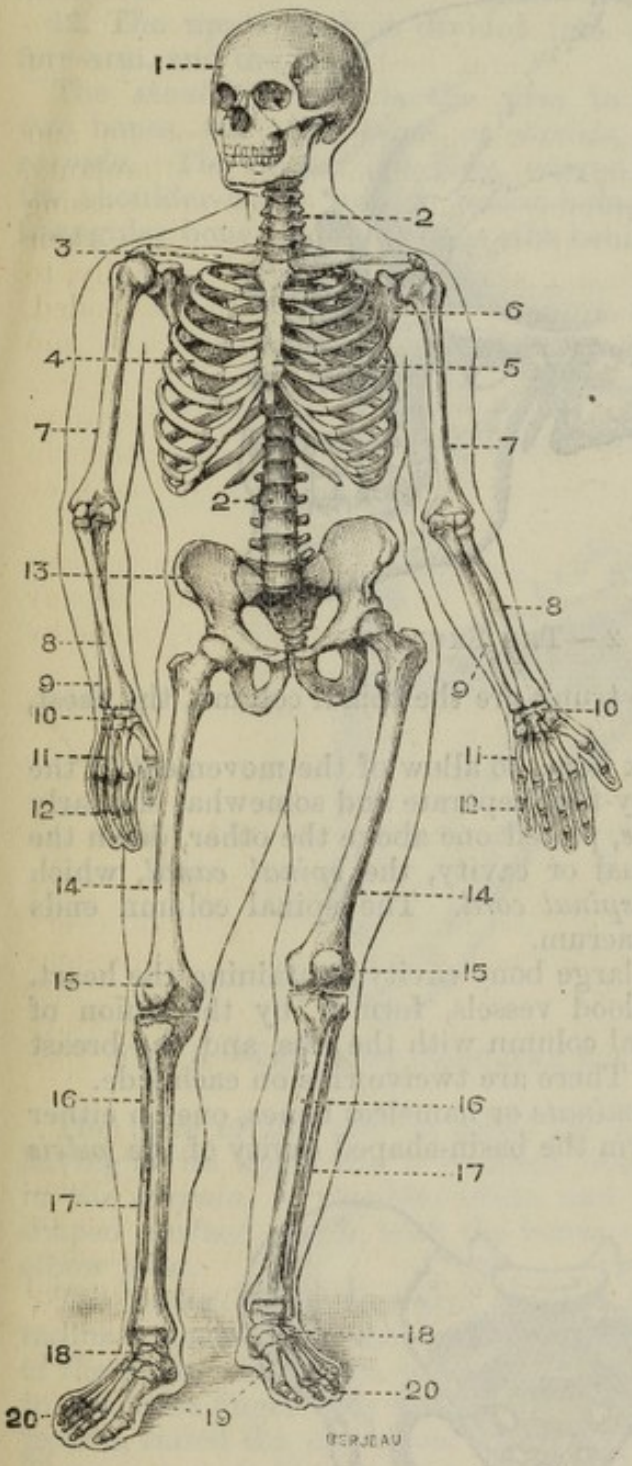
(4) The circulatory system—heart, blood, and blood vessels—to carry to different parts of the body nourishment and oxygen. (5) The respiratory system—lungs and air passages—to take in air and so give oxygen to the blood. (6) The digestive system—mouth, stomach and intestines, and certain glands—to take in and give to the system food and water. (7) The excretory system—kidneys, lungs, and skin—to extract from the blood the products of waste and to eliminate them. (8) The skin, enclosing the whole, for the protection of the body and the regulation of its heat.

The Bones, Joints, and Muscles.

Skeleton.

9. The skeleton consists of a number of bones, some long, some short and irregular, held together by bands or ligaments to form joints, which allow of greater or less movement between them. The bones determine the general shape and proportions of the

body, give attachment to the muscles, and form levers on which the muscles act to move the body from one position to another. They also form cavities for the protection of important organs.



1. Cranium, or skull.
2. Spine formed of vertebræ.
3. Clavicle, or collar-bone.
4. Ribs.
5. Sternum, or breast-bone.
6. Scapula, or shoulder-blade.
7. Humerus.
8. Radius.
9. Ulna.
10. Carpus, or wrist bones.
11. Metacarpal bones.
12. Phalanges, or fingers.
13. Pelvis.
14. Femur, or thigh bone.
15. Patella, or knee-cap.
16. Tibia.
17. Fibula.
18. Tarsus, or ankle bones.
19. Metatarsal bones.
20. Phalanges, or toes.

FIG. 1.—THE SKELETON.

The skull.

10. The bones of the head and face are together called the skull. The skull consists of two portions, namely :—The *cranium*, a strong bony case for the protection of the brain, and the face, which con-

sists of a number of bones, of which one only, the lower jaw, is movable.

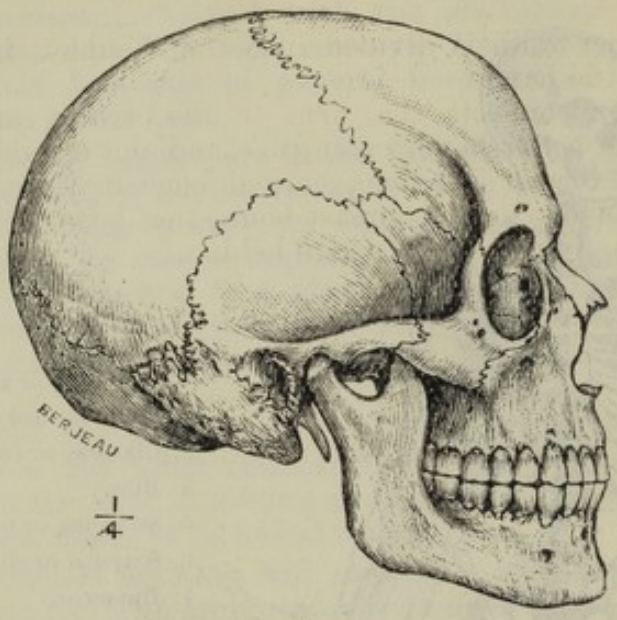


FIG. 2.—THE SKULL.

Bones of the trunk.

11. The bony parts of the trunk are the spinal column, the chest, and the pelvis.

Spinal column.

The *spinal column* or back bone, to allow of the movement of the trunk, is composed of twenty-four separate and somewhat similarly shaped bones called *vertebræ*, placed one above the other, down the centre of which runs a canal or cavity, the *spinal canal*, which contains and protects the *spinal cord*. The spinal column ends below in a bone called the sacrum.

The chest.

The chest, or *thorax*, is a large bony cavity, containing the heart, lungs, gullet, and great blood vessels, formed by the union of twelve vertebræ of the spinal column with the ribs, and the breast bone, or *sternum*, in front. There are twelve ribs on each side.

The pelvis.

The *sacrum*, and the *innominate* or nameless bones, one on either side, are firmly united to form the basin-shaped cavity of the *pelvis*

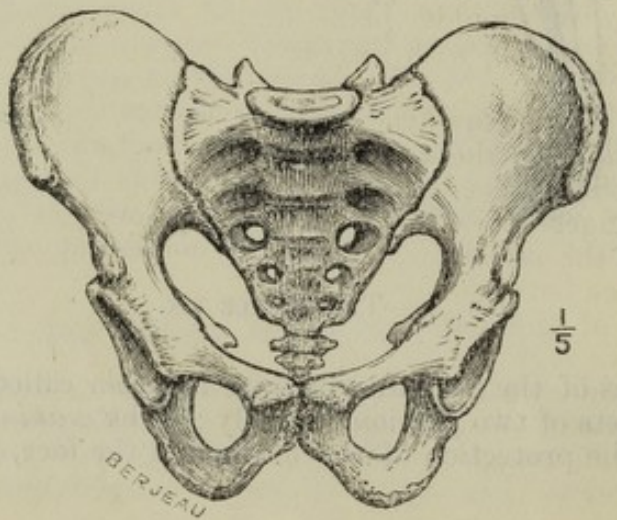


FIG. 3.—THE PELVIS.

which contains and protects the bladder, and the lower end of the bowel, or *rectum*, and to it the lower extremities or limbs are attached.

Bones of the upper limb.

12. The upper limb is divided into the shoulder, the arm, the fore-arm, and the hand.

The shoulder.

The *shoulder* connects the arm to the trunk, and includes two bones, the collar-bone, or *clavicle*, and the shoulder-blade, or *scapula*. The former is a long, curved bone in front connecting the shoulder-blade to the breast-bone, the latter a large, flat, triangular bone lying upon the ribs behind.

FIG. 4.—THE RIGHT COLLAR-BONE.

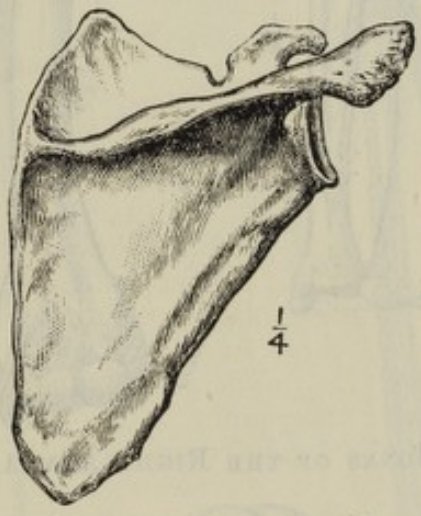


FIG. 5.—THE ~~LEFT~~ *Right* SHOULDER-BLADE (seen from behind).

The arm.

The bone of the arm is called the *humerus*; it is a long bone, having at its upper end a rounded head, which works in a socket in the *scapula*, or shoulder-blade, and at its lower end a roller-shaped surface, which, with the bones of the fore-arm, forms the elbow joint.

The fore-arm.

The bones of the fore-arm are the *radius* and the *ulna*. The radius extends from the outer side of the elbow to the thumb side of the wrist. The ulna extends from the inner side of the elbow to the little finger side of the wrist. At its upper end is a projection, called the *olecranon*, which forms the point of the elbow. There is a space between the radius and ulna.

The hand and wrist.

The bones of the hand are arranged in three rows: firstly, in the wrist are eight small bones, called the *carpus*; secondly, a row of long bones, called the *metacarpus*, forming the palm; and lastly, three small bones, named the *phalanges*, for each finger and two for each thumb.

Bones of the lower limb.

13. The lower limb is divided into the thigh, the leg, and the foot.

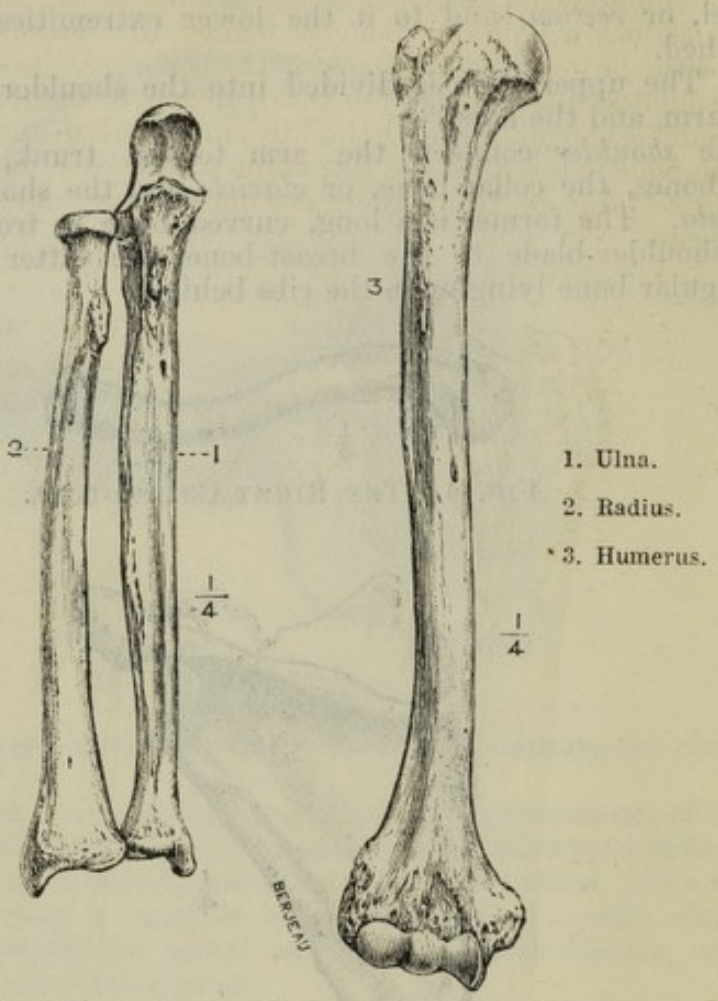


FIG. 6.—BONES OF THE RIGHT ARM AND FORE-ARM.

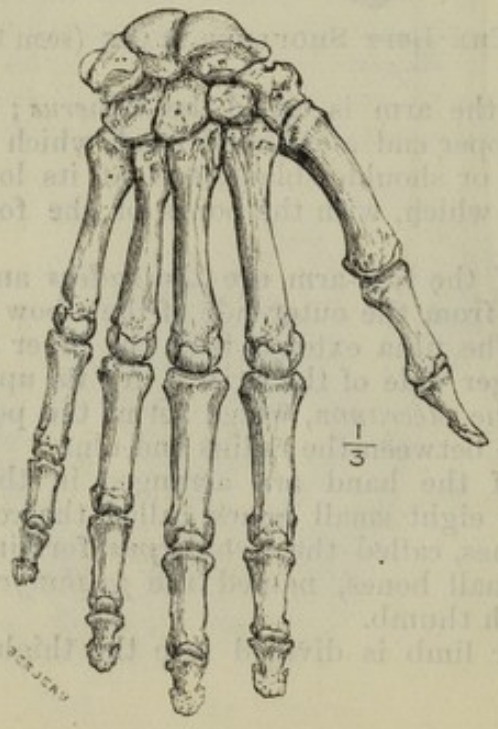


FIG. 7.—THE BONES OF THE RIGHT HAND.

The *thigh* is that portion which extends from the hip above to the knee below; its one bone is named the *femur* or thigh bone, and is the largest and strongest in the body. At its upper end there is a rounded head, which fits into a deep cup-shaped depression in the nameless bone forming the hip joint; below, the expanded end of the bone enters into the formation of the knee joint. Protecting the knee joint in front there is a small bone called the *patella*, or knee-cap. The thigh.

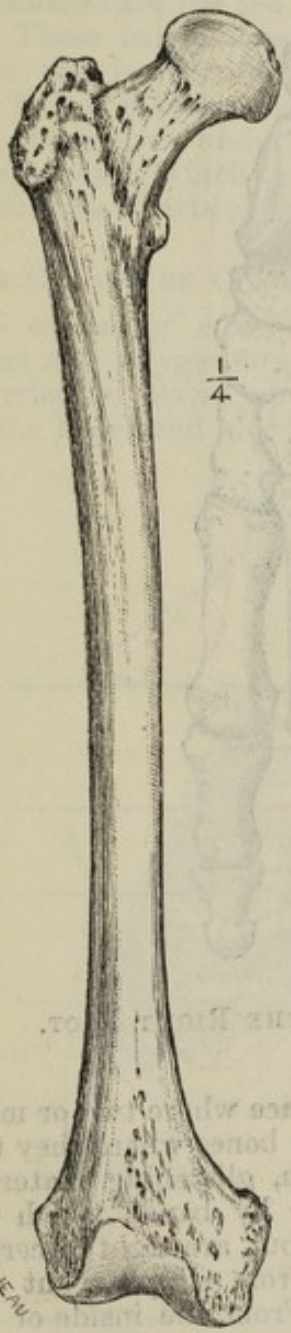


FIG. 8.—THE THIGH-BONE (right side).

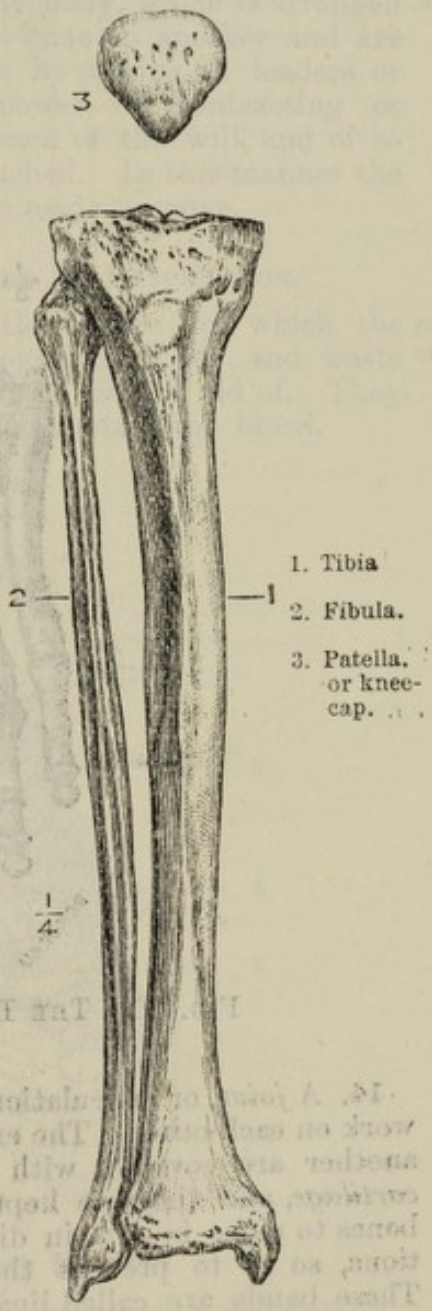


FIG. 9.—THE PATELLA, TIBIA, AND FIBULA (right side).

The *leg*, extending from the knee to the ankle, has two bones, a larger one lying on the inner or great toe side, called the *tibia* or The leg.

shin bone, upon the flat expanded head of which rests the lower end of the thigh bone, and a more slender one on the outer side, called the *fibula*.

The foot and ankle.

The construction of the foot is like that of the hand; it has three rows of bones: seven short strong ones, called the *tarsus*, in the ankle; secondly, a row of longer ones, the *metatarsus*, corresponding to the sole of the foot and instep; lastly, three small bones, named the *phalanges*, for each of the four outer toes and two for each great toe.

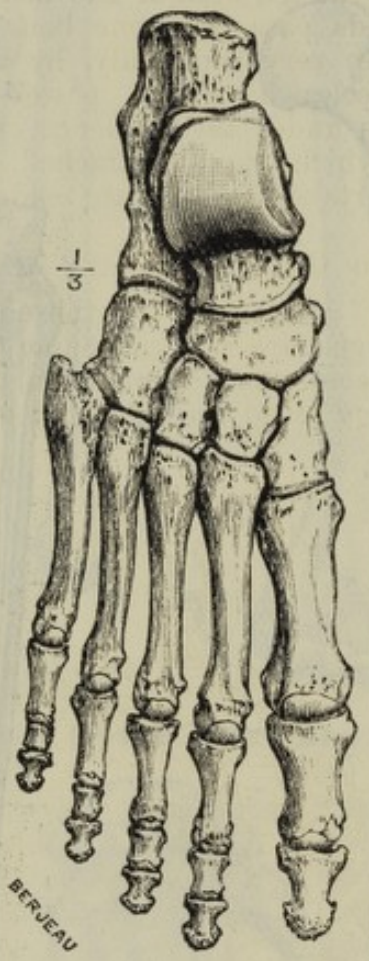


FIG. 10.—THE BONES OF THE RIGHT FOOT.

Joints.

14. A *joint*, or articulation, is the place where two or more bones work on each other. The ends of the bones where they touch one another are covered with a smooth, glistening material called

Ligaments.

cartilage, and they are kept together by bands which allow the bones to move in certain directions, but are tight in certain positions, so as to prevent the bones from slipping out of place. These bands are called ligaments. From the inside of the joint an oily material, like the white of a raw egg, and called *synovia*, is poured out, which allows the ends of the bones to glide smoothly over one another. The membrane which lines the joint and provides this material is called the *synovial membrane*.

The two principal kinds of joints are the ball and socket and the hinge joint. The ball and socket joint allows one of the bones to move freely in all directions. The shoulder and hip are joints of this description; the scapula and the innominate bone each having a cup-like hollow, into which fit the rounded, ball-shaped ends of the long bones of the arm and thigh. The second kind of joint, working like the hinge of a door, allows of movement up and down or backwards and forwards only, as seen in the elbow and knee. Varieties of joints.

15. The *muscles* are the red flesh of the body, which is arranged in bands. These bands pass from one bone to another and are attached to the bones very commonly, by means of leaders or tendons. These muscles have the power of contracting or shortening themselves under the influence of the will, and of so moving the bones to which they are attached. In this manner the limbs and different parts of the body are made to move. Muscles.

The Organs of Circulation and of Respiration.

16. The *organs of circulation* are the means by which the nourishment and oxygen are carried round the body, and waste matters carried to places where they are to be got rid of. They consist of the heart and blood vessels, and contain the blood. Organs of circulation.

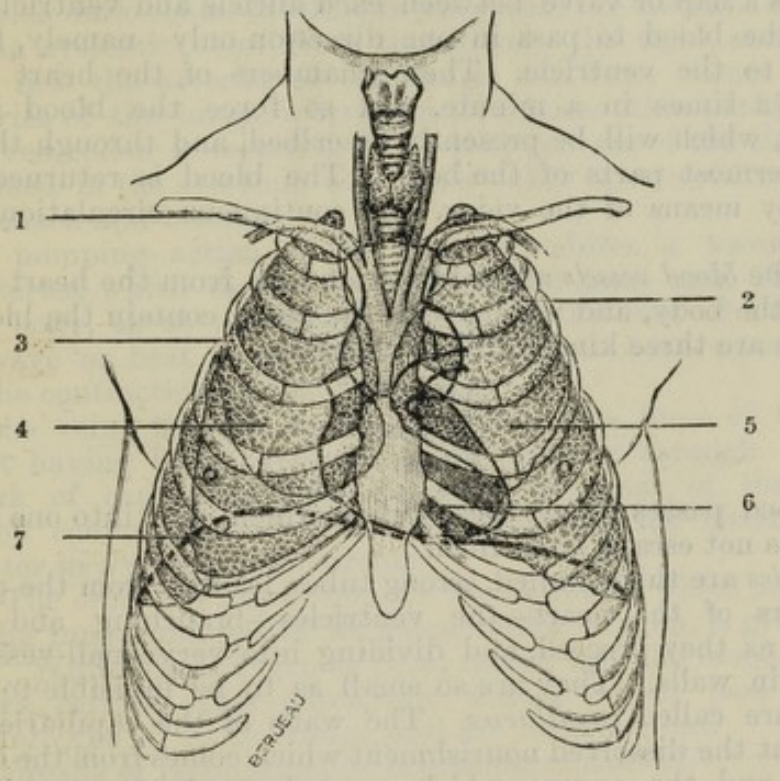


Fig. 11.—The Thorax or Chest.

1. Collar-bone. 2. Second rib. 3. Third rib. 4. Right lung. 5. Left lung. 6. Heart. 7. Cut edge of diaphragm.

The *blood* is a fluid of a red colour, which coagulates or changes into a jelly-like mass, when it escapes from the blood vessels. It

is made up of two parts—a clear fluid, which is what is seen in a blister, and many millions of very minute coin-shaped bodies, which give to the blood its colour and substance, and which collect together in the blood clot. These little discs are too small to be seen by the naked eye—over 3,000 placed in a line side by side would not make up 1 inch. They are called corpuscles. The blood in the right side of the heart and in the veins of the body is dark-coloured, and requires aëration, *i.e.*, to be supplied with oxygen from the air ; that in the left side of the heart and the arteries of the body is of a bright scarlet and aërated, *i.e.*, it has obtained oxygen from the air during its passage through the lungs. The dark-coloured blood is called venous blood, the bright-coloured blood is called arterial blood.

Heart.

17. The *heart* is a hollow muscular pump about the size of a closed fist, lying in the middle of the chest between the two lungs, with its point, or apex, toward the left side.

It is divided into a right and left half, separated by a partition, so that nothing can pass directly from the right to the left side of the heart.

Auricles and ventricles.

Each half is divided by another partition into an upper, thin-walled receiving chamber and a lower, thick-walled pumping chamber. The upper chamber is called an auricle, the lower a ventricle. There is a flap or valve between each auricle and ventricle, which allows the blood to pass in one direction only—namely, from the auricle to the ventricle. These chambers of the heart contract about 72 times in a minute, and so force the blood into the arteries, which will be presently described, and through them into the uttermost parts of the body. The blood is returned to the heart by means of the veins. A continuous circulation is thus kept up.

Blood vessels.

18. The *blood vessels* are tubes extending from the heart to every part of the body, and which, with the heart, contain the blood.

There are three kinds of blood vessels :—

Arteries.
Capillaries.
Veins.

The blood passes along these tubes, which open into one another, and does not escape from them.

Arteries.

Arteries are thick-walled, strong tubes, leading from the pumping chambers of the heart—the ventricles—branching and getting smaller as they proceed, and dividing into very small vessels with very thin walls. They are so small as to be invisible to the eye. These are called *capillaries*. The walls of the capillaries are so thin that the dissolved nourishment which comes from the digestive system, and the oxygen which comes from the lungs and is contained in the blood, can pass through them into the tissues of the body and so nourish it ; while impurities from the tissues soak into and are carried by the blood into the veins..

Capillaries.

The capillaries form a close network all over the body, and gradually collecting together and getting larger they become veins.

Veins.

The *veins*, thin-walled tubes, commencing thus in the capillaries, become fewer in number and larger in size as they get nearer the

heart, until they end in the large veins which open into its upper chambers—the auricles.

The arteries carry the blood from the heart to the capillaries, the veins from the capillaries to the heart. The blood travels rapidly in the arteries and veins, and very slowly in the capillaries, so as to allow the work above described to be done. Course of the blood.

19. In the body there is a double circulation, owing to the fact that the oxygen required to aërate the blood cannot be taken into the blood at the same time as nourishment. Consequently, the blood has to make one round to take in and distribute the nourishment and to distribute the oxygen, and a second round through the lungs to take in the oxygen from the air which is drawn into them. Of these two rounds, or circulations, the first is called systemic, the second pulmonary. The systemic circulation is that of every part of the body except the lungs. The pulmonary circulation takes place in the lungs alone, and is for the sole purpose of aërating the blood. The blood, when it passes from the capillaries of the lungs, is aërated and bright scarlet; it remains so while it circulates through the veins of the lungs into the left auricle, from thence into the left ventricle, from thence into the systemic arteries, until it passes into the systemic capillaries, where it loses the oxygen with which it has been charged and becomes dark-coloured. It remains dark-coloured while flowing from the systemic capillaries into the systemic veins, from thence into the right auricle, from thence into the arteries of the lungs, and from thence into the capillaries of the lungs, where aëration again takes place, and the bright red colour is restored. This is the course of the circulation. The blood in the systemic capillaries takes up nourishment from the stomach and bowels.

The pumping action of the heart produces a wave through the arteries, which can be felt where they come near the surface of the body, as at the wrist just above the root of the thumb. This wave or beat is called the pulse, each beat corresponding with the contraction or beat of the heart. The pulse.

In the veins there is no beat or pulse, the force of the blood current having been expended while passing through the wide network of capillaries lying between the ends of the arteries and the commencement of the veins, so that the blood flows in the latter in a steady even stream.

20. The *organs of respiration* are the means by which air is taken into the lungs, and one of its gases, called oxygen, is given to the blood. While the oxygen is being taken into the blood, carbonic acid gas, certain other gases, and watery vapour pass from the blood into the air in the lungs, and are breathed out. Organs of respiration.

The organs of respiration, or breathing, consist of—

The *trachea*, or windpipe.
The lungs.

The *trachea*, or windpipe, is a stout tube through which the air passes into and out of the lungs. Its upper part, called the larynx, is the organ of voice, and opens into the back of the mouth and nose. The windpipe can be felt in the throat under the skin where it Windpipe, larynx, and bronchi.

lies immediately in front of the gullet. In the chest it divides into two tubes, the bronchi, one for each lung.

There is a flap, called the epiglottis, at the upper opening of the larynx, which covers it and prevents food from passing into the windpipe when swallowing.

Bronchial tubes.

The bronchi are stout tubes leading from the windpipe to the lungs. In the lungs the bronchi branch out in all directions, becoming smaller and their walls thinner as they proceed to their closed endings, the air cells.

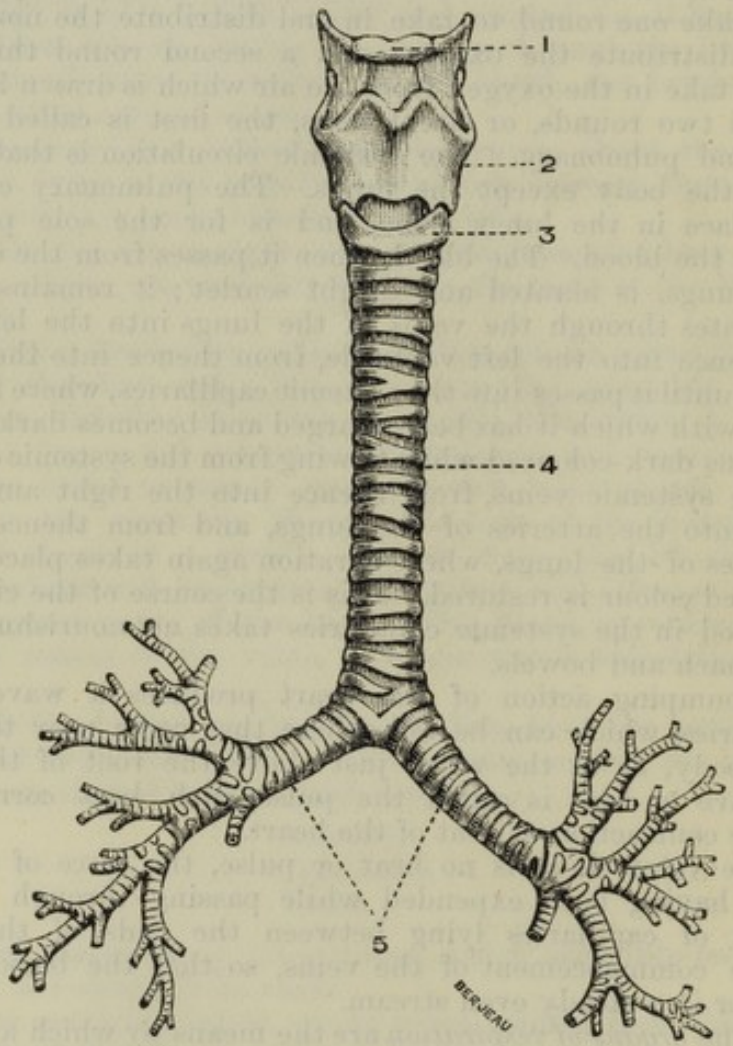


FIG. 12.—THE LARYNX, WINDPIPE, AND BRONCHI.

1. Hyoid bone. 2. Thyroid cartilage, and 3. Cricoid cartilage, forming the larynx. 4. Trachea, or windpipe. 5. Bronchi.

Lungs.

The lungs, two in number, lie in the cavity of the chest, one on either side. Each consists of a mass of minute, extremely thin-

Air-cells.

walled cells, the air-cells, which are the blind endings of the bronchial tubes.

Lung capillaries.

In the extremely thin walls of the air-cells are spread networks of capillaries.

The air-cells thus communicate directly with the external air through the bronchi, windpipe, larynx, mouth, and nose.

21. Respiration or breathing consists of— Description of respiration.

Inspiration or drawing-in of air to the chest, immediately followed by—

Expiration or breathing out, expulsion of air from the chest.

This is followed by a pause while one may slowly count two.

These together form a complete respiration.*

A complete respiration occurs in health eighteen times in a minute. Breathing-in or respiration is carried out in the following way :—

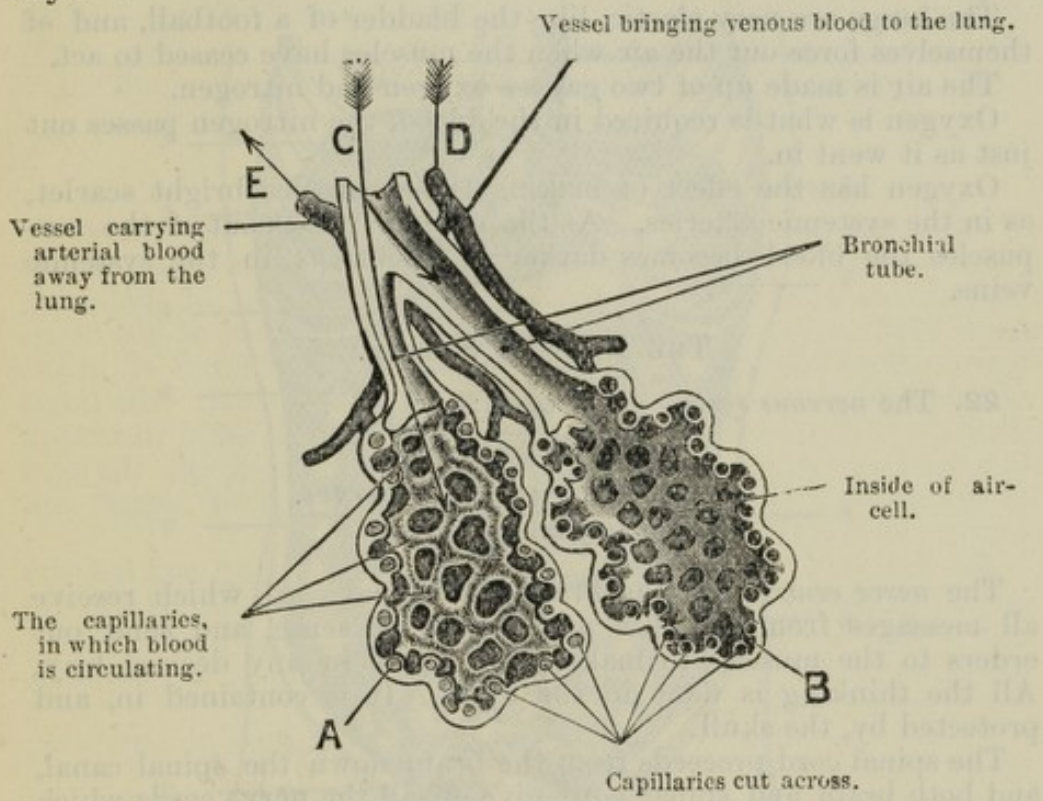


FIG. 13.—TWO AIR-CELLS OF THE LUNG CUT ACROSS.

A, showing the arrangement of the capillaries around the air-cells.
B, showing the appearance of the inside of an air-cell.
C is a bronchial tube. The arrow in it shows the direction of the air in inspiration.
D, a blood vessel taking the dark blood to be aërated in the cell.
E, a blood vessel returning the bright aërated blood to the left auricle.

There are certain muscles, by the action of which the chest is enlarged. Mechanism of respiration.

One of these, the diaphragm, or midriff, causes the chest to become deeper, much in the same way as a concertina when drawn out.

The diaphragm when not in action is arched upwards, being attached to the ribs and back bone, forming the floor of the chest, and separating it from the belly or abdomen. When in action and contracted, it becomes flat, pushing the belly outwards, and enlarging the cavity of the chest.

* The importance of impressing the relation to one another of these three phases of respiration becomes manifest when the practice of artificial respiration is being taught.

There are other muscles attached to the ribs which raise them up and so increase the size of the chest, making it broader from side to side. When the chest is thus being made larger the air is drawn in through the mouth and nostrils and passes down the windpipe and bronchial tubes into the air cells.

Purification of the blood.

Here it remains long enough to allow the oxygen to pass through the capillaries into the blood. At every breath a little additional air is drawn in, and some watery vapour, carbonic acid and other foul gases passed out. The chest is not completely emptied or filled at each breath.

The lungs are very elastic, like the bladder of a football, and of themselves force out the air when the muscles have ceased to act.

The air is made up of two gases—oxygen and nitrogen.

Oxygen.

Oxygen is what is required in the blood, the nitrogen passes out just as it went in.

Oxygen has the effect of making the corpuscles bright scarlet, as in the systemic arteries. As the oxygen passes out of the corpuscles the blood becomes darker in colour, as in the systemic veins.

The Nervous System.

Nervous system.

22. The *nervous system* consists of :—

(1) Nerve centres.
(2) Nerve cords, or nerves.
(3) Nerve-endings.

The *nerve centres* are the brain and spinal cord, which receive all messages from the skin and organs of sense, and send out orders to the muscles to make them move in any desired way. All the thinking is done in the brain. It is contained in, and protected by, the skull.

The spinal cord proceeds from the brain down the spinal canal, and both brain and spinal cord give off all the nerve cords which proceed to every part of the body.

The *nerve cords* are the connecting threads between the nerve centres and nerve-endings. They are, therefore, attached at one end to the brain or spinal cord, and at the other end terminate in the nerve-endings, whether in the skin, organs of sense, or muscles.

Nerve-endings.—These are to be found in every part of the body ; for instance, it is not possible to touch any portion of the skin with the point of a needle which does not contain a nerve-ending. They are able to communicate to the brain information of what is taking place in the part where they are distributed. For instance, with the end of the finger we can tell whether anything we touch is rough or smooth, hot or cold. Other nerve-endings in the ear, eye, tongue, or nose send to the brain information as to hearing, sight, taste, and smell. Acting on this information the brain can send an order to any muscle, or set of muscles, instantaneously by the nerves which pass into them, and so make them move.

The Digestive System.

23. This consists of two portions :— Digestive system.

(1) A long tube called the alimentary canal.

(2) Glands which prepare juices to be mixed with the food and digest it.

The alimentary canal begins at the mouth and ends at the anus or lower opening of the bowel. It is altogether about 30 feet long.

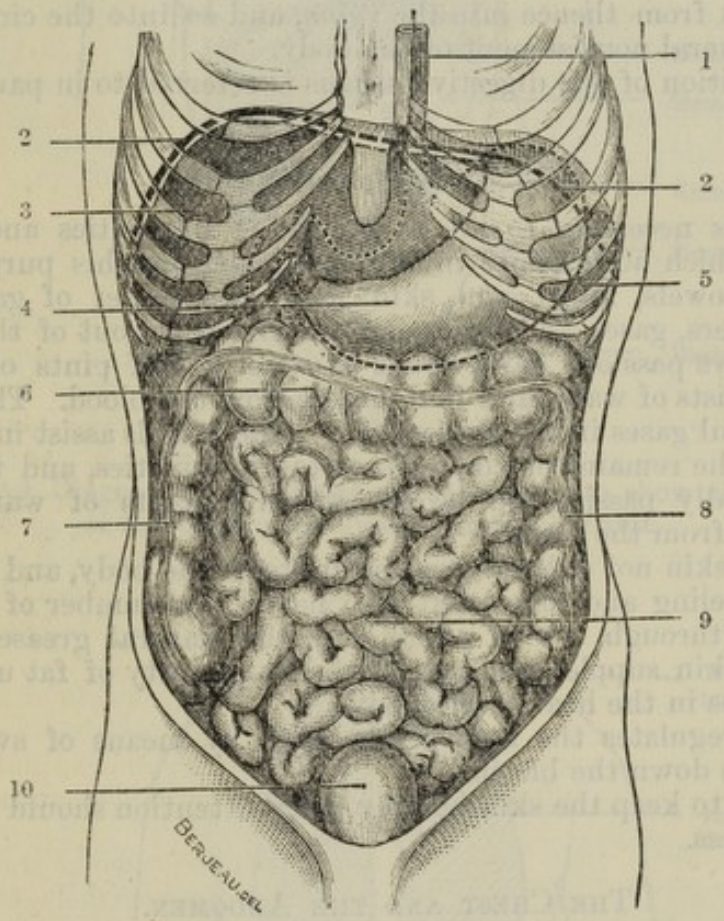


Fig. 14.—The Abdomen.

1. Gullet. 2, 2. Cut edge of diaphragm. 3. Liver. 4. Stomach. 5. Spleen. 6. Transverse colon. 7. Ascending colon. 8. Descending colon. 9. Small intestines. 10. Bladder.

The different parts of the alimentary canal are the mouth, gullet or œsophagus, stomach, small and large intestines.

The glands, or organs which pour juices into this canal or tube, are the salivary glands in the mouth, the gastric glands in the stomach, the liver which makes bile, two pints a day, and the pancreas which makes a juice similar to the saliva, and other glands in the walls of the small intestine.

It is necessary for proper digestion that the teeth should be in good order and kept from decay. One great means of preventing decay is to brush the teeth regularly every day. This removes the remains of food which when left among the teeth helps to cause their decay.

The food passes through the gullet from the mouth, after being chewed or masticated and mixed with the saliva, into the stomach. As it becomes sufficiently liquefied by the action of the stomach, it passes gradually into the intestines or bowels, where further digestion takes place, and the unused parts of it are passed out about 24 hours after having been swallowed.

While it is passing down the stomach and bowels the nutritive part of it is dissolved and sucked into the blood, through the thin walls of the capillaries on the inside of the stomach and bowels, and passes from thence into the veins, and so into the circulation for the general nourishment of the body.

The position of the digestive organs is referred to in para. 26.

The Excretory System.

Excretory system.

24. It is necessary to life to get rid of impurities and waste matters, which accumulate in the blood, and for this purpose the kidneys, bowels, lungs, and skin have the power of gathering these matters, gases, and fluid, and passing them out of the body. The kidneys pass out daily about two and a half pints of urine, which consists of water and foul matter from the blood. The lungs pass out foul gases in the expired air. The bowels assist in casting out, with the remains of the food, certain impurities, and the skin is continually passing off sweat, which consists of water and impurities from the blood.

The skin.

25. The skin not only covers and protects the body, and has the sense of feeling and touch, but also has in it a number of minute apertures, through which sweat and the natural grease which keeps the skin supple pass out. It has a quantity of fat under it, which keeps in the heat of the body.

It also regulates the heat of the body by means of sweating, which cools down the blood.

In order to keep the skin healthy, great attention should be paid to cleanliness.

The Chest and the Abdomen.

Position of vital organs.

26. There are two large cavities in the trunk—namely, the chest, or thorax, and the belly, or abdomen. The chest is separated from the belly by the diaphragm, a flat muscle which is concerned in the breathing (*see* para. 21). The walls of the chest are principally made of bone—namely, the back-bone, ribs, and breast-bone or sternum. The walls of the belly are almost entirely made of flesh, or muscles arranged in layers. The chest contains the lungs and heart ; passing through the back of the chest to reach the stomach, through a hole in the diaphragm, is the gullet. The windpipe passes from the neck into the chest. Large blood vessels pass into and out of the chest to reach the heart.

The belly contains the stomach and bowels, the liver, spleen, pancreas, kidneys, and bladder. The liver is a very large organ. It is placed below the diaphragm, under the ribs, on the right side, and fills nearly a sixth part of the belly. The stomach is under the ribs on the left side, and varies in size according as to

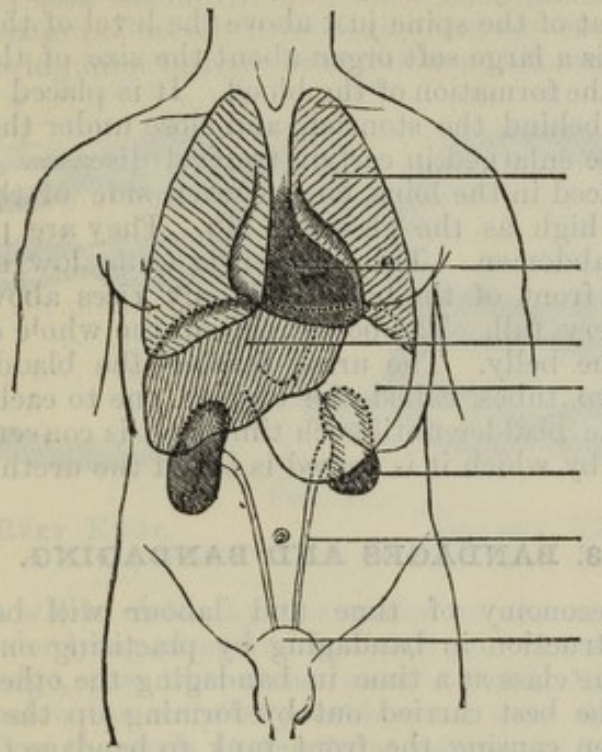


FIG. 15.—A Diagram of the Chest and Abdomen, to show the position of the Organs, as Viewed from the Front.

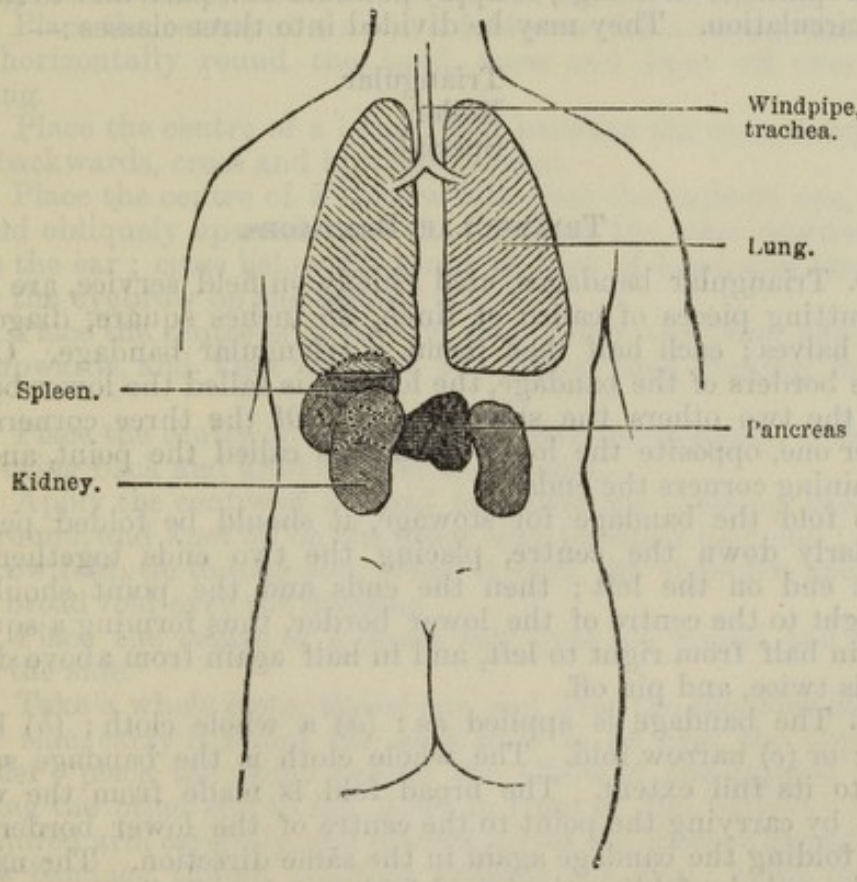


FIG. 16.—A Diagram of the Chest and Abdomen, to show the position of the Organs, as Viewed from Behind.

whether it is empty or full. The pancreas or sweetbread lies across the front of the spine just above the level of the navel.

The spleen is a large soft organ about the size of the fist. It is concerned in the formation of the blood. It is placed deeply under the left ribs, behind the stomach, and close under the diaphragm. It is apt to be enlarged in certain tropical diseases. The kidneys are deeply placed in the loins, one on each side of the back-bone, and reach as high as the eleventh rib. They are placed at the back of the abdomen. The bladder is quite low down, in the middle of the front of the belly, and only rises above the pelvis when it is very full. The bowels fill up the whole of the rest of the space in the belly. The urine reaches the bladder from the kidneys by two tubes, called the ureters, one to each kidney. It remains in the bladder until such time as it is convenient to pass it. The tube by which it is passed is called the urethra.

3. BANDAGES AND BANDAGING.

Method of instruction.

27. Great economy of time and labour will be effected in imparting instruction in bandaging by practising one-half of the members of the class at a time in bandaging the other half. This can probably be best carried out by forming up the men in two ranks, and then causing the front rank to bandage the rear rank, and *vice versâ*.

Various kinds of bandages.

28. Bandages are used for many purposes, the chief of which are to fix splints or dressings, to apply pressure to a part, and to support the circulation. They may be divided into three classes :—

Triangular.
Roller.
Special.

Triangular Bandages.

Description of triangular bandage.

29. Triangular bandages, used chiefly on field service, are made by cutting pieces of calico or linen, 38 inches square, diagonally into halves ; each half then forms a triangular bandage. Of the three borders of the bandage, the longest is called the lower border, and the two others the side borders. Of the three corners, the upper one, opposite the lower border, is called the point, and the remaining corners the ends.

Stowage.

To fold the bandage for stowage, it should be folded perpendicularly down the centre, placing the two ends together, the right end on the left ; then the ends and the point should be brought to the centre of the lower border, thus forming a square ; fold in half from right to left, and in half again from above downwards twice, and pin off.

Three modes of application.

30. The bandage is applied as : (*a*) a whole cloth ; (*b*) broad fold ; or (*c*) narrow fold. The whole cloth is the bandage spread out to its full extent. The broad fold is made from the whole cloth by carrying the point to the centre of the lower border, and then folding the bandage again in the same direction. The narrow fold is made by folding the broad fold once lengthwise.

31. In every case where a knot has to be tied, a reef knot will be used, the formation of which is best explained by the accompanying diagrams showing how to make it and how not to make it. Reef knot.

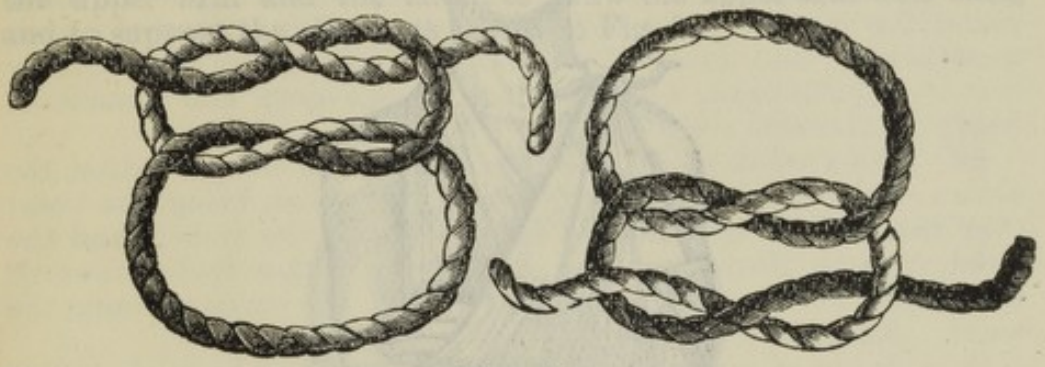


FIG. 17.

REEF KNOT. GRANNY KNOT.

32. Take a whole cloth, lay the centre on the top of the head, the lower border lying along the forehead just above the eyebrows; fold in the edge, pass the ends round behind, leaving the ears free; cross below the occipital protuberance over the point of the bandage; bring the ends to the front again, and knot off on the centre of the forehead. Place the hand on the top of the head to steady the dressing, draw the point down to tighten and fit the bandage to the head, then turn it up and pin off on the top. To bandage top of head.

33. Place the centre of a narrow fold over the dressing, pass the ends horizontally round the head, cross and knot off over the dressing. Side of head.

34. Place the centre of a broad fold between the eyes, carry the ends backwards, cross and knot off in front. Both eyes.

35. Place the centre of a narrow fold over the injured eye, pass one end obliquely upwards over the forehead, the other downwards across the ear; cross below the bump at back of head, and knot off above the eyebrow on the injured side. One eye.

36. Place the centre of a narrow fold under the chin, pass the ends upwards, and knot off over the top of head tucking in the ends. Chin and side of face.

37. Place the centre of a narrow fold over the dressing, cross the ends, bring back and knot off over the wound. Neck.

38. Apply the centre of a broad fold over the dressing, pass the ends round, and knot off on the other side, leaving a long end; take a narrow fold, tie to long end, bring it over the shoulder, and pin off to broad fold over the dressing. Chest.

39. Place the centre of a broad fold over the wound, and knot off on the side. Abdomen.

40. Take a whole cloth, throw one end over the shoulder on the sound side, carry it round the neck so as to lie over the opposite shoulder; place the point behind the elbow of the injured arm, allowing the other end to fall down in front of the patient; bend the injured arm carefully, and place it across the chest on the middle of the bandage, thumb pointing towards the chin; bring up the lower end in front of the forearm, and knot off to the end lying over To apply the greater arm sling.

the shoulder on the injured side; draw the point forward round the elbow and pin off.

FIG. 18.—GREATER ARM SLING.

In broken collar bone.

There is one exception to this method of applying the greater arm sling, viz., in fracture of the clavicle, where it is not advisable to allow anything to press on the injured bone. To avoid this, the lower end which is brought up in front of the forearm, should be passed between the arm and the side of the injured shoulder, and knotted off to the upper end behind the neck.

FIG. 19.—ARM SLING FOR FRACTURED COLLAR BONE (CLAVICLE).

Fractured clavicle.

This bandage may be also used to secure the arm temporarily in cases of fractured clavicle. Having placed a pad in the arm pit, apply the centre of a narrow-fold bandage to the outer surface of the arm of the injured side; carry the front end horizontally across the chest; bring the back end forwards between the arm and chest, over the upper margin of front part of bandage, then up through the loop formed; carry backwards round chest exercising steady traction, so as to draw the arm backwards

then secure the two ends on the opposite side of the chest. The arm-sling depicted in Fig. 19 can then be applied. An ordinary roller bandage may be used ; taking care to place a pad between the upper arm and the chest, to draw the upper arm well back, and to support the elbow, as shown in Fig. 20.

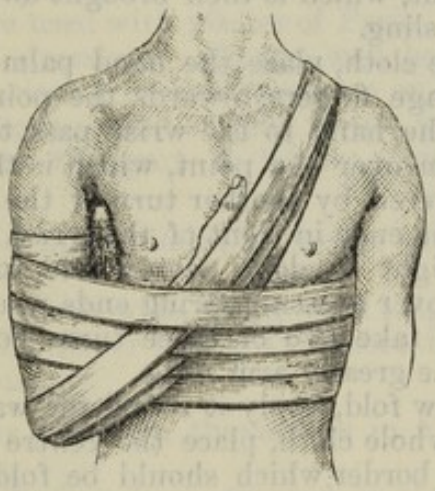


FIG. 20.—BANDAGE FOR FRACTURED CLAVICLE.

To apply the lesser arm sling.

41. Take a broad fold, place one end over the shoulder on the sound side, carry it round the back of the neck so as to lie over the opposite shoulder, allowing the other end to fall down, bend the arm carefully and place the wrist across the middle of the bandage with the hand a little higher than the elbow, bring up the lower end, and knot off to the upper end over the shoulder on the injured side.

FIG. 21.—SHOULDER BANDAGE AND LESSER ARM SLING.

To bandage the shoulder.

42. Lay the centre of a whole cloth on the top of the shoulder, point upwards, the lower border lying across the middle of the arm. Fold in the lower border, carry the ends round the arm, cross them, and knot off on the outer side. Apply the lesser arm sling, draw

the point of the first bandage under the arm sling, fold it back on itself, and pin off over the shoulder.

Elbow. **43.** Place the centre of a whole cloth over the back of the bent elbow, point upwards, turn in the lower border, pass the ends round the forearm, cross them in front, pass up round the arm, cross behind, and knot off in front. Tighten the bandage by drawing on the point, which is then brought down and pinned off. Apply greater arm sling.

Hand. **44.** Take a whole cloth, place the hand palm downward on the centre of the bandage, fingers towards the point, bring the point over the back of the hand to the wrist, pass the ends round the wrist, crossing them over the point, which is then folded towards the fingers, and covered by another turn of the bandage round the wrist. Knot off the ends in front of the wrist.

Or a figure of eight bandage, narrow fold, may be used. Place centre of bandage over dressing, bring ends round to opposite side of hand, cross and take two or three turns round the wrist and knot off. Apply the greater arm sling.

Hip. **45.** Take a narrow fold, apply it round the waist, and knot off in front, then take a whole cloth, place the centre over the hip, point upwards, the lower border which should be folded in lying across the thigh; pass the ends round the thigh, and knot off on the outer side. Draw the point upwards beneath the bandage round the waist, turn it down and pin off.

Knee. **46.** Keep the leg straight, apply a broad fold, cross behind, and knot off in front below kneecap.

Foot. **47.** Place the sole of the foot on the centre of a whole cloth, toes towards the point; turn the point upwards over the instep, take one of the ends in each hand close up to the foot; bring them forward, cross them over the instep covering the point. Draw the point up to tighten the bandage, and fold it towards the toes. Carry the ends back round the ankle, cross them behind, catching the lower border of the bandage. Bring the ends forward, cross them again over the instep, covering the point, carry them beneath the foot, and knot off on the inner side.

Other part of limbs. **48.** When applied to any other part of the limbs, a broad fold is used, the centre of the bandage being placed over the dressing, the ends passed round the limb, and knotted off over the wounds.

Perinæum, and lower part of abdomen. **49.** Take a whole cloth, lower border uppermost, pass the ends round the waist immediately above the hips, and knot off behind, leaving one long end: pass the point between the legs, draw it upwards, and knot off to the long end behind. Another method:— Apply a narrow-fold bandage round the waist; pass the end of a second bandage, similarly folded, beneath the waist bandage at the centre of the back, fold over and secure with safety pin; bring the other end forward between the thighs, up to the waist bandage in front, pass beneath, turn over and secure with safety pin. This forms a modified T bandage. (*See* para. 61.)

To fix splints. **50.** Take a narrow-fold bandage, double it upon itself, and place the loop thus formed upon the splint on the outer side of the limb; pass the free ends round the limb from without inwards, and one of them through the loop; tighten the bandage by steadily drawing on the two ends, and then knot them in the usual way

Roller Bandages.

Varieties of roller bandages.

51. Roller bandages are made of calico, linen, flannel, some loose-woven material, gauze impregnated with some antiseptic, or elastic webbing. The rollers ordinarily in use for bandaging the head or limbs are made of calico and linen. Flannel bandages are used for special purposes, for warmth, or after inunctions. Loose-woven bandages are used with plaster of Paris. Gauze bandages are used in antiseptic dressings. Elastic web bandages are used to support the circulation or exercise pressure on a limb.

Sizes of roller bandages.

52. Roller bandages consist of long strips, varying in length and width according to the part to which they are to be applied, thus :—

For the head and upper limbs, 2½ inches wide, and from 3 yards to 6 yards long.

For the fingers, ¾ inch wide, and 1 yard long.

For the trunk and lower limbs, 3 or more inches wide, and 6 to 8 or more yards long.

They are tightly rolled on themselves in a compact cylindrical form ready for use.

Practical instruction in rolling bandages.

53. The class will first be instructed in the proper methods of rolling a bandage, single-headed, and double-headed, and, at the conclusion of exercises given in accordance with paragraphs 54 to 60, the bandages will invariably be inspected, to see that each man hands his in properly rolled.

Application of a roller bandage.

54. To apply the bandage the operator stands or sits opposite the patient. The limb is placed in the position it is to occupy when bandaged, and care must be taken that the bandage is not put on so tightly as to cause discomfort or swelling of the limb below ; a bandage thus too tightly applied may produce gangrene of the limb, by cutting off its blood supply. If, on squeezing the tips of the fingers or toes of the bandaged limb, it is observed that the colour returns much more slowly than when this is done on the unbandaged limb, it may be assumed that the bandage is too tight. The roller is taken in the right hand when bandaging the left limbs and in the left hand when bandaging the right. The outer surface of the bandage is applied to the inner side of the wrist or ankle, and two turns taken straight round the limb from its inner to its outer side by the front.

Simple spirals.

From this point the bandage may be taken up the limb in *simple spirals*, that is, evenly put on turns of the bandage, each overlapping for one-third the width of the bandage, from below up, taking care to have the lower edges of the turns of bandage parallel with each other.

Reverse spirals.

When the swell of the limb is reached, the edges can no longer be maintained parallel, the bandage will not lie evenly, and gaps occur between the turns if the simple spiral is used. It therefore becomes necessary to use the *reverse*. To make the reverse, the thumb of the disengaged hand is placed on the lower border of the bandage on the outer side of the limb, the bandage is slackened and turned over, reversed, downwards, and passed round the limb to the opposite side, its lower edge parallel with that of the turn

below. On reaching the outer side the reverse is again made, and so on up to the joint. The angles formed by the successive reverses must be kept in a straight line.

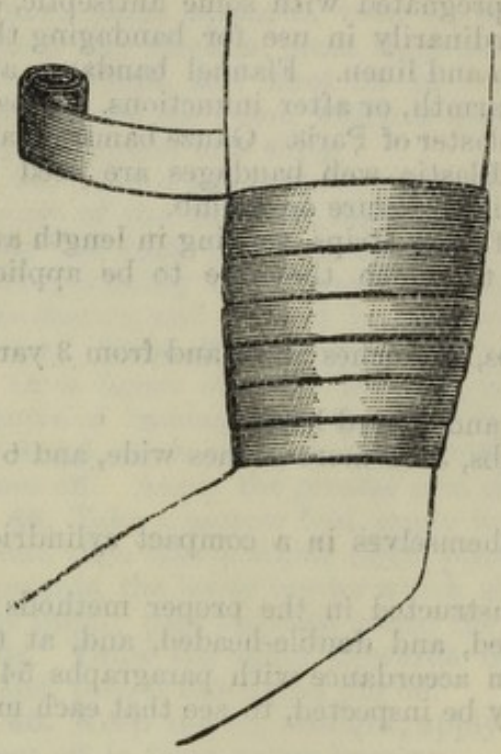


FIG. 22.—SIMPLE SPIRAL.

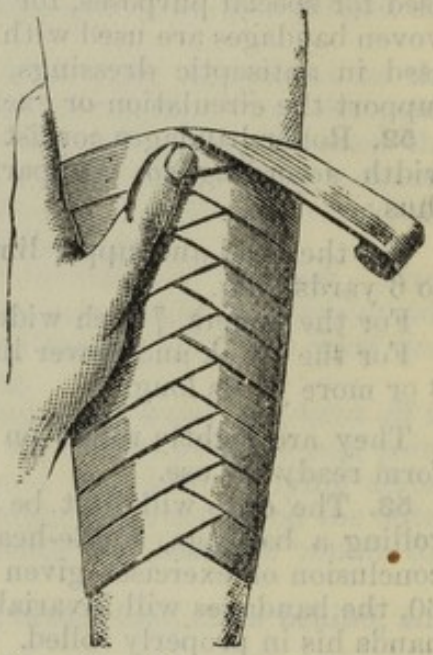


FIG. 23.—REVERSE SPIRAL.

Figure of eight.

On reaching the joint, neither the spiral nor reverse will lie evenly, so that the *figure of eight* has to be resorted to. This, as its name implies, is applied by passing the roller obliquely round, alternately upwards and downwards, thus making a figure of 8, each figure overlapping the one below by one-third the width of the bandage. The crossings of the figures should be kept in the same line as the reverses below.

Removal of bandage.

To remove a bandage it should be unrolled from the top and the slack gathered into a ball and passed from hand to hand round the limb.

To bandage a finger.

55. Take two turns round the wrist, carry the bandage across the back of the hand to the root of the injured finger, up the finger by an open spiral to the top, whence it is brought by an evenly-laid close spiral to the root; then across the back of the hand to the opposite side of the wrist which it started from, round the wrist once or twice, and pinned off.

To bandage the hand or foot.

56. Two turns are taken round the wrist or ankle, the bandage carried across the back of the hand or foot to the opposite side, passed across the palm or sole, and brought back to the opposite side of the wrist or ankle, over the back of the hand or foot, thus forming a figure of eight, which may be repeated as often as required.

To bandage the chest.

57. A roller 6 inches wide and from 6 to 8 yards long is used. It is applied from below upwards in a simple spiral, each spiral

overlapping the one below for one-half its breadth. On completing the last spiral the bandage is pinned off behind, leaving about a yard and a half free ; this end is brought over one shoulder as a brace, carried obliquely down over the bandage in front to the lowest turn, to which as well as to the upper turns it is fastened, thus preventing the bandage from slipping down.

58. A bandage to the abdomen is similarly applied to that for the chest, except that it is put on from above downwards, and that it is kept in position by the free end being carried from behind forward between the thighs and fastened in front. To bandage the abdomen.

59. To keep a dressing on an ordinary wound of the head a few circular turns of a bandage are sufficient. To exert pressure on a graduated compress applied over a bleeding wound (*see* para. 98) the *knotted bandage* is used. This is made with a single-headed bandage. The bandage should be unrolled for about a foot, and the end held in the left hand, which is kept close to the temple ; the roller is then carried round the forehead and occiput, so that it comes back to the unrolled end at the wound. At this point the roller is twisted round sharply and then carried down below the chin and round over the vertex. On coming to the temple again the same twist is made, and the roller is once more passed round horizontally ; where sufficient pressure is obtained the bandage is fixed by knotting the two ends together. To bandage the head. The knotted bandage.

60. A roller bandage may be applied to the groin, shoulder, or thumb in the following manner, which is known as the spica bandage : To bandage the groin, shoulder, or thumb.

It is made by applying the bandage in a series of figure of eight turns, overlapping from below up. Take two turns of a single- The spica bandage.

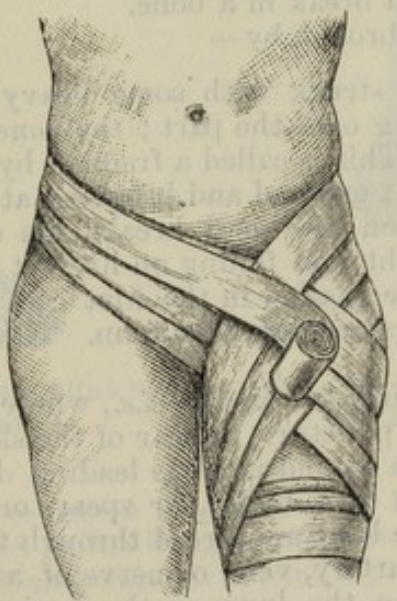


Fig. 24.—Spica Bandage.

headed roller round the thigh, as a point of attachment, from within outwards, carry the bandage upwards over the groin above

the hip, and round the back to the opposite hip, then across in front of the abdomen, passing round the outer side of the thigh and upwards between the thighs to complete the figure of eight. The turns are to be repeated as often as necessary.

Special Bandages.

The T bandage.

61. The T bandage is specially prepared by taking a piece of bandage 3 inches wide and 1½ yards long and sewing to it another similar strip 1 yard long, so as to form a T. It is applied by passing the long strip round the hips so that the attached piece is at the sacrum ; pin off in front. Bring up the short piece between the thighs and fasten to the first piece in front. It is used to keep a dressing on the perinæum.

The four-tailed bandage.

62. To prepare the four-tailed bandage, take a yard and a half of 3-inch roller bandage, make a slit in its centre about 3 inches long, and then slit up the ends, so as to leave 6 inches in the centre.

In applying it, place the central slit on the point of the chin, tie the two upper tails behind the neck, and the two lower tails on the top of the head ; the ends of the upper and lower tails should then be tied together behind the head to prevent the bandage from slipping forward.

It is used for fracture of the lower jaw or to retain a dressing on the chin.

4. FRACTURES AND THE APPARATUS FOR THEIR TREATMENT.

Definition and causes of fracture.

63. A fracture is a break in a bone.

The bone may be broken by—

(1) Being directly struck with some heavy weapon, or a bullet, or by a wheel passing over the part ; the bone breaks at the point struck or crushed. This is called a fracture by direct violence.

(2) Being struck at one end and breaking at some other part, as when a man falling on his hand breaks his collar-bone, or when jumping from a height and falling on his feet he breaks the base of his skull, the force passing in the first case up his arm, and in the second up his legs and spinal column. This is called a fracture by indirect violence.

Simple fracture.

64. The fracture may be simple—*i.e.*, where the bone is broken without any wound, puncture, or tear of the skin over it—or,

Compound fracture.

Compound, when a wound is made leading down to the broken ends of the bone, as by a bullet, or spear, or bayonet wound, or when the ends of the bone are forced through the skin.

Complicated fracture.

When the main artery, vein, or nerve of a limb is injured by the fracture, or when the lung or the brain are damaged by a broken rib or skull, the fracture is said to be complicated.

Comminuted fracture.

The bone may be broken also into more than two pieces, or even completely pulverised, when the fracture is said to be comminuted.

Signs of fracture.

65. It may be known that a bone is broken by the following signs :—

(1) Loss of power—*i.e.*, that the limb cannot be put to its proper use. For instance, when a leg is broken the man cannot stand upon it; when an arm is broken the hand cannot be raised to the back of the head.

(2) Alteration in shape. The limb may be bent, twisted, or shortened, and, when compared with the sound limb, it appears of an unnatural shape.

(3) Unnatural mobility—that is, when the limb is handled it gives way, where it is broken between the joints, where, if sound, it should not be movable.

(4) When handled, which should not be unnecessarily done, there is generally a grating sensation, caused by the broken ends of the bone grating against one another. Pain and swelling always accompany fracture.

FIG. 25.—SIMPLE FRACTURE OF TIBIA AND FIBULA.

FIG. 26.—COMPOUND FRACTURE OF TIBIA AND FIBULA.

66. The joining or *union* of a fractured bone is produced by a soft substance called callus being thrown out between and around the broken ends, which substance eventually hardens into new bone, thus soldering the fragments together. Mode of repair.

The time taken for a fracture to unite depends upon the size of the bone. A finger, for instance, may unite in fourteen days, whereas the thigh-bone would take two months to heal.

67. If in doubt as to whether the bone is really broken, the case must be treated as one of fracture. Handle the limb with the How to prevent further injury.

greatest gentleness, in order that there may be no risk of further injury to the part, bearing in mind that a simple fracture may easily be converted into the much more serious compound, or complicated fracture, by rough handling.

Removing the clothing.

In removing the clothing the greatest gentleness must be used. In the case of a fractured thigh or leg, the outside seam of the trousers should be slit right up. Braces must be unfastened all round. There must be no dragging on taking off the clothing. The leg of the cut trousers should then be very carefully drawn to the inside of the injured limb, and the leg of the trousers on the sound limb can then be pulled off with it. The sock should be cut off, after the boot has been slit up the back seam, fully unlaced, and removed. In fracture of the arm the coat seam and shirt must be ripped up.

Apply splints round the limbs, so as to render the fragments immovable.

In doing this there need be no effort made accurately to replace the fractured parts, but merely in a general way, to reduce the deformity by first fastening the lower bandage round the carefully applied splints, pulling gently and slowly in the line of the limb, and then securely fastening the upper bandage. To support the limb effectually the splint should extend beyond the joints above and below the fracture.

Splints.

Splints consist of supports made of some unyielding material, wood generally, varying in length, width, and shape with the part to which they are to be applied. Before being applied they should be padded with some soft material, to protect the limb from the hard surface and edges of the splint.

Pads for splints.

These pads are usually made of soft linen or calico, stuffed with cotton wool mixed with tow, or with tow alone. Care must be taken that the pads are quite even, and contain no lumps of tow or wool, which should be well teased out. Pads should be large enough to protect the limb from the edges of the splint. Some splints are covered with jaconet to keep them clean and the pads dry.

They are bound to the limb by bandages or tapes, so that when fixed the limb is protected and held firmly in its proper position. (Refer to para. 69.)

Moving a patient suffering from fracture.

In moving a patient all disturbance of the limb should be prevented as much as possible. In the upper extremity the arm may be supported in a sling and tied to the side. In the lower extremity the limbs may be tied together at the knees and ankles.

In no case should a man with a broken limb, or supposed broken limb, be moved until splints have been applied.

After treatment.

68. The subsequent treatment of fractures—that is, the setting of the bones and final application of the splints—is carried out by the officers; but it is necessary that the men should be familiar with the apparatus in general use in military hospitals, in order that they may render intelligent assistance.

The apparatus contained in the boxes, described in paras. 130 and 131, will be shown and explained by the instructor. The following paragraphs describe the apparatus required for the

treatment of various fractures. Those used are rattan cane splints for the limbs, japanned iron wire arm splints, sheets of perforated zinc, with shears, hammer, anvil, and rivets to shape and join them, plaster of Paris, and sheets of paste-board, which have to be cut to shape and softened in water. There are special splints for certain parts of the body :—For the radius, a special radius splint; for the thigh-bone, Liston's long thigh splint (generally jointed for packing); for the lower part of the thigh-bone, McIntyre's splint; for the leg, the same splint, or a metal back-splint.

Fracture bed.

For cases of fracture it is necessary that the bed should be even and firm, so that in a case of fractured thigh or leg, for instance, the limb can be kept quite straight and immovable. Boards are also used for this purpose. These can be placed under the limb, leaving the rest of the bed free. A six-foot table can be used.

Sand bags.

Bags filled with sand are very useful to steady a limb. They are placed on each side to prevent movement, and to steady it.

Tight bandages.

After a splint has been applied there may be much pain and swelling of the parts, due to the bandages being too tight. The orderly should at once inform the sister or non-commissioned officer, who will inform the officer if thought necessary.

Plaster of Paris splint.

For a plaster of Paris splint there are required one or two pounds of fresh plaster of Paris, which after the tin has been opened should be put on the hob for twenty minutes ; one or two flannel bandages ; three or four loose-wove or muslin bandages ; two clean basins, one for the dry plaster, and the other for cold water ; a newspaper is spread under the limb to protect the bedding. Method of applying :—The muslin bandages are soaked in water ; the flannel bandage is wrapped round the limb, this is then covered by one layer of the wet muslin bandage ; a handful of dry plaster is taken, dipped into the cold water, and smeared on ; another muslin bandage is applied, and covered with more plaster. The limb is kept carefully in position till the plaster sets.

Improvised splints.

69. On the battlefield, or in cases of emergency, specially-made splints may not be at hand, and it therefore becomes necessary to contrive an apparatus which shall take their place. Such splints are called improvised splints.

How made.

They may be made of any firm, unyielding substance which may be at hand, such as sticks, telegraph wire, bark of trees, stiff paper folded, bundles of twigs, rushes, or straw, portion of a soldier's equipment, such as rifles, bayonets, swords, lances, &c.

How applied.

They may be padded with grass, straw, heather, leaves, or articles of clothing, and the straps of the soldier's equipment or strips torn from shirts may be utilised as bandages or slings. The triangular bandage is used to secure improvised splints, in the manner described in paragraph 50.

Rifle splint.

70. The following are the rules for the application of a rifle splint (Fig. 27). See that the rifle or magazine contains no cartridges. If the splint be for the right side, remove the bolt.

Take a narrow-fold bandage, place it over the heel plate of butt in such a way that two-thirds of its length are on what will be the outer side, and one-third on the other side of the butt : take a half hitch with the long end round the butt, making a half knot on

outer side. Tie the ends with a reef knot so as to form a loop, the knot of which must come below the stock and be on a level with the projecting part. This is for the perineal bandage to pass through, and is called the butt-loop. Leave the magazine in

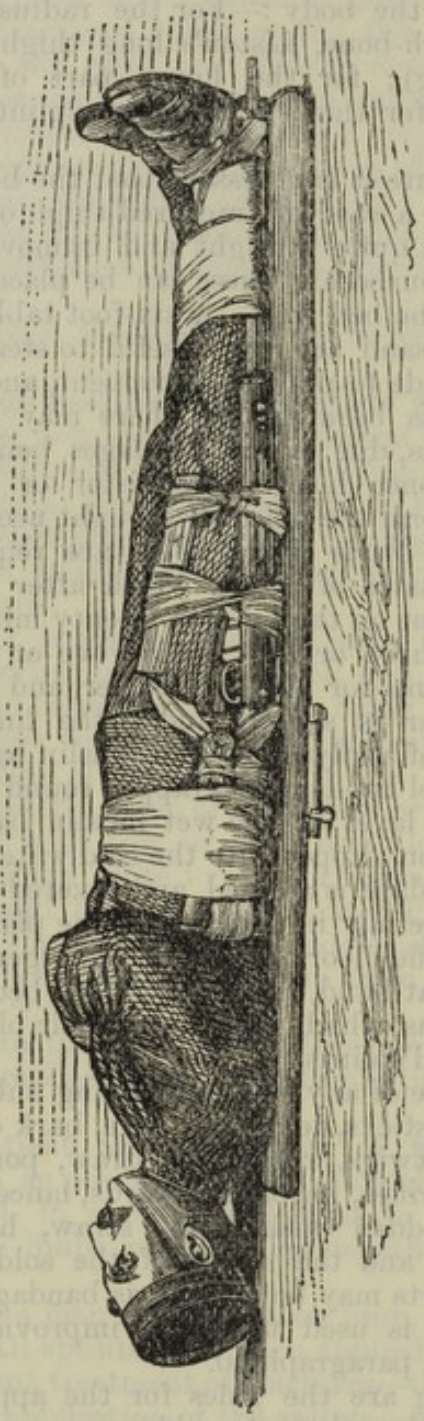


Fig. 27.—Rifle Splint applied.

position : place the rifle along the injured limb, butt towards the armpit, trigger guard to the front. Take a narrow-fold bandage, place its centre over the ankle of the injured limb, pass the ends behind, enclosing muzzle of rifle, cross behind. With the outer

end take a turn round the muzzle in front of the sight or D for sling, bring both ends up, cross over instep and tie off on the inside of the foot. Take a narrow-fold, place its centre in the fork, bring one end out behind, the other in front of the limb; pass one end through the butt-loop and tie, gradually tightening the knot as the limb is gently drawn to its proper length. Pass both ends round small of butt and tie off. Take two long splints, place one on the top and the other along the inner side of the thigh and fix at each end by a narrow-fold bandage tied off over the rifle in the manner described in paragraph 50. Take a broad-fold bandage, place the centre over the butt of the rifle, pass the ends round the body, and tie off on the opposite side. Tie the patient's legs together by placing the centre of a broad fold over both ankles, pass the ends behind, cross, bring up and tie off on top between the legs.

Fracture of ribs and pelvis.

71. Splints are only useful in fractures of the limbs, but in fractures of the ribs and pelvis a broad roller bandage, or a broad fold triangular bandage, should be tied firmly round the chest or hips, as the case may be. In a case of fractured ribs strapping is often applied. This supports the parts and restrains the breathing, thereby giving the broken ribs more or less rest. The strapping, cut in strips of about three inches wide, should be long enough to reach from the spine to the breast-bone. Six or seven pieces of strapping will be required. The first strip is put on above the fracture and applied in a downward direction, the second piece is put on overlapping the first by a half, and so on. A bandage is then applied. In all cases of fracture every care should be taken to move the broken ends of the bone as little as possible.

Strapping ribs.

In fractures of the limbs the bandages which fix the splints should be tied as far from the fracture as possible. Fracture of the collar bone is dealt with in para. 40.

Cleaning splints.

72. It is the orderly's duty to clean and disinfect all splints before they are put away. If a dirty splint is used, particularly for a case of compound fracture, septic poisoning may be conveyed from one patient to another. Neglect of this duty may be the cause of the death of a patient. Splints should be well rubbed with tow dipped in turpentine, then thoroughly scrubbed with hot water, soap, and a brush, and finally soaked in some antiseptic solution.

5. DISLOCATIONS.

Definition and signs of dislocation

73. By dislocation is meant the slipping of the bones of a joint out of place. For this to happen some of the ligaments or bands, and the capsule of the joint, must be torn, the end of one or other bone shooting out of its place. The joint immediately becomes stiff, and considerable force is required to put it back into place.

The signs of dislocation are :—

(1) Alteration in the shape of the joint when compared with the one on the opposite side.

(2) The end of the displaced bone can often be felt through the skin.

(3) Alteration in the length of the limb.

(4) Inability to move the joint.

How to distinguish from fracture.

A dislocation can be distinguished from a fracture by :—

(1) Its always happening at a joint.

(2) By there being no grating.

(3) If the end of the bone can be felt it is found to be smooth and rounded in dislocation, sharp and angular in a fracture.

(4) The limb instead of being unnaturally movable, as is the case in a fracture, is unnaturally stiff.

Treatment.

74. On no account should the orderly attempt to put it back.

The only treatment that is to be undertaken before the arrival of the officer, is to support the limb in the position easiest to the patient, and fix it there with a bandage.

6. SPRAINS.

Definition and signs of a sprain.

75. The straining or tearing of the ligaments, from the sudden twisting or wrenching of a joint, is called a sprain. The signs of a sprain are pain, loss of power, and there is no alteration in shape.

Immediate treatment.

76. The treatment consists in keeping the part at rest : if the upper limb, by supporting it in a sling ; if the lower, by putting the patient to bed. Cold evaporating lotions should be applied to the part, or, if these cannot be borne, hot fomentations. In every case it is best to apply a splint.

7. WOUNDS.

Definition of wound.

77. A wound is an injury of the body involving a division of the skin or mucous membrane deep enough to cause bleeding.

It may be large or small, deep or shallow, and of any shape. It may be caused by a blunt or sharp instrument.

Wounds may be described as follows :—

Incised wounds, produced by a sharp-cutting instrument, as a razor, and presenting clean-cut edges.

Lacerated wounds, in which the skin is torn as by a sharp nail, and in which the edges are ragged.

Contused wounds, characterised by bruised edges, and produced by some blunt instrument, as a hammer or stick.

Punctured wounds, in which the skin is pierced, and in which the wound is deep and very narrow, as in wounds produced by a dagger or bayonet.

Sabre wounds would be mostly incised wounds. Wounds produced by fragments of shell or a large bullet are classed as contused wounds, or as contused and lacerated wounds. Wounds produced by an unbroken small-bore bullet—*e.g.*, the Lee-Metford, are classed as punctured wounds.

Incised wounds heal the most readily, and contused wounds the least readily. Lacerated wounds will occupy an intermediate position. Punctured wounds will heal well at the surface, but are dangerous, owing to their depth and long extent.

To secure the best healing of a wound, it is essential that the skin should be clean, that the instrument making the wound is clean, and that nothing unclean is carried into the wound.

Actual poison may be introduced into a wound, as in wounds by poisoned arrows, in snake bite, and in bites from mad dogs.

These wounds are of a special character, and are considered in paragraph 109.

8. THE DRESSING OF WOUNDS.

78. A simple wound should be treated in the following way :—

(1) Stop the bleeding.

(2) If the wound appears to be dirty, clean it by either irrigating it with antiseptic lotion, or wiping it with a piece of dry antiseptic gauze.

(3) Apply a dressing.

First field dressing.

79. A Field Dressing forms a component part of every British soldier's kit on active service, so as to be available, at all times and in all places, as a first dressing for wounds.

When a soldier goes on active service the first field dressing will be placed in the pocket on the right side of the skirt of his frock (*see* Clothing Regulations), and thus the quantity of material required to be carried as medical stores is greatly reduced.

The field dressing now in use is an adaption of that used in the French service, and consists of :—

Outer cover (sewn cloth).

Two safety pins.

Inside cover (thin waterproof, cemented, air tight).

Thin waterproof (mackintosh) folded over dressings (size 12 inches by 6 inches, to be torn in half if required).

Gauze bandage 4¼ yards long, folded flat into 2½ inches by 4 inches.

Piece of gauze, 17 inches by 13 inches, weight not less than 3 pennyweights, folded to suit the size of the package.

Compress of compressed charpie to be of flax between layers of gauze (like Gamgee's dressing), capable of being teased out into a thick pad.

Directions for use are printed upon both the outside and inside cover.

Rules to be followed in applying dressings.

80. Rules for applying dressings. When about to apply dressings, the following rules will be observed :—

(1) The dresser will be careful that his hands and nails are perfectly clean (*see* paragraph 85).

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

(3) Never attempt to remove by force a dressing which has stuck ; this must first be loosened by bathing with tepid antiseptic solution from an irrigator.

(4) Never use a sponge for washing a wound or sore, but use fresh clean pieces of antiseptic gauze or wool, and subsequently destroy them.

(5) The dresser will avoid touching his eyes, nose, or any sore with his hands or anything which has touched the discharge.

(6) Before dressing any wound or sore, 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 this over with collodion, so as to make a water-proof coating.

(7) Dressing forceps and not the fingers should be used for removing old dressings, especially in cases where there is danger of infection, such as in syphilitic cases, &c.

Mode of changing a dressing.

81. The different parts of the old dressing will, one by one, be very gently and carefully removed, those that stick being first softened and loosened by the aid of tepid antiseptic solution. If a roller bandage has been used, it will be unpinned and wound off the limb, the slack being gathered up and passed from one hand to the other. After the dressings have been removed, the parts will be washed with a gentle stream of boiled water, or boiled water to which some antiseptic has been added. If the patient be confined to bed, measures will first be taken to protect the bed-clothes from damp by covering them over with a waterproof sheet, and by arranging an empty vessel under the wound or ulcer so as to catch the waste solution. An irrigator containing tepid antiseptic solution is next held on a higher level than the patient, and the parts flushed by a stream from the irrigator to the requisite extent. This having been accomplished, the new will be applied, and the old dressings at once burned.

Articles for dressing wounds.

82. The following articles are required for dressing wounds in the ordinary way, and none of them must be handled unless the hands have previously been prepared as in paragraph 85 :—

Antiseptic gauze, antiseptic wool, jaconet waterproof cloth or Christia tissue, iodoform in dredgers, drainage tubes, instruments in antiseptic solution, antiseptic swabs in antiseptic solution, dressing trays, irrigator, waterproof sheet, plaster and bandages for fixing on dressings, and safety-pins.

9. THE ANTISEPTIC TREATMENT OF WOUNDS.

Healing of wounds.

83. The way in which a wound heals is as follows:—

(1) The blood escapes.

(2) The ends of the divided blood vessels draw back, contract, and clots of blood form in them, thus stopping the bleeding.

(3) The fluid part of the blood continues to ooze out, finally gets jelly-like, and sets, forming a scab or crust.

(4) New blood vessels gradually make their way from side to side of the wound, the circulation is thus restored, new tissue is produced and unites firmly the cut surfaces, and all that remains is a scar.

This is what happens in a cut when the surfaces of the wound touch one another. When the wound is large, and the raw surfaces cannot touch one another, the wound is said to suppurate, and small rounded projections, called granulations, grow, come up to a level with the skin, and a new skin is gradually formed over them. In the end a scar forms, which, when the wound has quite healed, is slightly drawn in. The main object in the dressing of

a wound is to protect it from the entry of small bodies, called germs. These not only prevent healing but lead to the formation of matter, and, possibly, to blood poisoning. A wound into which these germs have entered is called a *septic wound*, and the treatment which is directed against these germs is called the *antiseptic treatment*. A wound free from germs is called an *aseptic wound*.

Antiseptic treatment of wounds.

84. These germs, sometimes called microbes, and scientifically called bacteria, belong to the vegetable world. They are to be found everywhere, especially in dust and dirt. They are on the skin; in all dressings which are not specially prepared; in clothing, on instruments, and in water which has not been recently boiled. They are exceedingly small, and cannot be seen by the naked eye. One of them, alighting on a wound, where, owing to the warmth and moisture, it becomes active, can in 24 hours produce seventeen millions of like germs. The growth of these germs irritates the wound, causes it to form matter or to suppurate, and produces poisonous substances which, being drawn into the blood, cause fever, and, perhaps, blood poisoning. The wound is then said to become septic or poisoned. The killing of those germs which have already reached a wound, and the cleansing of the hands, skin, instruments, and dressings, constitutes the antiseptic treatment of wounds. No wound should ever be treated except by this method.

85. It is carried out as follows :—

Antiseptic precautions.

(1) In the case of the hands of the surgeon and skin of the patient, which are all more or less greasy (the germs are protected by this grease), it is necessary first to remove the grease. To do this the skin of the patient, and the hands of the surgeon and assistants, are scrubbed with yellow soap, hot water, and a nail brush, which has been kept in some antiseptic lotion.

Antiseptics.

(2) The next thing is to use some substance which has the power of killing the germs. These substances are called antiseptics. Those most commonly used are perchloride of mercury or corrosive sublimate and carbolic acid. Perchloride of mercury is used either as a solution, in the strength of one part in two thousand of water, or in dry dressings. It is not used for the cleansing of metal instruments, as it causes them to corrode and become black, and spoils the edge of any cutting instrument. Carbolic acid is used as a solution, in the proportion of one part to twenty parts of water. This lotion is much used to kill the germs, or to sterilize instruments. These two substances are very poisonous, and cannot be used without much care. There are other antiseptic substances—namely, boracic and salicylic acids, iodoform, formalin, biniodide of mercury, &c.

When an operation is about to be done, everything that will touch the wound must be thoroughly freed from germs :—

Cleansing of hands.

(1) The hands of the surgeon and orderlies must first be washed as already described. The nails, which harbour all kinds of germs, are thoroughly attended to and well cleaned. No finger rings must be worn. Next the hands must be well soaked in perchloride of mercury lotion, or in a 1 in 500 solution of biniodide of mercury in methylated spirit. The hands cannot be

effectually cleaned except in a lotion made with spirit. They must not be wiped. After a few minutes they can be considered free from germs, and safe to handle a wound.

Cleansing the skin of patient.

(2) The skin of the person on whom the operation is to be performed, for at least 10 inches around the place where the cut is to be made, must be carefully shaved, next cleansed with hot water and soap, then washed with ether to remove the grease; washed with a 1 in 500 solution of biniodide of mercury in methylated spirit, and then covered with a piece of antiseptic gauze, called a guard, which has been dipped in some antiseptic lotion, such as 1 in 30 carbolic lotion, and is laid over the place and kept in position by a bandage.

Cleansing of instruments.

(3) All instruments used must first be boiled in water, containing one part in a hundred of carbonate of soda. The water itself must have been previously boiled for some time. This is done in an apparatus called a sterilizer. After the instruments, placed in the tray, have been boiled in the trough of the sterilizer for at least 5 minutes, they are tipped out into a tray or basin containing a solution of carbolic acid, one part in twenty, until required for use. Just before the instruments are to be used this solution is very freely diluted with warm sterilized water. A solution of carbolic acid so strong as 1 in 20 would be an irritant to any wound with which it was brought in contact. On no account must instruments thus sterilized be touched or handled by anyone whose hands have not been prepared as above described, nor must the hands, skin, clothing, or blankets of the patient be allowed to touch the instruments. To guard against this, one or two sterilized towels are placed around the part to be operated upon. Should an instrument fall upon the floor during an operation, it must, on no account, be used again until it has been re-sterilized. Should a dressing fall upon the floor it must be thrown away.

Dressings.

(4) Materials used for dressings have been sterilized previous to use. In the case of dry antiseptic dressings, such as gauze or wool, these have been specially prepared by being saturated in antiseptic solution, then dried, and afterwards wrapped up in waterproof paper, which has also been sterilized. They are done up in small packages, which can be considered safe for use, provided they have been freshly opened. The materials for stitches and drainage tubes have also been sterilized, and are usually kept ready for use in an antiseptic fluid in closed glass bottles or tubes.

Towels, aprons, and sleeves.

(5) Towels, aprons, and sleeves which are used by the surgeon, nurse, or orderlies, have been thoroughly boiled and dried by heat, and are kept in a sterilized closed box until required for use. As it is impossible to sterilize sponges, they are never used in connection with wounds.

Swabs.

Instead of sponges, pieces of antiseptic wool, wrapped in antiseptic gauze, of about the size of an apple, are generally used. They are called swabs. These are kept in a basin containing antiseptic solution until required at the operation. After having been used they are at once destroyed.

Flushing or washing of a wound.

(6) Water which has been thoroughly boiled, or antiseptic solution, is used during and after an operation to flush or wash any part of a wound as required.

(7) All boxes, trays, basins, &c., used for holding dressings or instruments are made of some hard, smooth material, such as glass, china, or vulcanite, and are sterilized by heat before and after use. Instruments such as scissors, forceps, &c., are so made as to be able to be taken to pieces, and they, as well as knives, are made as smooth as possible without crevices, so that they can be easily cleaned and do not harbour germs. Trays, &c., for instruments and dressings.

All these points must be carefully attended to, as the neglect of any one of them will certainly make all the rest useless, leading to infection of the wound and great distress to the patient.

86. The exact way of using these antiseptic dressings to wounds is as follows:— How antiseptic dressings are used.

(1) In the case of an operation in hospital, where everything is at hand for the thorough carrying out of the antiseptic treatment, after all blood has been wiped away by means of antiseptic swabs, the edges of the wound are drawn together by the surgeon by means of stitches, a drainage tube, if necessary, having been put between its lips. Iodoform or boracic acid powder are then sprinkled over the wound by means of a dredger, pieces of dry crumpled antiseptic gauze are next placed over the wound, and over the top of this antiseptic wool is laid—much if the wound is large, less if it is small. Over the wool is placed a bandage to keep the dressing in its place.

(2) In the field, or where all precautions as to sterilizing hands, skin, &c., cannot be carried out, it is best, first, not to handle the wound more than is necessary to stop bleeding or remove dirt, next to apply the "first field" or other dry antiseptic dressing, taking care to handle it as little as possible, and not to touch with the fingers the part of the dressing which is to come next to the wound. In the field.

87. When a wound has become infected with germs, is inflamed and discharging, it is usual to treat it by antiseptic baths or antiseptic fomentations. This is done as follows:—Boracic acid is the usual antiseptic used in such cases. An antiseptic bath consists of boracic acid dissolved in warm water (strength, 5 grains to 1 ounce of water). The limb, or other part, is to be held in a clean bucket, basin, or other vessel containing this warm lotion for such a length of time as may be directed. Antiseptic bath and fomentation.

An antiseptic fomentation is commonly made by pouring warm boracic lotion on boracic lint and then wringing the lint out and applying it at once to the wound. It is then covered by waterproof material, to keep in the heat and moisture, and fixed on with a bandage. It should be renewed before it becomes dry or cold.

10. OPERATIONS.

88. It is usual to give an aperient the night before a surgical operation, followed by an enema in the morning. Five hours before the operation, if an anæsthetic (chloroform or ether) is to be given, the patient is allowed to have a light meal. After that no solid food may be given. If there is a wound all dressings must Preparation of patient for operation.

be removed, and the wound cleaned and then covered with antiseptic gauze soaked in antiseptic lotion. If no wound is present the skin of the part on which the operation is to be performed must be cleansed as already described. If the arm or chest is to be operated on, the sleeve of the shirt must not be put on on that side. Patients must keep their socks on, and be kept warm. The clothes about the neck and chest must be left loose. Any false teeth must be removed.

Hands of assistants.

89. The orderlies who are to assist must sterilize their hands as already described.

Instruments.

Instruments will be got ready, sterilized, and placed in a tray in which there is carbolic lotion (1 in 20). As many sterilized needles as are likely to be required should be threaded (the hands having been first sterilized) with the sutures which are to be used, and placed in antiseptic solution in a tray. This solution is much diluted just before the operation by adding boiled water.

Dressings, &c.

Towels, dressings, &c., will be sterilized.

Operating room.

90. The operation room should be kept at a heat of from 65 to 70 degrees. There must be plenty of hot and cold water ready, and extra blankets, mackintosh sheets, basins, towels, &c. It should be ascertained what dressings will be required for the case, and these should be prepared.

A towel and small basin should be ready in case of vomiting, which often happens when a patient is taking, or recovering from, chloroform.

Preparation of patient's bed.

91. The patient's bed should be prepared for his return. A cradle should be at hand, also hot-water bottles and spare blankets, which should be warmed. After he is put to bed he must be turned upon one side, unless otherwise ordered, and be carefully watched in case of vomiting, collapse, or stopping of breathing. When a patient is being taken to and from the operating room, he must be kept well covered with blankets, as when under the influence of chloroform or ether he is very liable to a chill.

After effects.

92. After an operation in which an anæsthetic has been given, there is a tendency to faint, and the patient should not be allowed to sit up. After a limb has been amputated, a cradle should be placed over the stump. Sometimes hæmorrhage occurs after an operation, and it is well to see, from time to time, if any blood is oozing through the dressings. Any pallor or faintness should be watched for. If there should be much hæmorrhage, the orderly must proceed as laid down in the section on hæmorrhage, and at once report the matter. Pending the arrival of the officer, he should have cold water, ice, hot water, swabs, and towels ready, and a fresh dressing. If hæmorrhage, after amputation, takes place from a stump, the stump should be kept well raised until the officer arrives. It is better not to let the patient see what is going on.

Hæmorrhage after operation.

Secondary hæmorrhage.

93. Hæmorrhage taking place two to six weeks after an operation is called "secondary hæmorrhage." It is caused by sloughing into an artery, and requires prompt action on the part of the orderly. The limb should be raised, and a tourniquet applied to the main artery. It should be at once reported

Nursing of Tracheotomy Cases.

Tracheotomy.

94. This operation consists in opening the windpipe in the neck, and inserting a tracheotomy tube. These cases require the most careful attention, and the after success of the operation depends greatly on the care and watchfulness of the orderly. The wishes and wants of the patient must be watched for, as he cannot speak out loudly enough to make himself heard, until he has learnt to put his finger over the tube.

Tent and steam kettle.

A tent made of sheets is usually erected round the bed of the patient. This tent prevents draughts round the bed and helps to keep up an even temperature. If a steam kettle is used, the tent keeps in the warm, moistened air. To regulate the temperature within the tent, a ward thermometer is suspended inside. The temperature of the air should be between 65 and 70 degrees, and it is very important this temperature should be kept the same night and day. The kettle should not be more than two-thirds full, and when more water is added to it it should be boiling water.

Instruments Required.

Scalpels.
Retractors.
Dilating forceps.
Artery forceps.
Dissecting forceps.
Tongue forceps.
Scissors.
Tracheotomy tubes, with tapes attached.

Dressings.

Shields, made of lint and jaconet.
Strips of antiseptic gauze.
Swabs.
Boiling water.
Antiseptic solution.
Receivers.
Sand-bag.

Cleanliness of the parts.

The neck must be kept perfectly clean and dry, and everything done to prevent soreness of the parts. All directions as to the tube must be most carefully attended to.

After operation keep the patient under very careful observation.

Have at hand—

(1) Basin of warm water with soda or lime water added, in which to clean tube.
(2) Tray containing tracheal and dilating forceps, tracheotomy tubes, scissors.
(3) Tapes, shields.
(4) Swabs wrung out in boracic solution.
(5) Receivers.

Do not move the outer tube.

Do not attempt to clean the inner tube whilst in position in neck, but remove it and clean it thoroughly in soda or lime water.

This must be done about every 20 minutes to prevent tube getting sticky with mucus.

When changing tapes secure the clean ones to the tube before removing soiled ones.

Feeding the patient.

It is very important to maintain the patient's strength, and nourishment may be given at two-hour intervals if necessary. Solid foods, sufficiently soft, are often more easily swallowed than fluid foods. Care should be taken to keep patient lying down, for fear of heart failure.

Nasal Feeding.

95. Have the food carefully measured, warmed, and strained.

Make the tube quite soft in warm water, and grease the end with glycerine or oil.

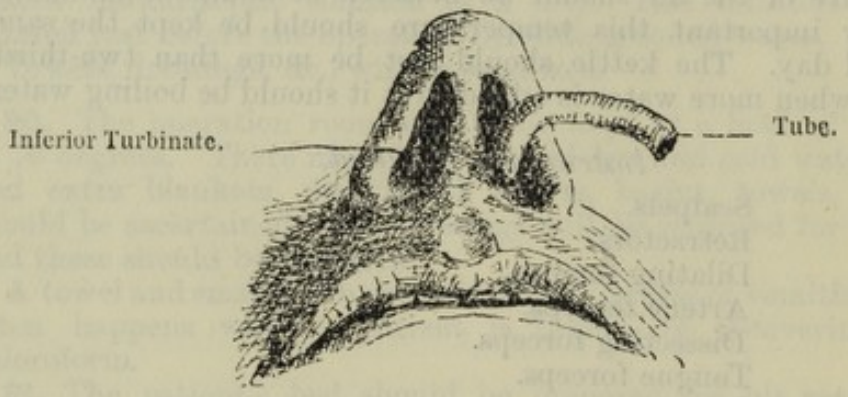


FIG. 28.—NASAL FEEDING.

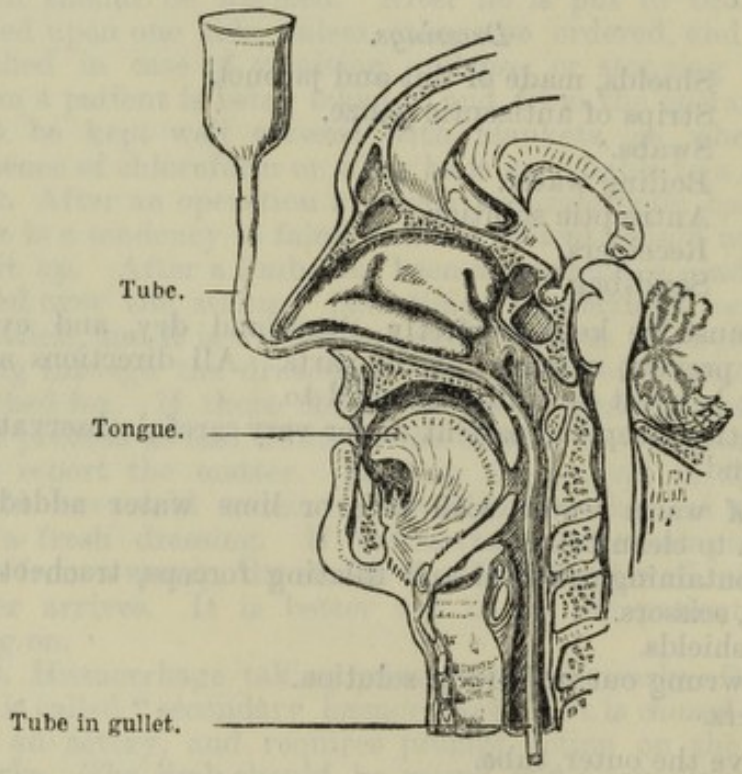


FIG. 29.—NASAL FEEDING.

Section through head and neck showing right side of larynx, pharynx, mouth, and nose, with nasal tube passed through right nostril.

(*Drawn from a preparation in the Museum of the Middlesex Hospital by Mr. Harman.*)

To ensure the tube passing readily, it must not be pushed upwards, but *directly backwards* (*see* Fig. 28) for about 14 inches until about one-third is left outside the nose.

The danger attending the passing of a nasal tube is the great facility with which it may slip into the larynx, instead of into the gullet; in the event of this happening, withdraw the tube a short distance and pass it again. If it is passed into the larynx the patient would at once show signs of urgent dyspnœa, and if you place your finger over the end of the tube it would be sucked in at every inspiration. There is no necessity to be alarmed if air bubbles up when the tube has been passed—it is probably gas escaping from the stomach.

When the tube is in position, pour the nourishment down in a steady stream, not allowing the tube to get empty, so as to avoid forcing air into the stomach.

When you have given the prescribed amount, draw the tube out quickly, but without jerking it, keeping your thumb firmly fixed over the end to prevent the food returning.

11. CASES OF EMERGENCY AND THEIR IMMEDIATE TREATMENT.

96. In all cases of emergency the officer should be sent for at once, and until his arrival the instructions given below will as far as possible be carried out (see Standing Orders, paragraph 198.) Reference to Standing Orders.

Bleeding or Hæmorrhage.

97. Bleeding may take place when any portion of the system of blood-vessels gives way or is opened into. It is either arterial, venous, or capillary. Varieties of bleeding.

In bleeding from an artery, or arterial hæmorrhage as it is called, the blood that escapes is of a bright red colour, and wells up from the wound with each pulsation of the heart. Should the cut end of the artery be fully exposed in the wound, then the blood squirts or jets out for some considerable distance. The blood escapes in large or small quantities, according to the size of the vessel injured; in the case of a large artery, such as the femoral or carotid, life is destroyed in a few minutes if the bleeding be not arrested. Arterial bleeding.

In bleeding from a vein, or venous bleeding as it is called, the escaping blood is of a dark colour, it flows or oozes out, but there is no appearance of pulsation. Venous bleeding.

In capillary bleeding, the blood oozes from the entire surface, and not from any one point as when an artery or vein is injured. Capillary bleeding.

Arterial hæmorrhage is more difficult to stop than venous, by reason of the greater force of the current; capillary bleeding is less dangerous than either, but the danger to life depends on the amount of blood lost.

98. The means for temporarily arresting arterial bleeding until more permanent means can be resorted to by the officer are:— How to arrest bleeding from an artery.

(1) Laying the patient down, and rapidly exposing the wound.

(2) Placing the finger upon the wound, so as to stop the blood coming out.

(3) Pressing the main artery with the fingers between the wound and the heart.

(4) If in a part of the body where a tourniquet can be used, such as the limbs, apply a tourniquet; or it may be possible sometimes to stop the bleeding by keeping the limb strongly bent, and bandaging it so as to keep it in this position.

This pressure should be maintained until some of the more permanent means can be employed, or medical assistance procured.

(5) Or, in case of a wound of a large blood vessel, where a tourniquet or pressure cannot be applied, a good plan is to pack or plug the wound with a strip of antiseptic gauze, which is gradually packed into the wound, and pressure made with a pad and bandage over it.

Compression between the wound and the heart.

99. Compression of the artery between the wound and the heart may be effected by the fingers (digital compression) or by the application of a tourniquet; but these methods can only be successfully carried out where the artery lies over a bone.

Digital compression of the following arteries is carried out as follows:—

Digital compression of common carotid artery.

The common carotid lying in the side of the neck may be compressed against the spine by pressing with the thumb backwards and inwards in the hollow of the neck, formed between

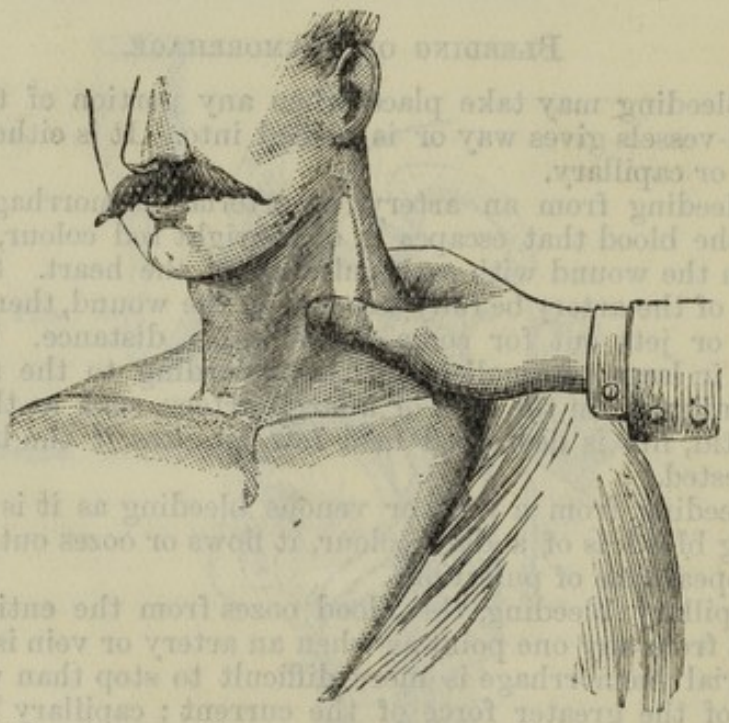


FIG. 30.—DIGITAL COMPRESSION OF THE CAROTID ARTERY.

the windpipe and the ridge of muscle running from behind the ear to the centre of the breast-bone. (Fig. 30.)

Of subclavian artery.

The subclavian artery may be compressed at the base of the neck opposite to the centre of the collar bone. By drawing forward the shoulder, the artery will be more easily reached by the thumb, pressing downwards against the first rib behind the clavicle. (Fig. 31).

Of axillary artery.

To compress the axillary artery raise the arm, place the fingers in the armpit and press upwards against the head of the humerus.

FIG. 31.—DIGITAL COMPRESSION OF THE SUBCLAVIAN ARTERY.

Of brachial artery.

The brachial artery may be compressed with the fingers against the inner side of the middle of the humerus.

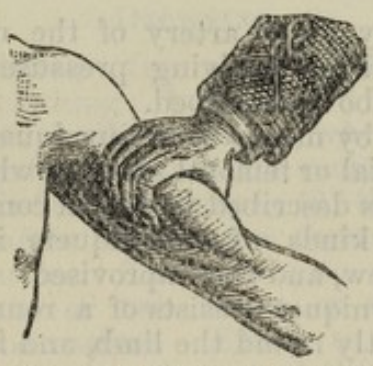


FIG. 32.—DIGITAL COMPRESSION OF THE BRACHIAL ARTERY.

The inner seam of the coat sleeve, or the inner margin of the biceps muscle, may be taken as a rough guide to the course of the artery.

Of abdominal aorta.

The abdominal aorta may be compressed by flexing the thighs on the abdomen, and pressing backwards against the vertebræ at the level of the navel, but slightly to its left.

Of femoral artery.

The femoral artery runs from the centre of the groin down the inner side of the thigh to the centre of the back of the knee-joint.

The artery may be compressed against the hip bone by pressing at the fold of the groin, or against the upper end of the thigh

bone by pressing backwards and outwards on the line of the artery, some four fingers' breadths below the fold of the groin.

FIG. 33.—DIGITAL COMPRESSION OF THE FEMORAL ARTERY.

Other arteries of the limbs.

Bleeding from any other artery of the upper or lower limbs should be controlled by applying pressure on the brachial or femoral arteries, as above described.

Compression by tourniquets.

100. Compression by means of a tourniquet is only applicable in the case of the brachial or femoral arteries, where the pad takes the place of the thumb as described in digital compression.

Kinds of tourniquets.

There are three kinds of tourniquets in common use—the elastic band, the screw, and the improvised.

1. The elastic tourniquet consists of a round thick elastic cord which is wound tightly round the limb, and is then fixed by hooks or other appliances.

Screw tourniquets.

2. The necessary parts of the screw tourniquet are a pad, a band, and a means of tightening the band so as to forcibly press the pad against the artery, and so compress it against the bone.

The pad is placed over the main artery, the strap is passed round the limb and buckled. Care must be taken that the pad does not shift from its position over the artery. The screw is then turned until the bleeding stops.

Improvised tourniquet.

3. An improvised tourniquet is an apparatus made upon the spur of the moment to represent a tourniquet, as follows :—Take a handkerchief, a smooth, rounded stone, and a stick, wrap up the stone in the centre of the handkerchief, tie a knot over it and

place the stone over the artery, pass the ends of the handkerchief round the limb and tie them securely, leaving sufficient space for the stick to be admitted; pass the stick then between the handkerchief and the skin, and carefully twist it until by tightening the handkerchief the stone is pressed upon the artery with sufficient force to arrest the flow of blood. A pad should be placed between the stick and the skin to prevent the latter being bruised, and the end of the stick must be secured with a bandage to prevent the tourniquet untwisting.

Many other substitutes for the tourniquet may be adopted. Thus a tourniquet may be made out of a small square of cake tobacco and a puttee tape.

Arrest of venous bleeding.

101. To arrest bleeding from a vein lay the patient down, remove any constriction which may be round the limb, elevate the limb and apply a pad and firm bandage.

Capillary bleeding.

102. To arrest bleeding from the capillaries, bathe the part with cold water, and apply a pad and bandage firmly over the wound.

Bleeding from nose.

103. In bleeding from the nose place the patient in a lying down position, raise the arms and apply cold water to the back of the neck. Before concluding that the hæmorrhage has ceased, the attendant should satisfy himself that blood is not trickling into the throat and being swallowed.

Bleeding from lungs or stomach.

104. When bleeding occurs from the lungs or stomach the patient will be directed to lie down with his head raised, be kept perfectly quiet, and given small pieces of ice to suck or swallow. Blood coughed up from the lungs (hæmoptysis) is of a bright red colour, while that brought up from the stomach (hæmatemesis) is usually of a dark colour like coffee grounds.

Drowning.

Restoration of the apparently drowned.

105. Send immediately for medical assistance, stimulants, blankets, and dry clothing; but proceed to treat the patient instantly on the spot, in the open air, whether ashore or afloat. The points to be aimed at are: (1) The removal of all obstructions to the passage of air into the lungs; (2) the restoration of the breathing; and (3) after breathing is restored, the promotion of warmth and circulation. The efforts to restore life must be persevered in for one or two hours, or until a surgeon has pronounced life to be extinct. Efforts to promote warmth and circulation, beyond removing the wet clothes and drying the skin, must not be made until the first appearance of natural breathing, for if the circulation of the blood be induced before breathing has recommenced the restoration of life will be endangered.

106. The steps taken should be as follows:—

(1) *Remove all obstructions to the passage of air into the lungs;* therefore (*a*) open out clothing so as to expose the chest and waist; (*b*) clear away any mucus, weeds, mud, &c., from the mouth, nose, and throat; (*c*) draw forward the tongue, and keep it projecting beyond the lips, either by tying a piece of tape round it, or by holding it with a dry cloth; (*d*) empty the water out of the lungs and stomach as much as possible; to do this turn the patient

face downwards, with a large firm roll of clothing under the chest and stomach ; place one of his arms under the forehead, so as to raise the mouth off the ground ; press two or three times, for four or five seconds each time, upon the patient's back, thus squeezing the water out of the stomach and chest.

(2) *Perform artificial respiration*, by imitating, as far as possible, the movements of natural breathing. This may be done by Silvester's method, or by Howard's method.

First of all, give two or three quick, smart slaps on the stomach or chest with the open hand.

Silvester's method.

(i) In Silvester's method (adopted by the Royal Humane Society), (*a*) turn the patient on his back, with the roll of clothing under the shoulder blades, the head being allowed to fall back ; (*b*) standing at the patient's head, grasp the arms just above the elbows, draw them gently and steadily upwards above the head, and keep them stretched upwards for two seconds ; by this means air is drawn into the lungs by raising the ribs (Fig. 34).

FIG. 34.—INSPIRATION IN DR. SILVESTER'S METHOD.

(*c*) Then turn down the patient's arms and press them gently and firmly for two seconds against the sides of the chest, crossing the fore-arms over the pit of the stomach. By this means air is driven out of the lungs by depressing the ribs (Fig. 35).

(*d*) Repeat these movements alternately, deliberately and perseveringly about 15 times a minute, until a spontaneous effort to breathe is perceived ; this should be aided by gently expanding and relaxing the chest as above, until the patient's breathing is thoroughly restored. The movements may have to be continued for two hours.

It is also advisable, if an assistant is at hand and two can work together, that one should kneel at the patient's head, and the other

astride his hips, facing the patient; when the operator at the head lowers the arms to the sides, the second operator presses on the sides and front of the chest backward and downward, throwing all his weight into the movement; while the arms are being raised, he can apply friction and warmth to the body.

(ii) *Howard's Method.*—"To perform artificial respiration, quickly turn the patient upon his back, placing the roll of clothing beneath it, so as to make the breast-bone the highest part of the body. Kneel beside or astride of the patient's hips. Grasp the front part of the chest on either side of the pit of the stomach, resting the fingers along the spaces between the short ribs. Brace your elbows against your sides, and steadily grasping and pressing forward and upward, throw your whole weight upon the chest, gradually increasing the pressure while you count—*one—two—three.* Then suddenly let go with a final push which springs you back to your first position. Rest erect upon your knees while you count—*one—two*; then make pressure again as before, repeating the entire motions, at first about four or five times a minute, gradually

Howard's method.

FIG. 35.—EXPIRATION IN DR. SILVESTER'S METHOD.

increasing them to about ten or twelve times. Use the same regularity as in blowing bellows, and as seen in the natural breathing, which you are imitating. If another person is present, let him with one hand, by means of a dry piece of linen, hold the tongue out of one corner of the mouth, and with the other hand grasp both wrists and pin them to the ground above the patient's head."

(3) *Promote warmth and circulation:* (*a*) while the above treatment is being carried out, the hands and feet may be dried, and as soon as blankets are procured, the wet clothing may be removed and the body gradually re-clothed, taking care not to interfere with the efforts to restore breathing. (*b*) Apply friction by rubbing the limbs upwards towards the body; this may be done under the blanket, or over the dry clothing. (*c*) Promote the warmth of the

body by the application of hot flannels, or hot-water jars to the pit of the stomach, arm-pits or soles of the feet. (*d*) If the power of swallowing has returned, small quantities of wine, warm brandy and water, or coffee should be administered.

Further instructions.

107. Prevent unnecessary crowding round the patient, especially if in an apartment. Avoid rough usage, and do not allow the patient to remain on the back unless the tongue is secured. Under no circumstances hold the patient up by the feet. On no account place the patient in a warm bath unless under medical orders.

108. Artificial respiration must also be resorted to in cases of suffocation either from the fumes of charcoal or *choke damp*, in mining accidents, or from hanging, also in cases of lightning stroke, severe electric shock, chloroform poisoning, &c.

Snakebite or Poisoned Wound.

Poisoned wound.

109. A poisoned wound is one into which some poison is put at the time when it is inflicted—for instance, that caused by the bite of a poisonous snake, a poisoned arrow or spear, or a mad dog's bite.

The poison finds its way rapidly into the blood, and in the case of snake-bite or poisoned weapon kills the wounded person often in a very short time.

Treatment.

The *first* thing to do is to prevent the poison from reaching the heart through the veins.

This is done immediately by tying a piece of string or a strong strip of shirt or handkerchief very tightly round the limb some distance above the wound, between it and the heart, so that the part below is strangled.

Next, if any brandy or other spirit be at hand, give a good dose, as the poison has the effect of stopping the circulation.

Lastly, if possible, cut out the wounded part and encourage bleeding, and until this has been thoroughly done do not take off the band.

If the breathing is bad or has stopped, use artificial respiration.

Should the wound be in a part of the body where a band cannot be placed, then at once cut out and encourage it to bleed, and give stimulant.

Burns.

Immediate treatment of burns.

110. The damage to the body occasioned by burns varies with the degree of heat applied to the part burnt—the more intense the degree of heat, the more severe the burn. As regards immediate treatment, it should be remembered that severe burns, more particularly those situated on the head, neck, and trunk, and those which occupy a great extent of surface, are likely to be attended from the outset by serious constitutional disturbances described under the head of "shock," and from which alone the patient may sink unless properly supported. The points to be aimed at in all cases are protection of the injured surfaces from the air, and relief of pain. A burn or scald must be covered up as quickly as possible, and should, on no account, be exposed to the air longer than is absolutely necessary. This will be best accomplished by

removing burnt clothing (cutting the clothes, never pulling them off), and then covering the surface with flour or enveloping the part in lint steeped in oil, or Carron oil (equal parts of lime-water and linseed oil), or in cotton wool. Where shock is present it must be treated as laid down in paragraph 112.

Scalds.

111. A scald is occasioned by the application of some hot fluid to the body, and is treated in precisely the same manner as a burn.

Shock, Loss of Consciousness, and Fits.

Shock.

112. *Shock* is a condition produced by any severe injury or emotional disturbance. It is usual as the result of pain, or of injuries, such as extensive burns or serious mutilation of the body. The sufferer becomes pale and cold, the pulse at the wrist is feeble or almost absent, he usually breaks out into a cold sweat, and there may be fits of shivering.

Treatment.—Restoration must be attempted by placing the patient in bed with the head low; restore warmth to the body by warm bed-clothing, hot-water jars to the extremities, and by administering hot drinks with small quantities of stimulants.

Loss of consciousness.

113. *Insensibility*, or loss of consciousness, is due to various causes which damage or interfere with the action of the brain. It may be produced by pressure on the brain, as when bleeding takes place within the skull; by actual damage to the brain substance, as results from a blow on the head, from a fracture of the skull, or from a bullet wound; or, as is often the case, by interference with the circulation of the blood within the brain. The last state of affairs occurs when the heart fails to pump the blood into the brain, or if the circulation is obstructed by pressure on the neck, as in throttling; it frequently happens as the result of the blood not being properly aerated in the lungs, either because the lungs do not act properly, or because the air supplied is impure, as when suffocation occurs in a room containing coal gas.

Concussion.

114. *Concussion* or *stunning* is a variety of shock caused by injury to the brain, generally from a blow or fall on the head. The symptoms resemble those of shock, but are generally accompanied by a more confused and bewildered state of the patient, or by complete unconsciousness.

The *treatment* is as for shock, but stimulants are not to be given without orders.

Fainting.

115. *Fainting* may be caused by over-exertion in hot weather or heated rooms, or by getting into the upright position when weak from disease. A fainting fit is distinguished by the patient falling down in a helpless condition generally insensible, without convulsions. The face and lips are pale, and the surface of the body cold, often covered with a clammy perspiration.

Treatment.—Lay the patient on his back with his head low and loosen the clothes about the neck and chest. Sprinkle cold water on the face and neck. Apply smelling salts to the nose, and, when the patient is able to swallow, administer stimulants in very small quantities. Fresh air is a necessity.

Epilepsy.

116. *Epileptic fits* are due to constitutional or local causes. The patient falls down insensible, and has convulsions affecting part or

the whole of the body, foams at the mouth, and often bites his tongue, making it bleed ; the face is livid.

Treatment.—Lay the patient on his back with his head slightly raised ; loosen the clothes about the neck and chest, and prevent him biting his tongue by placing a piece of wood between his teeth as a gag. Employ only sufficient restraint to prevent him injuring himself, but avoid pressing on the chest ; it will be sufficient if one man restrains the patient's legs,—kneeling by his right side and placing the right arm across the knees to do so ; a second attendant lightly restrains the patient's right arm, and a third the left arm, and also watches the head.

Treatment will not cut short an epileptic fit.

Apoplexy.

117. *Apoplectic fits* occur mostly in elderly persons. The patient falls suddenly insensible. The face is red, the breathing loud and snorting, and the pupils frequently of unequal size.

Treatment.—Raise and support the head and upper part of the chest. Loosen the clothes about the neck. Apply cold water to the head. Do not give stimulants.

Compression.

118. *Compression* of the brain is the result of severe injuries to the head, such as fracture of the skull ; the symptoms resemble those of apoplexy, and the same precautions should be taken.

Sunstroke.

119. *Sunstroke* or heatstroke, which is the result of excessive heat, occurs in hot climates or summer weather. The patient falls suddenly, generally insensible, sometimes in convulsions, the skin feeling burning hot to the hand.

Treatment.—Carry the patient at once into the shade, or the coolest available place. Provide plenty of fresh air. Raise the head and remove the clothes from the neck and upper part of the body. Douche the head, neck, chest, and spine, or the whole body, with cold water. Avoid crowding round the patient. Do not give stimulants.

Alcoholic poisoning.

120. *Drunken fits* are caused by the drinking of a large quantity of alcohol at one time. They occur suddenly, but may not come on for some time after the liquor has been taken. The patient falls into a deep stupor, there is a ghastly vacant expression of the countenance, which is sometimes red and bloated. The lips are livid, the pupils dilated and fixed, and the breath smells strongly of liquor.

Treatment.—Place the patient on his side with head slightly raised, and do not allow him to lie on his back, or on his face. Remove all constrictions from the neck and chest. Induce vomiting by tickling the throat with a feather. Have the stomach pump ready in case the officer on his arrival, should decide on using it.

Lime in the Eye.

Lime in the eye.

121. Lime or mortar in the eye may cause serious injury if it is not at once removed. The eyelid should be turned up, the lower lid pulled down, and every particle taken out as quickly as possible, and with great gentleness. The eye should be then well washed with a tepid solution of vinegar and water (about a teaspoonful of vinegar to four tablespoonsful of water). A drop of castor oil put into the eye will much allay the pain and smarting.

Frost Bite.

122. *Frost bite.*—This condition is the result of exposure to excessive cold. It affects the nose, ears, fingers, or feet; the part tingles and becomes blue; in the more severe cases white and free from pain. The *treatment* is to rub the affected part with snow or cold water, avoiding taking the patient into a warm room until the part has been thoroughly but very gradually thawed. Frost bite.

Poisoning.

123. A case of poisoning is recognised by (1) the sudden appearance of the symptoms in a person otherwise healthy, by (2) the symptoms coming on soon after food or drink has been taken, and, if after a meal of which many have eaten, the symptoms will then be complained of by several, or all who have partaken of it. The symptoms vary in character, and the treatment will depend on the poison taken. Poisoning.

124. Poisons destroy life—

(1) By actually burning the parts they touch, such as the mouth, throat, and stomach, and causing shock, or making the parts so swell up as to suffocate the patient. These poisons are called "corrosives"; they may be "acids" or "alkalies"—oil of vitriol is an example of an acid, caustic potash is an alkaline corrosive. How poisons act.

(2) By so irritating the parts they touch, such as the throat, stomach, and bowels, as to cause inflammation, often severe in degree; this inflammation gives rise to pain, vomiting, and, later on, diarrhœa, which may kill the patient by exhausting him. These are called "irritant poisons," examples of which are corrosive sublimate, carbolic acid, phosphorus, decomposed foods, &c.

(3) By being absorbed into the blood, and producing their poisonous action on the brain, nerves, heart, blood, or other important organ, and interfering with their action, causing death. Examples of these are opium, chloroform, strychnine, prussic acid, snake poison, arsenic.

Some poisons of this group are called "Narcotic poisons," as they cause insensibility, *e.g.*, alcohol and opium.

It is not unusual to find that certain irritant poisons produce dangerous results on vital organs when they become absorbed into the blood, in addition to their local irritant effects, *e.g.*, arsenic, carbolic acid.

125. In all cases of suspected poisoning a medical officer should be at once sent for, and the directions here given should be followed at once by the orderly, as no time must be lost. Two main principles must be borne in mind in the treatment of cases of poisoning:—

First.—Try to remove the poison already taken, if possible or advisable.

Second.—Try to lessen the poisonous effects by giving the proper remedy, sometimes called the antidote.

Any poison remaining, all vomited matter, or anything likely to prove of importance in the inquiry which is sure to take place subsequently, should be carefully preserved for inspection.

1. *Corrosive Poisons.*

Symptoms.	Treatment.
Great pain immediately after taking the poison in the mouth and throat, which look as if scalded; mouth and lips stained and blistered; shock, and perhaps difficulty in breathing; poison a liquid, breath may smell very sour, or of hartshorn.	If the smell is sour probably the poison is an acid, in which case magnesia mixture, lime water, or chalk and water, linseed or olive oil, poured into the mouth help to stop the further action by neutralising the acidity. If the breath smells of hartshorn, or does not smell acid, probably the poison is an alkali, in which case some weak vinegar and water or lime juice should be used to the parts touched by the poison. No emetic is to be given. The stomach tube should not be used except under very special circumstances. Hot-water bottles to the feet, and other means for restoring from shock. Use remedies as soon as possible Have the tracheotomy instruments in readiness.

The following are the most common corrosive poisons :—

Oil of vitriol (sulphuric acid), spirits of salts (hydrochloric acid), nitric acid, caustic soda, caustic potash, strong ammonia, oxalic acid (salts of sorrel), carbolic acid.

2. *Irritant Poisons.*

Symptoms.	Treatment.
Pain not at first very great, generally a sensation of burning, or a strong taste in the mouth and throat, coming quickly if the poison is liquid, and less quickly if it is solid when taken. The parts touched by the poison are not burned, and the pain is not so great as in the case of corrosive poison, but it gradually increases, and vomiting sets in, with pain in the stomach; diarrhœa, with straining, and sometimes blood in the stools. Much can be learned by looking at the vomited matter. Shock and exhaustion set in gradually.	Give warm water and encourage vomiting until the water returns clear, then small quantities of milk or white of egg, oil, or melted butter, to allay the irritation. Get the stomach tube ready.

The following are the most common irritants :—

Arsenic, antimony (tartar emetic), corrosive sublimate, copper, zinc, iodine, cantharides, powdered glass, stale or badly tinned fish or meat.

3. *Systemic (Constitutional) Poisons.*

Symptoms.	Treatment.
No sign of burning, redness, or pain, but there may be giddiness, dimness of sight, drowsiness gradually increasing, difficulty in breathing, irregular or weak pulse, delirium, cramps, convulsions, the pupils of the eye either widely open or tightly closed; according to the particular systems of the body affected—nervous, vascular, respiratory, &c.	The stomach must be emptied by means of emetics or the stomach tube; symptoms must be treated—that is, in case of drowsiness the patient must be kept awake by being walked about, cold water being freely used, and hot coffee given. If the drowsiness becomes greater, or the breathing threatens to fail, artificial respiration should be resorted to, sometimes for hours; if the pulse is weak, give ammonia (sal-volatile); if there are cramps, gentle rubbing of the limbs; if delirium or convulsions are present, patient should be carefully watched and kept as quiet as possible, and the administration of the special antidotes in the case of each poison. If the case is prolonged, nourishment must be given by the mouth or rectum.

The following are the most common narcotics :—

Opium and morphia, chloral, belladonna, strychnine, prussic acid, cocaine.

4. Certain poisons act both as irritants and by producing systemic effects; such are arsenic, phosphorus, chloroform, carbolic acid, alcohol, &c.

The treatment at first is usually directed to preventing their irritant effect; subsequently to antagonising their dangerous action on the constitution of the body.

12. SURGICAL INSTRUMENTS AND APPLIANCES.

126. The following are brief descriptions of the instruments and appliances in most common use :— **Description of instruments.**

Aspirator.—An instrument for drawing off fluids by means of an exhausting air pump.

Bistoury.—A long narrow knife, which is either straight or curved, sharp or blunt-pointed.

Bistoury, Hernia.—A long narrow knife, blunt except for about the space of an inch from the point, which is also blunt, used in the operation for rupture.

Bougie.—An instrument used for dilating strictures.

Catheter.—A tube for passing through the urethra into the bladder to draw off the urine.

Catheters are either made of silver or silver plate, or of gum-elastic; they contain a wire like a *stylet*. French olivary catheters are flexible and have no stylets. In the metal and gum-elastic catheters the eye is near the point. In French catheters it is 1½ inches from the point. English catheters are numbered from 1, the smallest, to 16, the largest; and French catheters, from 1 to 30,

Caustic-Holder.—A little case for holding caustic, usually made of vulcanite or silver.

Cupping Case.—A case containing the apparatus required for performing the operation of cupping.

Director.—An instrument with a groove in which to guide the point of a knife.

Drainage Tubes.—Indiarubber or glass tubes used after operation for draining a wound.

Elevator.—An instrument for raising depressed pieces of bone.

Enema Apparatus.—An instrument for administering enemata.

Forceps, Dental.—An instrument used for extracting teeth.

Forceps, Dissecting.—Plain forceps used for dissecting purposes.

Forceps, Dressing.—Forceps with scissor handles, used for removing old dressings, &c., from wounds and sores.

Forceps, Ferguson's Clawed, or Lion Forceps.—A strong forceps, with claws, used for gripping bone where much force is required.

Forceps, Gouge.—A strong forceps, cutting at the points, so as to gouge bone.

Forceps, Liston's Bone.—A strong forceps for cutting bone in operations.

Forceps, Spencer Wells', or Pressure Forceps.—Forceps for the compression of bleeding vessels during operations.

Hernia Director.—Made of steel, and broader than the ordinary director, used for the operation of strangulated hernia or rupture.

Irrigator.—A metal or glass vessel to which a tube is attached fitted with a nozzle and stop-cock, used for flushing or washing wounds with boiled water or antiseptic lotion.

Laryngoscope.—An instrument for examining the throat and larynx.

Ligatures.—Threads of sterilized silk, catgut, or tendon used for tying up blood vessels.

Needle Holder.—A strong special forceps for holding a needle to put in stitches during operations.

Needle, Aneurysm.—A curved blunt instrument with an eye near the end, used for passing a ligature under an artery.

Needle, Cataract.—A needle, without an eye, in a handle, used in the operation for cataract.

Needle, Surgical.—Curved and straight needles of various sizes.

Ophthalmoscope.—An instrument for examining the eyes.

Post-mortem Case.—A case containing the instruments used in the examination of bodies after death.

Probang, or Œsophageal Bougie.—A flexible instrument for passing down the gullet.

Probe.—A silver instrument for probing wounds.

Retractor.—A blunt hook or flat piece of metal bent at an angle for holding apart the edges of a wound during operation.

Saw, Amputating.—A saw used for sawing the bone in amputations of a limb.

Saw, Butcher's.—A framed saw, the invention of Mr. Butcher, used for the same purposes as the amputating saw, but more especially for excision of joints.

Saw, Hey's.—A small saw for cutting a piece out of a bone used in operations on the skull.

Scalpel.—A short knife with a curved edge, made in different sizes and used for cutting and dissecting.

Spatula.—A blunt knife for spreading ointments; also an instrument used for depressing the tongue when an examination is being made of the throat.

Sterilizer.—An apparatus for killing germs on instruments or in dressings, by means of heat.

Stethoscope.—An instrument with which to listen to the sounds in the chest.

Stomach Tube.—An apparatus used for washing out or emptying the stomach.

Sutures.—Threads of wire, silk, catgut, silkworm gut, horsehair, or tendon used by the surgeon for stitching wounds.

Syringe.—An instrument made of glass or pewter, used for injecting fluids.

Syringe, Higginson's.—An apparatus consisting of an indiarubber pump, to be squeezed by the hand, and two pipes, one fitted with a nozzle to pass into the anus, and one with a pewter end to slip into the basin for giving enemas.

Syringe, Hypodermic.—A graduated glass syringe fitted with a hollow needle, employed in the injection of morphia and other medicines beneath the skin.

Tourniquet.—An instrument for making pressure on an artery to stop the flow of blood through it (*See* para. 30.)

Tracheotomy Tubes.—Two curved silver tubes, one fitting inside the other, used for putting into the windpipe when it has been opened by an operation called tracheotomy.

Trephine.—A circular saw, used in operations on the skull.

Trocar and Canula.—A sharp-pointed instrument and sheath for tapping collections of fluid. Large for tapping the belly or chest, small for tapping hydrocele.

Truss.—An appliance used to keep the bowel in its place in cases of rupture.

127. The following are the contents of a SURGICAL HAVERSACK, which is a waterproof canvas bag :— Surgical haversack.

CONTENTS OF SURGICAL HAVERSACK.

(Weight about 7 lbs. Dimensions 13″ × 5″ × 9½″.)

Bandages, loose-woven, sal-alembroth	No. 4
„ triangular, „	6
Bearer's dressing case, canvas, containing :—	1
Clasp-knife, long-bladed (1).	
Forceps, dressing, pair (1).	
Pin-cushion, emery (1).	
Pins, common (40).	
„ safety (6).	
Probe and director, plated (1).	
Scissors, strong, pair (1).	
Spatula, plated (1).	
Thread, sewing, tablet (1).	
Vulcanite case, containing (in vaseline :—	
Needles, sewing (6).	
„ surgeon's plated (6).	

Gauze, double cyanide	yds.	6
Hypodermic case, containing :—	No.	1
Syringe ; needles (3) in glass tube ; cocaine tablets, $\frac{1}{4}$ gr. (2 tubes) ; morphia tablets, $\frac{1}{6}$th gr. (2 tubes) ; and glass mortar.		
Medicine-cup and mortar combined, vulcanite, with 2 pestles	„	1
Plaster, rubber, adhesive, 1-inch tape	spool	1
„ isinglass, transparent, 12 yds., 1-inch tape	tin	1
Silk, twisted, fine and medium, in aseptic solution	tube	1
Specification tallies (Army Book 166)	book	1
Splints, wire, arm, japanned, with tapes and buckles	pairs	2
Spirit Ammon: Aromat:	oz.	2
Tin containing candle and wax vestas	No.	1
Tourniquets, screw, small	„	2
Wool, boric, in 2-oz. packets	oz.	4
„ double cyanide	„	4
Waterproof canvas bag (to contain the above)	No.	1
Water-bottle, with felt cover, drinking cup, and straps	„	1

FIG. 36.—SURGICAL HAVERSACK.

128. The following are the contents of a MEDICAL COMPANION :— (Weight about 13 lbs. Dimensions 14″ × 7″ × 9″. Medical companion.

Chloroform (in 2 tubes) ... . oz. 4
Bottle, chloroform, capped, empty .... No. 1
Iodoform .... oz. 1
Mixture for diarrhœa .... „ 1½
Paraffin: Molle (boric), in boxwood case .... case 1
Spirit Ammon: Arom: .... oz. 1⅓
Tinct: Opii .... „ 1½
Pill and tablet in tin containing :— .... No. 1

No. 1. Tablets Apomorphia Hydrochlor: $\frac{1}{10}$th gr. in each .... tubes 2

„ 2. Tablets { Hydrarg: Subchlor:, 2 grs. / Antim: Oxid: Pulv:, 1 gr. / Ipecac: Pulv:, 1 gr. .... / Opii Pulv:, 1 gr. .... } in each No. 62

„ 3. Tablets Ipecac: Pulv: *sine* Emetine, 10 grs. in each .... „ 24

„ 4. Tablets { Pulv: Cretæ Arom: *sine* Sacchar:, 8 grs. .... / Acac: Pulv:, 1½ grs. .... / Opii Pulv:, ½ gr. .... } in each „ 44

„ 5. Tablets Antipyrin, 5 grs. in each .... „ 28

„ 6. Tablets { Ferri Hypophosph:, 2 grs. / Acid: Arseniosum, $\frac{1}{50}$th gr. / Quinin: Acid: Sulph:, 1 gr. / Strychninæ Sulph:, $\frac{1}{50}$th gr. / Saccharin, $\frac{1}{100}$th gr. .... } in each „ 60

„ 7. Tablets Hydrarg: Subchlor:, 1 gr. in each .... „ 144

„ 8. Pills .... { Plumbi Acet:, 3 grs. / Opii Pulv:, 1 gr. } in each .... „ 50

„ 9. Pills .... { Hydrarg: Subchlor:, 2 grs. / Pil: Rhei Co:, 2 grs. .... / Pil: Coloc: Co:, 2 grs. .... } in each „ 36

„ 10. Tablets Quinin: Acid: Sulph:, 2 grs. in each (pink) .... „ 76

„ 11. Pills .... { Camphor:, 3 grs. .... / Opii Pulv:, 2 grs. .... / Capsici Pulv:, ½ gr. .... } in each (brown) „ 24

„ 12. Pills .... Opii Pulv:, 1 gr. in each .... „ 134

„ 13. Tablets { Resin: Podoph:, ¼ gr. .... / Ext: Hyoscy:, ¼ gr. .... / Ext: Tarax:, ¼ gr. .... / Ext: Coloc: Co:, 1 gr. .... / Ext: Jalap:, ½ gr. .... / Resin: Leptandrin, ½ gr. / Ol. Menth: Pip:, q.s. .... } in each „ 60

„ 14. Tablets Potas: Permang:, 2 grs. in each .... „ 180

„ 15. Tablets Quinin: Acid: Sulph:, 5 grs. in each (pink) .... „ 34

Bandages, loose-woven, sal-alembroth .... „ 3

„ suspensory .... „ 2

Bandages, triangular sal-alembroth .... No. 4
Basin, vulcanite .... „ 1
Calico, thin .... yd. 1
Catheters, olivary, Nos. 3, 6, and 8, in tin case .... No. 3
Christia tissue .... yd. ½
Gauze, double cyanide .... „ 6

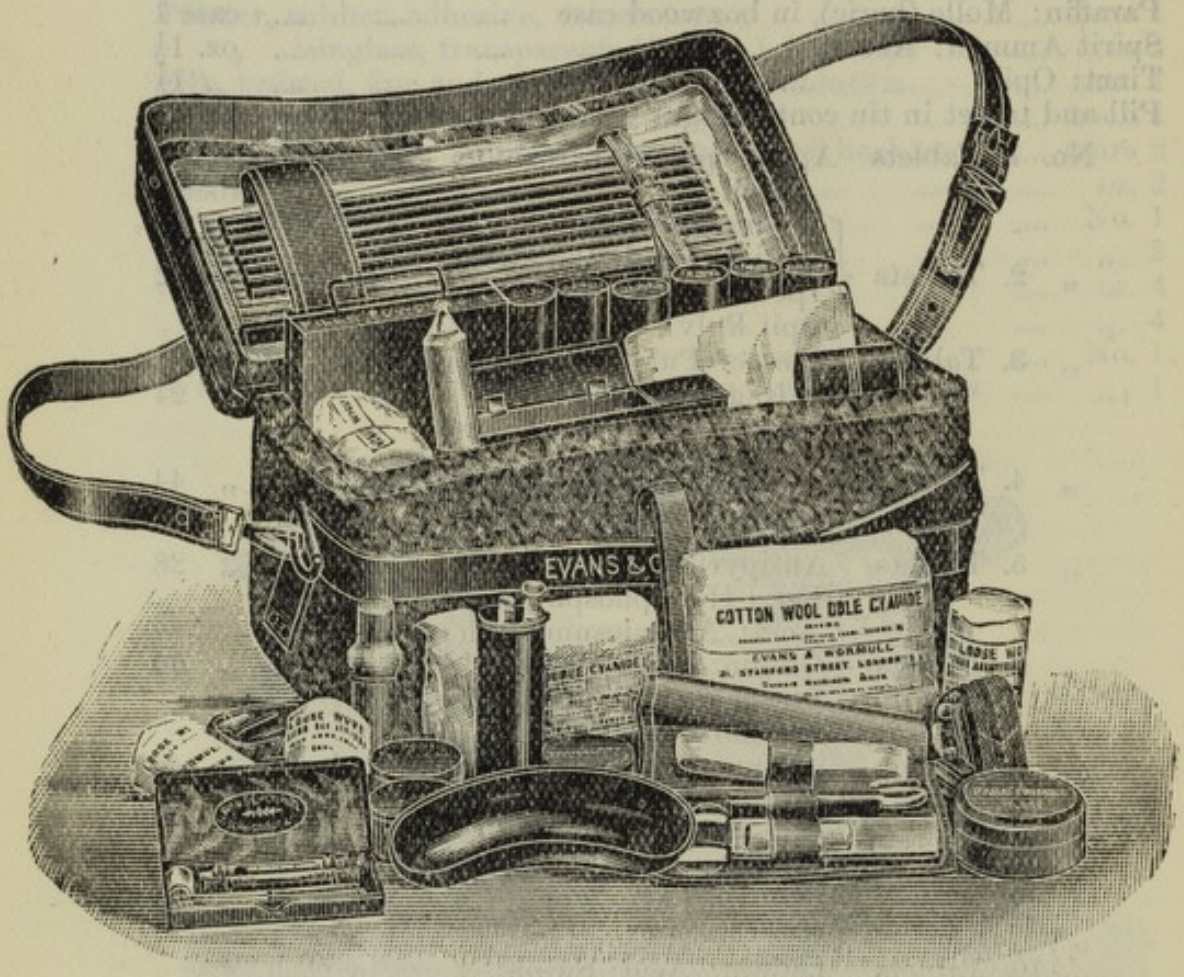


Fig. 37.—Contents of Medical Companion.

Housewife, canvas, containing :— .... No. 1
Pincushion, emery (1).
Pins, common (40).
„ safety (6).
Scissors, pair (1).
Tape, piece (1).
Thread, sewing, tablet (1).
Vulcanite case, containing (in vaseline) :—
Needles, sewing (6).
„ surgeon's plated (6).
Hypodermic case, containing :— .... No. 1
Syringe; needles (3) in glass tube; cocaine tablets, ¼ gr. (2 tubes); morphia tablets, $\frac{1}{6}$ gr. (2 tubes); and glass mortar.

Medicine-cup and mortar combined, vulcanite, with 2 pestles	No.	1
Minim measure in case....	,,	1
Plaster, rubber, adhesive, 1-in. tape	spool	1
,, isinglass, transparent, 12 yds., 1-in. tape	tin	1
Silk, twisted, fine and medium, in aseptic solution	tube	1
Splints, rattan cane, with pad cases	pair	1
Tape, pieces of	No.	6
Tin containing candle and wax vestas	,,	1
Tourniquets, screw	,,	2
Wool, boric	oz.	4
,, double cyanide	,,	4
Medical companion, hide-covered, with straps (to contain the above)	No.	1
Water bottle with felt cover, drinking cup, and straps	,,	1

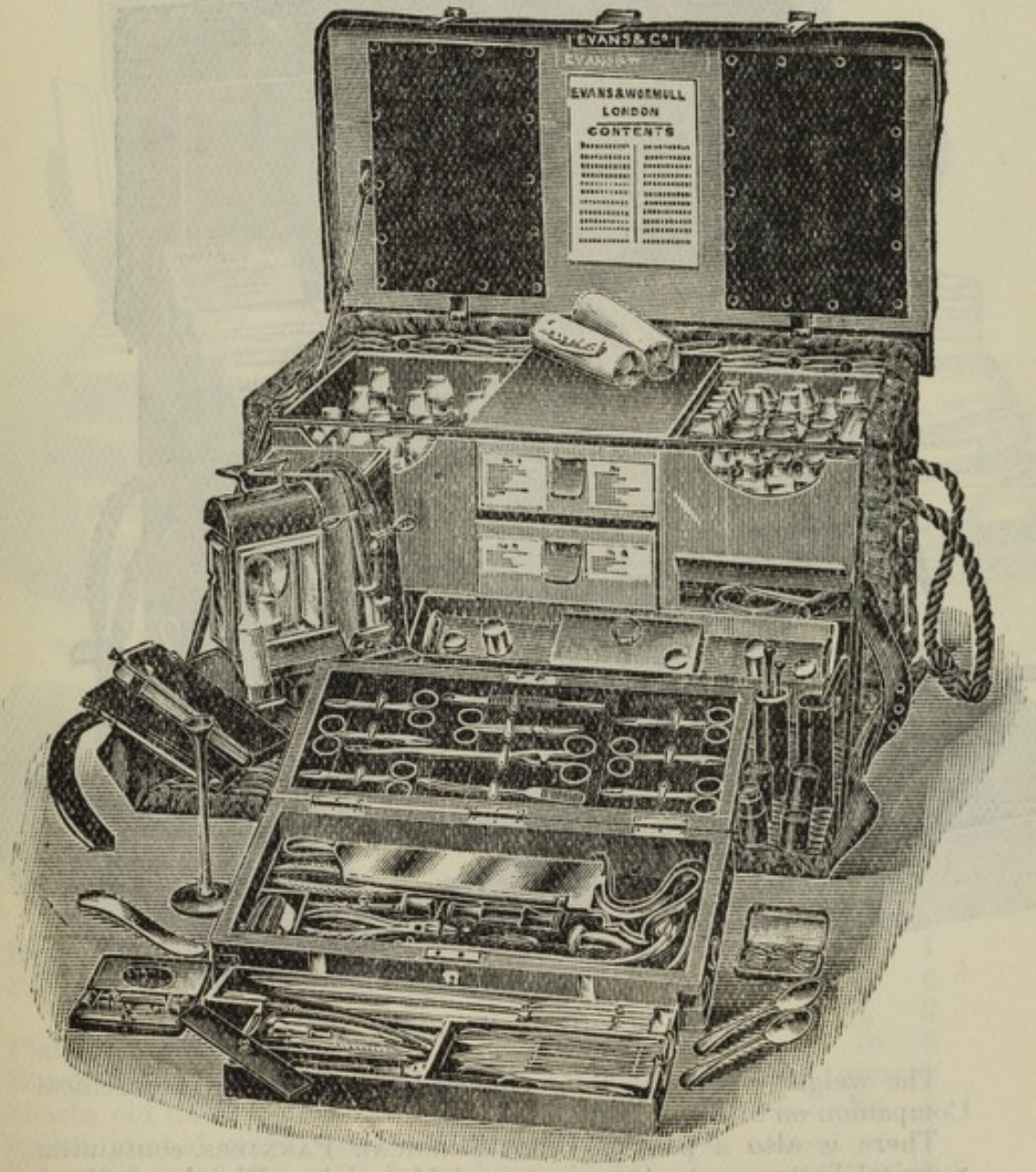


Fig. 38.—No. 1 Pannier.

Field medical panniers.

129. The following are some of the principal contents of the FIELD MEDICAL PANNIERS, the complete details of which are given in the Regulations for Army Medical Services :—

Contents of No. 1 (*weight about* 91 *lbs.*), *The Medicine Pannier.*

Chloroform, Morphia inject.; Iodoform, Diarrhœa Mixt., Quinine ; Purgatives, Tablets ; Brandy, &c.

A case of surgeon's instruments, writing materials, hypodermic syringe, clinical thermometer, candles, &c.

Contents of No. 2 (*weight about* 72 *lbs.*), *The Material Pannier.*

Gauze, Plaster, Perforated Zinc for Splints, Bandages, Tooth Instruments, Tourniquets, &c.; Extract of Meat, Food-Warmer, Anvil.

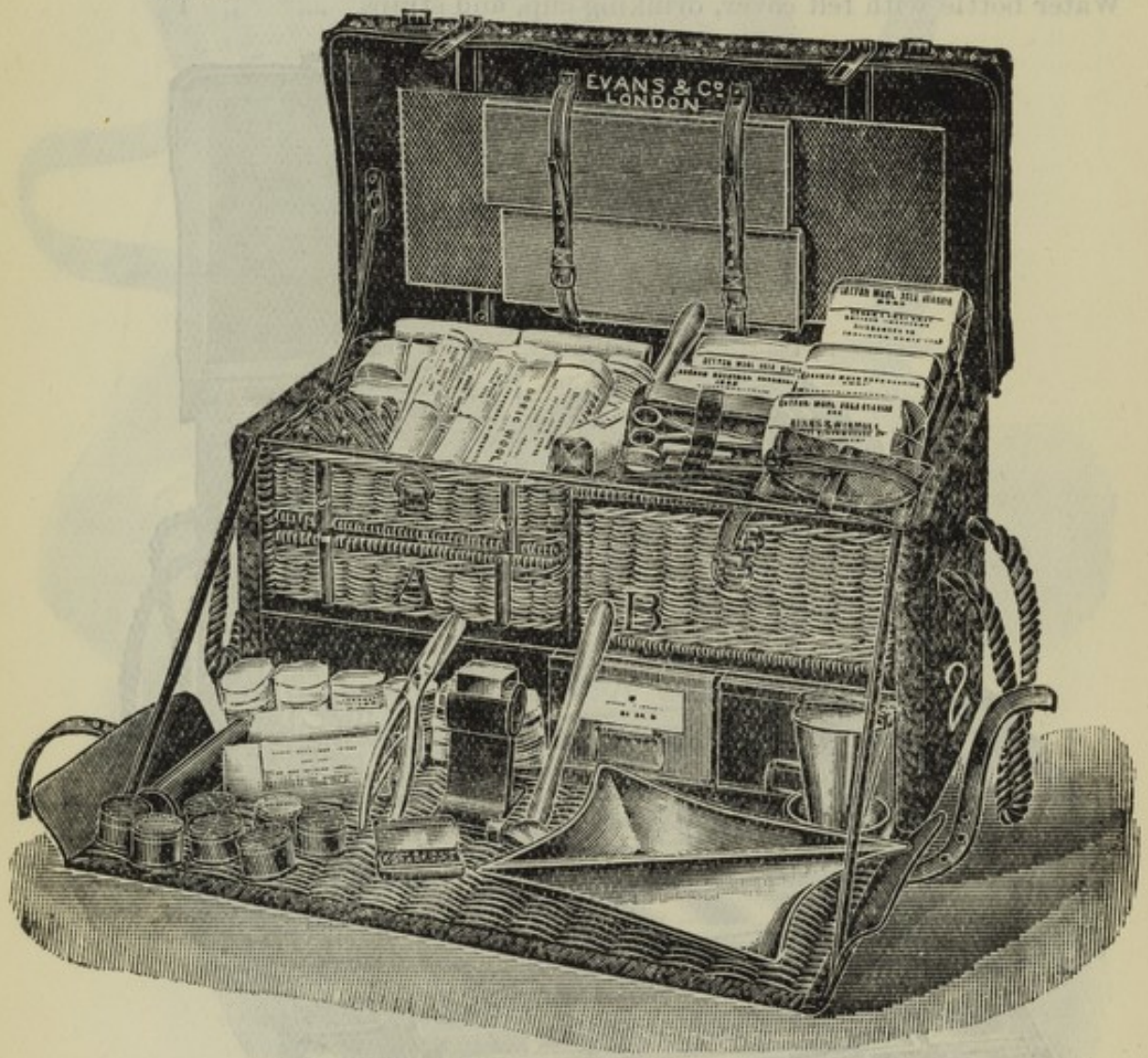


FIG. 39.—NO. 2 PANNIER.

The weight is equalised for side loads by strapping the Medical Companion on to No. 2 Pannier.

There is also a pair of FIELD SURGICAL PANNIERS, containing Surgical Instruments, Dressings, and Materials. Weight of No. 1 about 90 lbs., of No. 2 about 91 lbs.

130. The following are the contents of the FIELD FRACTURE BOX. (Weight about 72 lbs.) :—

(Dimensions 32″ × 12″ × 12″.)

Anvil, for making splints	No.	1
Bandages, loose-woven	„	50
„ triangular	„	50
Counter extension app., with improved clamp and bags (2)	„	4

FIG. 40.—CONTENTS OF FIELD FRACTURE BOX.

Gypsum bandage instruments in case, containing :—	set	1
Knife.		
Shears (for cutting zinc or gypsum bandage).		
Pins, safety	No.	24
Needles, sewing	„	25
Thread, fine	hanks	3
Hammer, for making splints	No.	1
Pasteboard, sheets of	„	6
„ splints	„	6
Plaster of Paris in ½-lb. tins	lb.	6
Rivets in box, for making splints	gross	1
Sheets, old linen	No.	2
Splint, jointed, thigh, wood	„	1
Zinc, perforated, 23″ × 9″, for making splints	sheets	16
Box to contain above	No.	1

131. The following are the contents of the GENERAL FRACTURE BOX. (Weight about 94 lbs.) :—

Double incline plane, McIntyre's.
2 jointed thigh splints, wood.
Jointed elbow „ wire.
Radius „ „
1 pair fore arm „ „
1 pair upper-arm splints, wire.
2 pair thigh „ „
Set of Duncan's rattan cane splints.
„ japanned leg splints.
6 pasteboards for „
1 lb. gutta-percha for „
Salter's leg sling.
Set of dislocation apparatus.
*Set gypsum bandage instruments, in case.
Christia.
2 lbs. plaster of Paris.
12 loose-wove bandages, sal-alembroth.
2 lbs. tow, carbolised.
1 lb. wool, sal-alembroth.
2 yards flannel serge, open texture, antiseptic.
2 arm slings, 1 leather, 1 wire.
12 triangular bandages.
24 straps with buckles.
2 old linen sheets.
2 broad flannel bandages, 7 by 6.
1 counter extension apparatus.
Canvas covers for splints.

132. The following are the contents of THE ANTISEPTIC CASE. (Weight about 43 lbs.) :—

(Dimensions 32″ × 12″ × 12″.)

Bandages, loose-woven, sal-alembroth	No. 50
Catgut	tubes 2
Drainage tubing, assorted sizes, in aseptic solution	„ 3
Gauze, double cyanide, in 6-yd. packets	yds. 48
Housewives, canvas, containing :—	No. 2

Pincushion, emery (1).
Pins, common (40).
Pins, safety (6).
Scissors, pair (1).
Tape, piece (1).
Thread sewing tablet (1).
Vulcanite case containing (in vaseline) :—

Needles, sewing (6).
„ surgeon's plated (6).

* Contents—1 gypsum knife, 1 gypsum shears, 24 safety-pins, 1 paper sewing needles, 3 hanks fine thread.

Jaconet, waterproof, in 2-yd. packets	yds.	6
Silk, twisted, fine and medium, in aseptic solution	tubes	3
Wool, boric, in 2-oz. packets	lb.	2
„ double cyanide, in 2-oz. packets	„	6
Box, tin lined, with sliding lid, to contain above	No.	1

FIG. 41.—CONTENTS OF ANTISEPTIC CASE.

133. The contents of a pair of SURGICAL SADDLE BAGS are (weight about 32 lbs.) :—

NO. 1 BAG.

Acid, Carbolic (liquid)	oz.	2½
Bottle, 3 oz., capped, empty, for chloroform	No.	1
Hydrarg: Perchlor: (soloids)	„	70
Iodoform	oz.	3
Sp: Ammon: Arom:	„	2
Antipyrin, 5 gr. tablets } in one tin	No.	30
Pulv: Ipecac: Co:, 5 gr. tablets } in one tin	„	60
Potas: Bromid:, 5 gr. tablets }	„	70
Potas: Permanganas, 2 gr. tablets }	„	100
Quininæ Acid: Sulph:, 5 gr. tablets (pink)	„	280
„ „ „ 2 „ „ „	„	348
Catgut, in carbolic solution } in leather-covered case	tubes	2
Silk ligatures, in aseptic solution } in leather-covered case	„	2
Minim measure, in case	No.	1
Pins, safety	box	1
Plaster, rubber, adhesive, 1 inch tape	spools	2
„ isinglass, transparent, each 12 yds., 1 inch tape	tin	1
Splints, wire arm	pair	1
Wool, boric	oz.	2
Wool, double cyanide	„	8

Surgical instruments, containing	case	1
Catheter, nickel, No. 8	No.	1
Elevator, double	„	1
Forceps, artery, Spencer Wells'	pairs	6
„ bone, short, straight, aseptic	pair	1
„ bullet	„	1
„ dressing, spring	„	1
„ necrosis	„	1
Knives, amputating, metal handles	No.	2
Needle, aneurysm, metal handle	„	1
Needles, surgeon's, in vaseline in vulcanite case	„	6
Probes, silver	„	4
Saw, Butcher's, metal handle, and spare blade	„	1
Scalpels, metal handles	„	3
Sciasors, dressing	pair	1
Tourniquet, screw	No.	1
Case, mahogany (to contain above)		1
Trays, tin, enclosing case	„	2

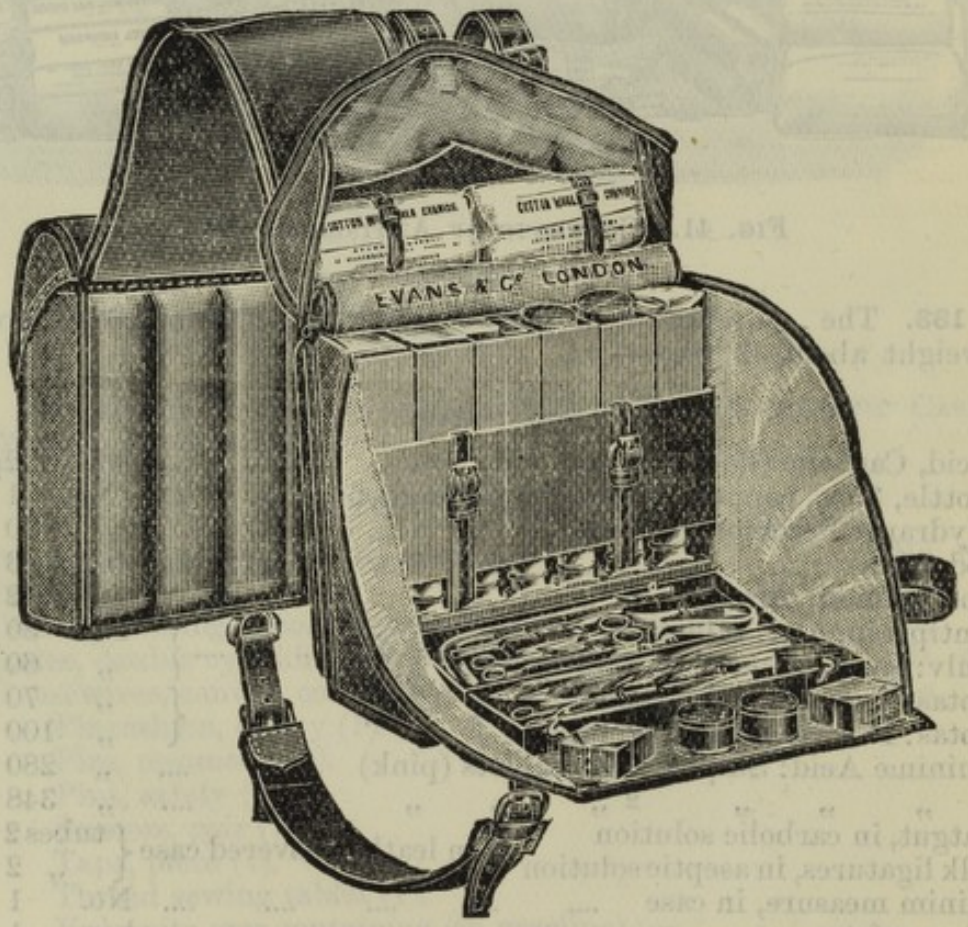


FIG. 42.—CONTENTS OF SURGICAL SADDLE BAG.

No. 2 BAG.

Bandages, loose-woven, sal-alembroth	No.	12
„ triangular „	„	12

Bearer's dressing case, canvas, containing :—	No.	1
Clasp knife, long-bladed (1).		
Forceps, dressing, pair (1).		
Pin cushion, emery (1).		
Pins, common (40).		
Pins, safety (6).		
Probe and director, plated (1).		
Scissors, strong, pair (1).		
Spatula, plated (1).		
Thread, sewing, tablet (1).		
Vulcanite case containing (in vaseline) :—		
Needles, sewing (6).		
Needles, surgeon's plated (6).		
Chloroform, in 2 oz. tubes	oz.	8
Christia tissue	yd.	1
Gauze, double cyanide	yds.	12
Hypodermic case, containing :—	No.	1
Syringe ; Needles (3) in glass tube ; cocaine tablets, $\frac{1}{4}$ gr. (2 tubes) ; morphia tablets, $\frac{1}{6}$th gr. (2 tubes) ; and glass mortar.		
Spoons, tea	No.	2
Specification tallies (A.B. 166)	book	1
Splints, wire, arm	pairs	1
Tourniquets, screw, small	No.	2
Tins containing candle and wax vestas	,,	2
Vulcanite cases containing, in vaseline :—	,,	2
Needles, sewing (6).		
,, surgeon's plated (6).		
Wool, boric	oz.	4
Wool, double cyanide	,,	12
Waterproof canvas bags (with girth and transverse strap) to contain the above	pair	1
Water bottle, cup, and straps		1

13. INFECTIOUS DISEASE.

Spread of infection.

134. In nursing a case of infectious disease every possible care must be taken to guard against the spread of infection. Infectious disease is spread by infective material, usually minute living germs, carried by the air, water, milk, books, clothes, bedding, &c., or by these germs remaining alive in previously infected rooms or houses. Every precaution should be taken by the orderly to avoid taking the disease himself, and to prevent its being conveyed to others. The hands of an orderly attending on infectious and enteric cases should be frequently washed, and all precautions made use of to keep in a good state of health, such as frequent warm baths, regular exercise, food, &c. Any carelessness on his part may cause a most serious outbreak of the disease ; consequently he must be careful to keep himself and his charge isolated from other persons. Bed-pans, urinals, and drinking vessels, also linen,

should be specially marked and kept only for the use of infectious cases.

Disinfection of clothing and bedding.

135. It is the duty of the orderly to see that all the hospital clothing and bed linen is soaked according to directions given for use in the hospital, or by special instructions from the medical officer, before it is put aside as soiled linen for the washerman.

Treatment.

136. No noise should be allowed in the ward. Should there be any excitement or delirium, all causes of disturbance should be avoided, and it may be advisable to darken the ward. Patients must be strictly confined to bed. The ventilation of the room should be carefully attended to, the temperature of the air being kept at from 60° to 65° Fahrenheit.

Feeding.

137. Nourishment ordered must be given with regularity. Water, barley water, or lemonade may be given freely when permitted, but in small quantities at a time.

Food or drink from an infected room must not be taken by other persons, but should be thrown away. It is highly dangerous for an orderly to drink out of a cup or mug which is in use by an infectious or enteric patient. Therefore not more food or drink than is likely to be required by the patient should be taken to the room.

The directions as to times, and the amount of nourishment to be given must be strictly carried out, and on no account should any article of food or drink be given to the patient unless such has been ordered.

Cleanliness of room and patient.

138. Both the room and the patient must be kept very clean. As regards the room, a duster which has been damped with some disinfectant solution should be used to dust the room and furniture so as to prevent the dust, in which infectious germs may be present, from being scattered about. The duster should then at once be thrown into a vessel containing some disinfectant solution.

The body of the patient should be often sponged with water with the chill taken off. This not only tends to keep the patient clean, but is very comforting, and increases the action of the skin. Part of the body should be sponged at a time to avoid chill. The patient should not be uncovered more than is necessary while he is being sponged ; a blanket must be kept over him.

Disinfection of motions and urine.

The motions and urine must be mixed with carbolic or cresol solution before being thrown down the water-closet.

Enteric or typhoid fever.

139. In enteric or typhoid fever the infectious germs are contained in the motions and in the urine. They multiply outside the body, and are very dangerous to others should they get into water, milk, or food, or if left on soiled linen, clothing, or bedding. Every care should therefore be taken by the orderly in washing and disinfecting his hands when nursing a case of enteric fever. All soiled linen must be placed in some disinfectant at once.

140. The number and character of stools, as well as the amount of urine, should be carefully noted, and reported to the officer at his visit. The temperature in enteric cases is usually taken every four hours. Special reports are kept in these cases by the orderly in charge, and, on being relieved, the report should be carefully read by the orderly coming on duty.

141. The greatest care should be taken to disinfect the stools immediately they are passed from the patient. A strong disinfectant is used. Whatever disinfectant is ordered to be employed, a quantity, equal to the amount of the stool, should be mixed with it, and allowed to come into contact with all the germs. To ensure this, the stool, mixed with disinfectant, must be allowed to stand for 20 or 30 minutes covered up before being thrown down the closet. Bed pans used for enteric patients should be disinfected after use, and not be used by others. Urine which is passed should be treated in the same way. It is important to bathe the patient after use of bed pan, and the swab of tow or wool used for this purpose should be promptly burnt. Disinfection of enteric stools.

142. In this fever the bowels are ulcerated, it is therefore very important to keep the patient in bed, and on no account allow him to sit up, or exert himself. Patients have been often known to drop back dead if these instructions have not been attended to. He should not be allowed to lie constantly on his back for fear of congestion of the lungs or bed sores. Special attention should be given to prevent bed sores by cleansing and keeping the skin dry. On account of the ulceration, and consequent weakening of the walls of the intestine, there is great danger of perforation occurring if hard or indigestible articles of food are given to the patient. The ulcerated condition of the bowels is the reason why solid food is kept from a patient so long, and as the patient's friends do not understand this, it is the duty of the orderly to see that nothing is given to the patient by his friends who may be allowed to visit him. Many patients have been killed by being given improper food. Nourishment is usually given every two hours, and directions as to feeding must be most carefully obeyed. Patient to be kept in bed. Feeding.

The tongue and teeth of an enteric patient should be kept cleaned with any mouth wash which may be ordered. Mouth to be kept clean.

The ulcers in the bowels in some cases bleed more or less profusely. If hæmorrhage occurs, it should be at once reported. Hæmorrhage causes the temperature to fall, and there may be other signs of collapse. Hæmorrhage from bowels.

14. MEDICINES FOR INTERNAL AND EXTERNAL USE.

143. Medicines for internal use contain drugs which either produce their effect directly, on the mouth, stomach, or intestines; or, becoming absorbed into the system, act on remote parts of the body, such as the brain, kidneys, heart, &c. How medicines act.

They are given in the following ways:— Ways in which given.

(1) By being swallowed.

(2) By being passed into the lower end of the bowel through the anus.

(3) By being inhaled into the lungs.

(4) By being rubbed into, or applied to, the skin.

(5) By being injected under the skin, or more deeply among the muscles.

(6) By means of medicated baths.

Different forms of medicine.

144.—(1) Medicines swallowed are in the form of liquids, pills, powders, and tabloids, &c.

(2) Those passed into the anus are in the form of enemas (liquid) and suppositories (solid).

(3) Inhalations are in the form of vapour, chloroform, steam, &c.

(4) Those rubbed into or applied to the skin are in the form of ointments and liniments, &c.

(5) Those injected under the skin are called hypodermic or intra-muscular injections.

(6) Baths are medicated by the addition of substances, such as brine, tar, &c. They may be used as ordinary warm baths, vapour baths, &c.

Effect of external applications.

145. External applications are intended :—

(1) To protect the surface ; or to become absorbed through the skin ; or to produce local effects, such as counter-irritation, as in the case of dressings to wounds, gargles, lotions.

(2) To raise or lower the general heat of the body, as by hot-water bottles, hot baths, ice packs, cold baths, sponging, &c.

(3) To draw the blood to the skin from some deeper part, such as by bleeding or wet cupping, in which case blood is actually taken away ; by dry cupping, in which it is temporarily brought to the surface ; and by hot fomentations and poultices, by means of which the blood is brought to the surface from some deeper part gradually, and for the time being only.

Administration of medicines.

146. Medicines dispensed at the surgery are labelled with :—

The name of the patient for whose use the medicine is intended : the number of the ward in which he is.

The amount to be taken, the directions for use, and the date of prescription.

Poisons and medicines intended for external use have special labels, and will be dispensed in fluted bottles (see Standing Orders 223). Orderlies must at all times be very careful to keep poisons out of the reach of patients, and poisons must be kept apart from ordinary medicines. They should be dispensed in blue bottles with special shapes and labels.

Those entrusted with the administration of a medicine should bear in mind that it is criminal to give a dose to a patient without first carefully reading the label. If this be not done an overdose may be given, or poisonous drugs intended for external use may be given internally, causing injury, or even the death of the patient, and the consequent punishment of the attendant. Should a wrong medicine have been given by mistake, the medical officer must be at once informed. It is a *most dangerous* proceeding to neglect to read the label before giving a dose to a patient.

As a general rule a bottle of medicine should be shaken before pouring out its contents. The label side should be uppermost when a dose is being poured out, in order that the label may not be soiled or destroyed. The bottle should not be left uncorked longer than is absolutely necessary, to avoid evaporation, and to prevent dust falling into the bottle ; for the same reason the dose should be swallowed as soon as possible after it is poured out.

Patients should not be roused from sleep for the purpose of taking medicine, except when the officer has expressly so ordered.

147. Unless orders are given to the contrary, medicines will be administered at the times given in the following table :—

	2 a.m.	6 a.m.	10 a.m.	2 p.m.	6 p.m.	10 p.m.
"At bed time" ...	—	—	—	—	—	1
"Morning and evening," or "Twice daily"	—	—	1	—	1	—
"Three times a day"...	—	—	1	1	1	—
"Four times a day"...	—	—	1	1	1	1
"Every four hours"...	1	1	1	1	1	1

No small display of tact on the part of the attendant will sometimes be necessary in order to induce refractory patients to consent to swallow their medicine ; on these occasions the attendant will not fail to remember that gentleness as well as firmness are required of him, and on no account must he treat the patient roughly.

Iron and acid mixtures should be taken through a tube, so as not to injure the teeth, and the teeth should be washed afterwards.

The following are the usual forms in which medicines are prescribed :—

148. A "mixture" is a medicine in liquid form, administered internally by the mouth, made up in several doses, varying from drops to wine-glassfuls. The exact dose should be measured in a graduated glass measure, and only when the use of such a glass is not available should medicine be measured in a spoon or wine-glass. The subjoined table will assist in the use of these measures :— Mixture.

Fluid measure.

1 drop	.... = 1 minim	= ℥ j
60 minims	.... = 1 drachm	= ʒ j
8 drachms	.... = 1 fluid ounce	= ℥ j
20 fluid ounces	.... = 1 pint	= O j

A tea-spoon is generally calculated to hold about 1 drachm, a dessert-spoon about 2 drachms, a table-spoon 4 drachms, and a wine-glass 2 ounces ; but the table-spoons used in military hospitals hold about 8 drachms or 1 ounce, and must, if used, be taken at their actual capacity.

149. A draught is medicine in liquid form, made up as a single dose—that is, the whole to be taken at once. Draughts vary in quantity from one to two or more ounces Draughts of castor oil may be administered floating on peppermint water or warm milk. Coffee is a good drink to take after administration of a nauseous drug. Draught.

150. A pill is medicine in solid form, made up in a small round mass and intended to be swallowed whole. Pills are best administered by placing them, one at a time, on the patient's tongue and then giving him a mouthful of water to swallow, which generally carries the pill down along with it ; when any further difficulty arises the pill may be enclosed in a crumb of bread, and then washed down with a mouthful of water. Care should be Pill.

taken that the lids of pill boxes, upon which the directions are written, do not get transferred from one box to another.

Tabloid. **151.** A tabloid is medicine in a solid form, compressed into small discs, which as a rule should be broken up and taken in the same manner as a powder.

Powder. **152.** Powdered drugs are made up loosely in a paper packet. When small, the contents of the paper are to be placed on the back of the tongue and washed down with water; when larger, the powder should be mixed with water in a mug or tumbler, stirred up with a spoon, and given without delay to the patient to drink, care being taken that none remains in the glass.

Seidlitz powder. A seidlitz powder consists of two parts, a large and a small powder; the contents of the large package are to be placed in a large tumbler with 6 ounces of water and stirred; the contents of the smaller, dissolved in 4 ounces of water in another tumbler, are then to be added, and the whole again stirred and drunk off while effervescing.

Enema. **153.** An enema is medicine or nourishment in a fluid state, which is passed into the rectum or lower bowel, through the anus, by means of a tube. For this purpose a rubber tube and glass funnel or reservoir, or Higginson's syringe may be used. Enemata vary in quantity from one to twenty, or more ounces, according to the purpose for which the enema is intended; nourishing enemata and those prescribed to allay pain, are usually small in amount, while on the other hand those intended to clear out the contents of the bowel are large. The syringe will invariably be tested before it is used, to see that it is in working order, and the enema heated to a temperature of 98° Fahr. When an enema is given to relieve the bowels it is generally made of a pint of warm water and enough soap rubbed into it to make it creamy (about 2 ounces of soap to one pint of water). Olive or castor oil may be ordered to be mixed with it. It is a good plan to mix the quantity ordered with a little of the soap and water, and inject it first, then the remainder of the soap and water.

To give an enema:—The patient should be placed on his left side, his hips brought to the edge of the bed, and a waterproof sheet placed beneath him. The pipe of the apparatus, having been well oiled, will be carefully passed up the anus, first upwards then somewhat backwards, for a distance of two inches, and the fluid allowed to pass slowly into the bowel. If the Higginson syringe is used, the fluid should be pumped through the apparatus before introducing the pipe, so as to get rid of air bubbles. The patient must be directed to resist the inclination to strain which follows, and he may be aided by keeping a folded towel pressed against the anus. The patient should not be uncovered more than is absolutely necessary, and a screen will be put round the bed. When an aperient enema is given a night-stool or bed pan should be placed conveniently in readiness. Sometimes small quantities (one or two drachms) of glycerine are used as an aperient enema; this is administered either from a glass or special syringe.

Nourishing enema. **154.** A nourishing enema is most satisfactorily given by means of the funnel and rubber tube or catheter. This should be done gently and slowly, as it is very important the injection should

be retained. These injections are given when it is necessary to feed a patient by the bowel. In this case the bowel requires washing out from time to time, usually daily with warm water. 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 slowly into the raised funnel, and then lowering it to let it run out, the bowel is well washed. A nourishing enema may vary in quantity from three to five ounces. It may consist of one or two eggs, an ounce of brandy and milk or beef tea to the required amount, thickened with a little flour; and should be peptonised or pancreatised. It should be as warm as the temperature of the body when given.

154A. *The "Drip" or Siphon Nutrient Enema.*—A very convenient method of feeding by the rectum is known as the "Drip" enema. An earthenware or enamelled cistern of about two pints capacity, with a rubber tube attached, is suspended at a height above the patient's bed sufficient to obtain the requisite pressure (about 3 feet). The tube has a soft catheter of appropriate size attached, or ends in a nozzle of shape and size convenient to be introduced within the bowel. A pinch-cock is fitted to the tube so as to regulate accurately the amount of nutrient fluid passing through the tube. The passage of drops only, as indicated by the name, is permitted. The ordinary nutrient fluids are placed in the reservoir, and arrangements made (as by standing the vessel in water, which must be kept hot) to keep them at about the body temperature. The amount given at each meal may be as much as a pint, or even more in certain individuals; about 40 to 60 minutes are usually taken to allow of the absorption of each meal; and one may be given every six hours. The patient lies comfortably in bed during each meal. Precautions require to be taken in this method as in other modes of rectal feeding to prevent irritation of the bowel and of the skin surrounding the anus, and thus to secure the toleration of the patient for this form of nutrition as long as is possible. The bowel should be carefully washed out by means of warm water, or by a soap and water enema before commencing feeding by this method.

Suppository.

155. A suppository is of a conical form, and is introduced into the lower bowel by the anus. The patient should be in the position already described for the introduction of an enema. When putting a suppository into the lower bowel the orderly should dip his finger and the suppository into some oil and pass the suppository as far up as possible.

Inhalation.

156. An inhalation is a medicine in the form of vapour which is drawn in with the breath — inhaled. Chloroform, ether, laughing gas, &c., called anæsthetics, are given by the medical officer to produce insensibility for operations. Other inhalations are given in the following way:—The medicine to be inhaled is put into a vessel called an "inhaler" containing hot, but not boiling, water, and the medicine to be inhaled. The patient inhales the vapour arising from the vessel through the tube placed at the top, taking care not to scald the mouth.

Inunction.

157. An inunction is medicine in the form of an ointment rubbed into the skin. A piece of ointment the size of a bean is to be

rubbed into the skin, as ordered, with the palm of the hand, gentle and steady friction being continued until the ointment is exhausted; a few turns of a flannel bandage may then be passed round the part so as to protect the bed-linen and favour absorption. If the ointment used be a mercurial one, the patient himself should be directed to apply it.

153. Some liniments—as, for example, iodine—instead of being rubbed in are painted on the part with a camel-hair brush, or with a small piece of cotton wool twisted on the end of a small stick.

Hypodermic injection.

159. A hypodermic injection is medicine in a fluid form introduced in small quantities beneath the skin by means of a small syringe and hollow needle. Some injections have to be passed deeply among the muscles, and are hence called intra-muscular. Injections should invariably be administered by the medical officer or by his definite order.

Medicated baths.

160. Medicated baths are prepared in the ordinary way for a full bath of 30 gallons of water, usually at a temperature of about 95° Fahrenheit. The patient may have to lie at full length in the bath for some time, so arrangements must be made to keep up the temperature of the bath, and avoid the risk of chill to the patient afterwards. Such a bath is medicated by adding appropriate chemicals or drugs. Thus a sulphur bath, mercurial baths, soda baths, tar baths, bran baths, may be administered. An earthenware bath is preferable for the purpose of preparing medicated baths, as certain of the substances used, *e.g.*, sulphur, spoil the paint or enamel on ordinary metal baths.

Vapour bath.

161. A vapour bath may be given by means of Wyatt's or other similar apparatus. Remove the clothes from the patient's bed, leaving only a blanket to lie upon. Put a cradle on the bed, and cover it with one or two sheets of paper, previously to placing the remainder of the clothes upon it; this will be found as efficient as a waterproof covering, and quite free from any unpleasant smell. Trim the lamp with methylated spirit, and spread out the wick, so as to give a good flame. Having lighted the lamp, place the end of the tube of the apparatus beneath the cradle, at about its centre, and tuck the bedclothes well down, so as to entirely exclude cold air. Place the tin basin, three parts full of warm water, over the lamp. When free perspiration has been induced all over the body, and the skin subsequently become tolerably cool, the body should be rapidly rubbed over with a warm coarse towel, and the patient carefully enveloped in blankets, great care being taken that he is not exposed to draughts.

Emetic.

162. An emetic is medicine in liquid form, given by the mouth, followed, as a rule, by the administration of large draughts of tepid water. Its object is to produce vomiting. A tablespoonful of mustard or salt mixed with a tumblerful of warm water, is a safe and easily-obtained emetic. An emetic having been ordered for a patient, the attendant should satisfy himself that it has acted; if it fails to do so in 20 minutes the sister or non-commissioned officer on duty should be informed. Tickling the throat with a feather may be tried in order to stimulate the act to vomit. Sulphate of copper, sulphate of zinc, antimony and ipecacuanha in wine, are important drugs used as emetics. A powerful emetic

known as apomorphine, is frequently used in very minute doses, either by internal administration, or hypodermically, but is always given by the medical officer.

External Applications.

(Dressings have already been dealt with, paras. 78 to 87.)

(1) *To have an Effect where Applied.*

Gargle. **163.** A gargle is used as a wash for the mouth and throat. A tablespoonful is to be taken into the mouth, the head then thrown slightly back, and the fluid set in motion by breathing through it, at the same time taking care not to swallow any; this is to be repeated at least twice on each occasion.

Injection. **164.** An injection is used for washing out the urethra, the ear, or any other cavity, by means of a syringe.

Urethral injection. A patient will be instructed to use an injection for the urethra as follows: having placed a chamber utensil on a chair in front of him, or, if in bed, between his thighs, he will first make water, so as to clear away all discharge from the urethra, then fill a syringe with the injection; place the forefinger of the right hand in the ring on the head of the piston, and hold the barrel firmly with the thumb and remaining fingers. Then holding the penis with the fingers and thumb of the left hand, he will bring it up against the belly, and insert the pipe of the syringe into the urethra, where it is held by the fingers of the left hand, and slowly press down the piston. When the injection has passed into the urethra the syringe will be withdrawn, and the injection, after being kept in the urethra by the pressure of the fingers for a few minutes is then allowed to run into the chamber utensil.

Eye wash. **165.** An eye-wash is used as a lotion for the eyes. It is applied either by means of a vessel called the eye bath; or an apparatus, the eye douche; or by simply allowing the lotion to run in and out of the space between the eye and the eyelids.

Every patient using an eye lotion must have his own appliances, and retain them exclusively for his own use.

Eye drops. **166.** Eye drops are dropped into the eye by a small glass pipette, or by means of a small pledget of cotton wool, or a camel's hair brush charged with the drops. To introduce the drops into the patient's eye: throw the patient's head slightly back, draw the lower lid downwards with the fingers of the left hand; now holding the end of the charged pipette over the outer side of the eye, the attendant will allow air to enter the barrel until the required number of drops have fallen into the eye. Cotton wool or the camel's hair brush can be readily used in a similar way.

A good plan is to use a camel-hair brush dipped into the eye-wash, and a drop is allowed to fall between the lower eye-lid and the eye-ball.

Liniment **167.** A liniment is applied to a part by rubbing.

To apply a liniment: Pour out a small quantity in the palm of the hand, and rub it over the part affected until the liniment is absorbed. This will be repeated for the required length of time.

As many liniments contain irritating substances, care should be taken that they are not brought in contact with the eyes or any tender surface.

Caustic.

168. Caustic is applied externally with a view of destroying unhealthy tissues. The caustics most commonly in use are nitrate of silver (lunar caustic), nitric acid, potassa fusa, and sulphate of copper (blue stone).

Sticks of nitrate of silver are kept for use in quills, or caustic-holders. This caustic should be cleaned with a damp rag, and dried with a piece of lint or paper after being used, and should not be placed in contact with any metal, nor should it be allowed to touch linen, or the hands, as it produces a dark stain. It is occasionally necessary to point a piece of caustic. To effect this, it should be rubbed on wet lint until it is pointed, but it should not be cut or scraped.

Nitric acid is generally applied by means of a glass brush or a piece of wood, one end of which is pared off thin and flat.

Sulphate of copper (or blue stone) is used in crystals. The crystal should be ground on a fine stone to a chisel point, and tied in a cleft cut in the end of a piece of wood. It should be wiped clean after use.

(2) *To Raise or Lower the General Heat of the Body.*

Hot-water bottles.

169. Bottles or special metal or earthenware vessels containing hot water are frequently applied to the feet, legs, and other parts to warm the body. They should be carefully corked, wrapped in a roll of flannel or fold of a blanket, and then applied; great care is necessary lest the heat be too great and the parts be burnt, especially if there is any want of feeling in the part, or insensibility of the patient. Warmth is frequently more conveniently applied by indiarubber bottles, containing hot water, *e.g.*, to the back and abdomen. Hot bricks are occasionally used for the same purpose.

These hot-water bottles, when being used for a patient, should be refilled by the night orderly about 2 a.m. and 5 a.m. in bad cases. These are the hours when a patient's powers are lowest. By doing this the patient will be kept warm until the night orderly is relieved.

Water baths.

170. Baths may be classified as water baths, vapour baths, and hot-air baths; each of these again may be divided into (*a*) simple, and (*b*) medicated, when some drug is added. Water baths, as well as being simple or medicated, may be local or general, according as a part or the whole of the body be immersed. The temperature of the different kinds of baths, and the time that patients should be allowed to remain in them, are shown by the accompanying table:—

		Description.	Temperature.	Time allowed for remaining in.
			degrees.	minutes.
Water	simple (water alone)	Hot	98–105	10
		Warm	92–98	20
		Tepid	85–92	20
		Cold	temp. of the air	a few minutes
	medicated (water with mustard, acids, alkalies, iodine, or sulphur)	Warm	92–98	20
Vapour	simple (steam alone)	...	...	15–30
	medicated (steam first, then either calomel, iodine, or sulphur).	...	...	
Hot air	simple (hot air alone)	...	...	15–30
	medicated (hot air first, then chlorine)	...	...	

171. The temperature of a water bath should always be determined by the bath thermometer, the use of which will be carefully explained by the instructor.

It may be regarded as an invariable rule that the original temperature of a bath is to be maintained the whole time the patient remains in it, if necessary by additions of hot water, care being taken in so doing not to scald the patient.

In preparing a hot, warm, or tepid bath, hot water should be poured into the vessel first, and cold water then gradually added and mixed until the proper temperature is reached, as shown by the thermometer. The patient is then placed in the bath, which to avoid spilling should not be more than two-thirds full, the whole body with the exception of the head and face, or a part of the body, as ordered, being immersed.

At the end of the appointed time, when taken out of the bath, the patient should at once be rubbed dry with a towel, avoiding exposure to draughts.

Tendency to faint in a hot bath.

Exhaustion and faintness are sometimes produced by a hot bath; weakly patients must be carefully watched, and removed immediately they appear faint.

The temperature of a cold bath will vary with the temperature of the air. The body should be immediately submerged on entering the bath, the head being also bathed, and as much movement as possible maintained while the patient remains in it.

Different forms of bath.

The baths used in military hospitals are the long bath—either fixed in a bath room, or movable so that it can be wheeled to the bedside—the hip, the slipper, the foot, and the arm bath; these latter are used when certain parts only of the body require bathing; the hip bath, for example, when it is intended to influence the organs in, or the parts about the pelvis. In preparing a hip bath, the vessel must not be more than one-third full, otherwise when the patient sits down in it the water will overflow. The foot-bath is one in which only the feet and legs are immersed; it can be given at a temperature up to 115°. The vessel should be so full as to permit the water to reach nearly as high as the knees.

A blanket should be wrapped round the patient as he sits with his feet and legs in the bath.

Sponging the body.

172. Sponging is employed during fever, to reduce the temperature by permitting evaporation of the water from the surface of the body. Cold or tepid water is used, and occasionally a little acid or aromatic is added to the water, *e.g.*, aromatic vinegar. To sponge a patient properly, roll a blanket under him, remove the shirt, tuck in towels on each side, to catch any water that may run down, and take away the bedclothes, leaving only a blanket over him. The whole body is not exposed at once, only the part to be sponged is uncovered. A large sponge wrung out of the water is rapidly passed over the body, part by part. The water should be maintained at the temperature ordered, by adding either cold water, or ice, as required. When the temperature is sufficiently lowered by evaporation from the surface, the patient is carefully dried with a soft towel, and put to bed.

173. *The Warm Pack.*—"The warm pack" is used for the purpose of bringing the blood to the surface of the skin, so as to reduce the tension in the arteries; to remove waste material from the blood by causing sweating; and in this way to give assistance to the kidneys. The bed is prepared by being covered with a waterproof sheet as in sponging, two or three blankets are placed under the patient, a sheet dipped in warm water is then wrapped round the patient's body, and the blankets folded over him. The patient will, as a rule, in a short time perspire freely, and may be left in the warm pack from 20 to 30 minutes, according to the directions given. The effect of the warm pack may be intensified by placing hot bottles in the bed near the patient's body. There should always be at least one layer of blanket between the bottles and the skin. It is often advisable to spread a coverlet on cradles over the patient. The patient should be carefully watched so that any tendency to fainting may be noticed early and properly treated.

174. *Cold Pack.*—A "cold pack" is used to lower the heat of the body in fever. The bed is arranged as in the case of the warm pack. The sheet is dipped in water of the temperature ordered, which may even be "ice-cold," and applied loosely round the patient's body, one or more layers of blankets may also be folded over him if directions are given to that effect. It will not be necessary to use blankets in cases where it is desired to reduce the temperature rapidly, but it is usually advisable to cover the patient with cradles before spreading the coverlet. The cold pack may be continued from 30 to 50 minutes, and the process may be repeated under the direction of the medical officer until the temperature is brought down to the required degree. The patient is then rapidly dried and wrapped in a blanket; hot bottles must be in readiness to apply, if there is risk of collapse.

174A. The "*ice-pack*" is used to reduce the temperature in cases of extremely high fever. The bed is arranged as in the case of the cold pack, but pieces of ice are placed outside the sheet in the armpits, between the thighs, at the sides of the neck, &c. In addition the body may be rubbed with large pieces of ice.

In cases of fever the temperature may also be reduced by placing

the patient in an ordinary long bath at a comfortable temperature. By placing lumps of ice in the bath, the temperature of the water is lowered to the required degree, and may gradually be made ice-cold.

The application of packs either in diseases of the kidneys or in fever must only be made on the express direction of the medical officer. In the case of cold or ice-packs the application is made under the supervision of the officer or the sister of the ward.

Local application of cold.

175. If it should be required to apply cold to a part of the body only, this is done by means of ice-bags, Leiter's tubes, or evaporating lotion.

Ice bags.

176. Ice bags are made of indiarubber. They are of various shapes, round for the head, long for the spine, &c. To use them the ice should be broken by means of a needle or ice pick, into pieces the size of a hazel nut. The bag is then half filled with the ice and firmly closed. It is fixed where required by means of a tape or bandage. A piece of lint should be placed between the ice bag and the skin, and should be changed frequently, as it ought to be kept dry. If the ice bag causes persistent pain this should be reported to the officer at his visit.

Leiter's tubes.

177. Leiter's tubes are also adapted to the head or other part of the body. They are made of thin metal, and coiled so as to form a mat or cap. Iced water is allowed to run through the tubes from an irrigator, and a basin is placed so as to receive the water as it escapes.

Evaporating lotion.

178. Evaporation causes reduction of temperature, and is used to keep parts of the body continuously cold. This is done by laying a single layer of lint, saturated with water, or evaporating lotion, over the part, which should be freely exposed to the atmosphere to favour evaporation.

The lint should be kept constantly wet. This may be effected either by re-dipping the lint in the water or lotion from time to time as it begins to dry, or, by keeping it moistened by irrigation, that is, by conducting a trickling stream over it. The simplest plan of irrigation is by placing a basin or bottle containing water near, but on a higher level than the patient's bed; from this a skein of worsted, one end in the water and the other laid on the piece of wet lint covering the part to be irrigated, conducts the water to it in a trickling stream, and in this manner keeps it constantly wet. A waterproof sheet must be spread over the bed-clothes to protect them from damp, and so arranged that the excess of water may be conducted along a channel into an empty vessel placed by the side of the bed to receive it.

(3) *To Draw the Blood to the Skin from some deeper part.*

Bleeding and cupping.

179. Bleeding, wet or dry cupping, or the application of leeches, are carried out by order of the medical officer.

Blisters.

180. Blisters are used to draw the fluid part of the blood from the deeper parts to the skin, and to produce counter-irritation. The skin should be thoroughly cleansed before the blister is applied.

181. A blister is made by spreading blistering plaster to the size ordered, upon stiff brown paper, or adhesive plaster, leaving

a margin of at least half an inch. To apply it, the plaster is held for a moment before the fire, if in cold weather, then laid on the skin, and a few strips of adhesive plaster laid down over it to retain it in position and prevent it slipping. Anyone putting on a blister should remember that the pain occasioned by a rising blister is materially increased if the plaster is put round the whole spot to be blistered, one side should be left open and not stuck down. A bandage may be loosely applied over the whole for greater security, but should not be so tight as to prevent the plaster being raised by the accumulation of fluid in the blisters forming under it.

Unless directions be given to the contrary, the blister should be removed and the part dressed after a lapse of twelve hours, but the time varies, so it ought to be looked at occasionally and dressed when it has risen. The bandage and strips of plaster being loosened, the blister is gently raised from one side and removed. Several openings are then made in the blebs with a pair of sterilized scissors, a vessel having been placed in a position to receive the fluid which escapes. This done, a dressing of simple ointment is applied, and renewed twice or three times daily until the surface is healed.

If orders are given not to allow the blistered surface to heal up at once—in other words, to keep it open—the old skin should be completely removed, and such other ointment dressing as may be ordered will be substituted for simple ointment dressing. This will be continued until orders are given to allow the sore to heal, when simple ointment is to be applied as first described.

Blistering fluid.

182. Besides the use of blistering plaster, other methods of producing blisters (such as blistering paper, blistering fluid) may be employed. Blistering fluid is painted on the part with a camel-hair brush, and the blister made is subsequently treated as above. Great care is to be taken that none of the fluid is allowed to run on to the skin beyond the actual region to be blistered.

This is the best way of producing a blister. Only the part marked out by the officer is to be painted. If the skin is very greasy it may prevent the blister from rising. If this is the case the skin should be wiped over with a piece of wool dipped in ether.

Poultices.

183. Poultices are intended as a means of applying heat and moisture to a part to draw the blood towards the skin from the deeper parts, and to produce sedative and sometimes stimulating effects; the following is the mode of preparation of that most commonly used :—

Linseed poultice.

Mix linseed meal gradually with boiling water, according to the size of the poultice required, by stirring in a previously warmed basin. The poultice should be about as thick as porridge. Some tow, neatly teased out, of the required size, is placed on a table, the poultice is turned out upon this and spread out with a spatula (which should be frequently dipped into a basin of hot water) in a layer half an inch thick, leaving a margin of tow uncovered about an inch in width, which should be rolled inwards. Care should be taken not to apply it too hot to a tender surface. Unless otherwise ordered this poultice should be renewed every two

hours. It should be about half an inch thick. A poultice is only used to a part when the skin is unbroken. After a part has been sufficiently poulticed it is generally covered with flannel or cotton wool and a bandage. A well-made poultice should not stick to the skin.

Changing poultices.

A poultice must not be taken off until the fresh one is ready to put on.

A poultice should be made as hot as possible, as it quickly cools, but care must be taken not to apply it to the part while it is too hot. Before putting on a fresh poultice, on the rapid removal of the old one, the skin should be wiped over quickly with some cotton wool. The heat of a poultice is kept in by covering it with a piece of thin mackintosh. If this is done it requires renewing every three or four hours. Large poultices keep longer warm than small ones. It is best to change large poultices every four, and small ones every two hours.

Fomentations.

184. Fomentations or stupes are applications of hot water to a part. To apply a fomentation: two pieces of flannel, according to size required, or two pieces of spongio-piline, are immersed in a basin of hot water placed by the side of the patient's bed; one piece is taken out, and, by means of wringer or towel, wrung out nearly dry, and placed as quickly as possible on the part to be fomented, and covered by a piece of waterproof sheeting; the second piece is to replace the first as soon as the first begins to cool. The process will be continued for the space of at least 20 minutes, unless otherwise ordered.

Turpentine stupe.

Oil of turpentine is sometimes directed to be sprinkled over the flannel or spongio-piline each time before being wrung out, and the application is then called a turpentine fomentation or stupe.

Mustard plasters.

185. Mustard plasters are used to produce counter-irritation. The skin should be reddened by their application in order to produce the desired effect.

To make a mustard plaster, mix some fresh mustard powder into a paste with cold water, and spread the paste into an even layer on stiff brown paper of the required size. This is then to be applied to the part, smoothed over, and pressed to the skin with the hand. It is allowed to remain on for a quarter of an hour, and, if the mustard is good, a burning sensation is produced, and the skin is reddened. After the plaster is removed, any mustard adhering to the skin must be washed off; this inconvenience may be obviated by laying a piece of thin tissue paper, or of fine muslin over the mustard plaster when prepared, so as to intervene between the mustard and the skin.

Mustard leaf.

A mustard leaf is frequently used in place of a mustard plaster. Before application it must be moistened with cold water.

Wool jackets.

After poulticing, a patient is sometimes ordered a jacket made of gamgee tissue or cotton wool. The former is the more suitable material. Wool jackets of the same materials are often used in cases of pneumonia and other lung diseases.

15. THE NURSING OF HELPLESS PATIENTS.

General instructions.

186. It is the duty of attendants to pay the greatest attention to the feeding of, and administration of medicine to, the sick.

The patient must have no food except that which has been ordered him by the officer in charge of the case.

Disobedience of this rule may result in the death of the patient. Medicines must be administered with the utmost regularity.

Cleanliness of patients.

It is also the duty of the orderly to see that the patients under his charge are kept clean. When they are admitted to hospital they should be washed. If there is an injury to a limb, it must be very carefully handled. A waterproof sheet must be used to keep the bed from getting wet, and over it a blanket is laid to keep the patient from feeling the cold of the waterproof sheet. The feet of patients should be washed twice a week, or more often if it can be done. The feet should be well dried and kept warm after washing. In washing, only one part should be washed at a time, and no parts should be unnecessarily uncovered. It should be done as quickly as possible.

The mouth and teeth, and if necessary the tongue, should be kept clean. A piece of lint is put over the finger, dipped in warm water, and then rubbed gently over the teeth, gums, and tongue. A little lemon-juice and glycerine is useful for this purpose.

Feeding at night.

Nourishment should be given regularly, not only by day but during the night. If the patient is not asleep food should be given as frequently at night as by day. Some nourishment should be given as soon as the patient awakes, but unless so ordered he should not be wakened. Care should be taken to distinguish between sleep and exhaustion. The amount of food taken should be carefully noted.

Causes of helplessness of patients.

187. Patients may be helpless from a variety of causes: from weakness, from paralysis, or from injury, and it is of great importance that attendants should be acquainted with the easiest, gentlest, and safest methods of lifting and laying them. When

Tendency to faint.

patients are weak, or have been a long time in bed, the tendency they have to faint when moved into an erect position should be borne in mind. Thus when moving such patients, they should be kept in the horizontal position as far as possible. This is taken into consideration in the methods recommended for performing the offices for helpless patients described in paragraphs 188 to 194.

Moving a helpless patient.

188. There are three methods of moving a helpless patient.

First method: An attendant takes up a position on either side of the patient, and, stooping, each passes one hand under his back at the lower part of the shoulder-blades, locking them together, the other hands are passed under his thighs close up to the hips, locking them also. Rising together, they steadily raise the patient and carry him in the sitting position. Where the leg is injured, both lower extremities will be supported by a third attendant.

This method cannot be used in cases of extreme weakness, as it gives no support to the patient's head.

Second method, where Captain Russell's stretcher is provided: This stretcher consists of two poles connected by strips of webbing

and two cross-bars. To use it, one pole is removed, and the other, with the webbing attached to it, is laid by the side of the patient. The looped ends of the strips of webbing are passed under the patient, and the pole, which was removed, passed through the loops. The cross-bars being put into proper position, an attendant takes hold of the handles at each end, and carries the patient as if on an ordinary stretcher. When the patient has been laid down, one pole is removed, and the strips of webbing thus set free withdrawn from under him.

Third method : A patient can be lifted with great ease and comfort by four attendants, two poles six feet long, and the blanket and under sheet. One pole is placed at each side of the patient, and the sheet and blanket firmly rolled round it. The four attendants take up a position, two at each side, facing the patient. Each grasps with one hand the end of one of the poles surrounded by the sheet, and with his other hand the pole near its centre. Acting together the patient is steadily raised and carried, feet foremost, over the foot of the bed.

Re-making bed for helpless patient.

189. When the bed of a helpless patient is to be re-made, a second bed should be prepared to take the place of the one in use, the patient being lifted from one to the other. He should on no account be allowed to sit in a chair while his bed is being made. Should there be no second bedstead, it is better to lay him on a mattress or blankets on the floor. The new bed should be placed by the side of the old one, but sufficiently distant to allow space for attendants to move freely between the two. The patient may be lifted by any one of the three methods just described, and being moved feet foremost over the foot of the old bed, so as to clear it, he is carried head foremost over the foot of the new bed, and steadily lowered into his proper place.

Changing an under sheet.

190. The under sheet may be changed by either of the following methods, as directed by the sister :—

First method : Turn the patient on his side. Roll up lengthwise half of the dirty sheet, and push the roll as far under the side of the patient as possible. Next roll up one half of the clean sheet and spread the other half over the side of the bed from which the dirty sheet has been removed, and tucking it under the mattress, place the roll alongside the roll of the dirty sheet. This done, go to the opposite side of the bed, and gently turn the patient back over the rolls of sheets. Then take away the dirty sheet and unfold the clean one, and tuck it neatly under the mattress, when the patient may be turned into his old position.

Second method : Roll clean sheet cross-wise ; untuck the dirty sheet at foot and sides of bed and roll it up under legs of patient ; then place clean rolled sheet at foot of mattress, allowing sufficient margin to tuck in firmly at the foot. This done, pass clean sheet under legs and gently raise upper part of legs and hips of patient and roll the dirty sheet towards head of bed, the clean sheet following and being unrolled in the same direction ; then raise shoulders and head of patient, and clear away pillows and bolster and soiled sheet, so that the clean sheet may be straightened ; then

roll bolster firmly into sheet, replace pillows, and tuck sheet in firmly at sides and foot of bed.

Changing a draw sheet.

191. A draw-sheet is used for all patients who are confined to bed for any length of time; and especially for a patient who has lost command over his bladder or bowels, or where the bed is liable to be soiled by discharge.

A draw-sheet requires to be frequently changed, in addition to a fresh part of it being brought under the patient as often as one part becomes soiled.

To bring a fresh part under the patient, the hips of the patient should be raised by two attendants, each passing a hand and locking them under the thighs, and when thus raised the folded sheet is gently pulled, without the waterproof, towards one side.

To change the draw-sheet, both the folded sheet and the waterproof (if a waterproof is required) should be removed; this may be done in the same way as the first method for changing an ordinary sheet, or the patient may be raised by two attendants as just described, and the dirty sheet removed and the clean slipped in.

Raising helpless patients in bed.

192. Weakly patients frequently require to be raised in bed. This may be done by pillows, by a bed with a head-lift, or by a head-lift which can be slipped in under the mattress and worked by a rack and pinion. When pillows are used they should be placed under the patient's back as well as his head, sloping up from his back gradually to where a pillow is placed for the head to rest upon. If merely piled one on top of the other under his head, and not arranged so as to support his back, the chin is pressed forward on the chest, a position which is very irksome to the patient and obstructs his breathing.

When the upper part of the body is raised by any of the methods described, there is a great tendency for the patient to slip down towards the foot of the bed. A foot-board with a pillow for the feet to rest against will prevent this, but often the patient cannot bear his feet against the board. Under such circumstances a firm pillow, either horse-shoe shaped or circular, with a hole in centre, may be put under the hips of a patient, and tied by two tapes to the head or sides of the bed, and thus a fixed point will be opposed to the hips slipping down. The foot of the bed may be raised by placing blocks under the legs.

Feeding.

193. When it is necessary to give food, drink, or medicine to a helpless patient, the head and, if possible, the upper part of the body should be raised. This can be done by placing the hand and forearm underneath the pillow and raising the pillow in such a way as to support the head and neck. The chin must not be allowed to fall on the chest. For fluids a feeding cup may be employed. Where this is not provided, a spoon, a glass, or mug may be used. When a glass or mug is used, the precaution should be taken of only half filling it, as otherwise the fluid is sure to be spilt.

Bed-pan.

194. The bed-pan is used to receive the motions of patients who are unable to get out of bed and use the water-closet or night-stool. It should be used with the greatest care, and with

as little disturbance as possible to the patient, who should not be exposed more than is absolutely necessary, lest he catch cold. There are two kinds in use, the circular and the slipper. When the circular bed-pan is used, the patient must be lifted by the first method described under the head of lifting a helpless patient, and the pan slipped under him. With the slipper bed-pan the patient should be raised at one side, and the thin edge gently slid in under the hips. The bed-pan before being used should be warmed (dipping it in water at about 110° will effect this) and sufficient carbolic or other antiseptic fluid poured in to cover the bottom of the pan. While being removed from the ward it should be placed in the receptacle, where one is provided for the purpose, or covered with a cloth or cover.

Bed-sores.

195. If a patient is kept in bed for a long time bed-sores are liable to occur. They cause great trouble to the patient, and should they appear, it is, in most cases, a sign of bad and inattentive nursing. If the patient is not kept dry, the risk of a bed-sore forming is increased. Dryness and cleanliness of the parts are the most important preventatives. In the case of all patients confined to bed, the parts on which bedsores are likely to form should be carefully washed with soap and water night and morning, *thoroughly dried*, methylated spirit applied, and, lastly, some simple dusting powder, such as zinc and starch.

Bed-sores generally occur on those parts which are most subject to pressure, viz., the skin over the back and prominences of the hips and the heels. When using the bed-pan, washing the patient, or changing sheets, the attendant should watch carefully for any signs of approaching bed-sores and report to the ward sister or non-commissioned officer. The use of a water-bed is of great assistance in avoiding the formation of bed-sores; and the parts threatened may be individually protected by judiciously-applied ring-pads made of tow, with a thin layer of cotton wool over it, and then covered with some soft material. In all cases the sheets must be kept free from wrinkles and any trace of crumbs.

If the skin is broken, a little spirit should still be rubbed in around the sore, which should be carefully avoided, so as to harden the neighbouring skin. Flexible collodion may be painted over the sore, to form a protective covering. The attendant should obtain special orders as to dressing the bed-sore from the officer in charge.

16. THE OBSERVATION OF THE SICK.

Notes to be taken of symptoms.

196. Symptoms are the signs of disease on which the medical officer has to depend to determine its nature, its severity and danger, the treatment, and the probability of recovery. It will thus be understood how important it is that the attendant should be able to note any change in the symptoms of a patient during the absence of the officer. The facts observed must be accurately reported.

General appearance of patient.

197. The appearance of the patient will very often show whether he has changed for the better or worse. The expression of the face may be that of pain, anxiety or vacancy. On the other

hand, it may be calm, hopeful and intelligent. The colour may be bright red, congested and dark, or pale. The lips may be crimson, purple, or white and bloodless. The nose may look pinched. The cheeks may be sunken and the temples hollow. The eye may be glassy and staring, or dull and heavy. The patient may lie in a listless, careless manner, or he may be restless and toss about; or again he may be picking at the bed-clothes, and his movements tremulous and uncertain.

Position in which he lies. The position in which he lies should also be noticed; whether he lies on his back or on his side, with his legs drawn up or stretched out. Patients helpless from extreme weakness have a tendency to slip down towards the foot of the bed, a condition to be avoided by specially arranging the bed.

Intelligence. **198.** The attendant should observe whether a patient shows his usual intelligence and interest in his surroundings or whether he appears to be dull and stupid, or if he rouses himself only when spoken to. **Delirium.** He may show the mental derangement known as delirium, which may be boisterous, or low and muttering in character. It may be so slight that the patient can be recalled to himself and for a time speak rationally, or so severe that it will be impossible to arouse him from it. In it the patient may see objects and hear sounds which do not exist, and speak and act as if these sights and sounds were real. It occurs more frequently during the night than in the daytime. A close watch should be kept on delirious patients lest they should get out of bed and escape from the ward, throw themselves out of the window or do themselves or others some bodily injury.

Manner. The manner of a patient should be observed. It may be calm and collected, excited, depressed, or in some way differing from his ordinary manner.

The temper also of a patient may vary. At one time he may be irritable, peevish, and easily annoyed, while at others he may be quiet, good-tempered, and easily pleased.

Sleep. **199.** It should be noted how long the patient sleeps: whether his sleep is disturbed, whether it is sound and calm and accompanied or not by heavy breathing, or if he mutters uneasily, or is quiet and comfortable. The amount of sleep should be carefully noted in the report. To encourage sleep the room should be darkened, and the light shaded from the patient's eyes. Cold feet may prevent sleep; this should be remedied. The orderly should move quietly about the room, and make as little noise as possible. A drink of warm milk or some other nourishment may cause sleep. Sleep is of the greatest importance to a patient, so much so, that he should not be wakened unless absolutely necessary. The wakening up of a case in which there is sleeplessness should be left until the last minute, and it is much better to let him wake of his own accord. Patients should never be startled from their sleep, and sudden or rough awakening must always be carefully avoided. It sometimes happens that a patient will report that he has not slept "a wink" at night, when in reality he has slept well; so that it becomes necessary to have a record of the duration of his sleep, for the information of the officer in charge.

Pain. **200.** Pain is an accompaniment of most diseases. It varies

much in its nature and modes of occurrence. It may come and go or be continuous, wander about or be fixed, or it may moderate for a time and again come on with great severity. It also varies much in degree, from mere uneasiness to agony. It may be dull, aching, smarting, burning, tingling, or throbbing. The statements of the patients have to be relied on as regards the existence of pain, but its degree may be generally judged from the expression of the countenance and the tone of the voice. The time of attack, the duration, the cessation, the degree and character of the pain should all be carefully noted.

State of skin

201. The condition of the skin should be watched, especially in fevers and inflammations; whether it is dry, moist, or perspiring, hot or cold, pale, red, or shrunken. The skin, from being cold, may become hot, then moist and perspiring. The time at which such changes occur should be carefully noted.

Shivering and eruptions.

Associated with the condition of fever is the occurrence of shivering, or rigor, a symptom which should never be overlooked. Any rash or eruption making its appearance on the skin should also be carefully noted.

Temperature—clinical thermometer.

202. The temperature, which should be taken with the greatest care by means of the clinical thermometer, which is self-registering, and so does not require to be read while in position. The index of the thermometer consists of a small piece of mercury detached from the column in the stem of the instrument which must be set before commencing to take an observation.

Fig. 43.—Clinical Thermometer.

To set the index it must be shaken down below 97°. This is done by taking the thermometer firmly in the hand, and then by one or more rapid swings of the arm the index can be brought down.

When the index has been set, the bulb of the instrument is placed in the arm-pit, which should be quite dry, in any part where it can be completely covered by the soft parts, or in the mouth. If taken in the mouth, the bulb of the thermometer is placed under the tongue and the lips are kept closed. The temperature in the mouth is, on the average, one degree higher than that in the arm-pit. The temperature, unless there are orders to the contrary, should always, therefore, be taken in the same place. After having been retained in position for five minutes, the instrument is carefully and gently removed. The top of the index—namely, the end farthest from the bulb—will denote the maximum temperature during the time the instrument has been in contact with the part.

Normal temperature.

The normal temperature, that is, the temperature of the body in health, as registered by the thermometer, is 98·4°, taken in the axilla.

In ascertaining the temperature, care should be taken that the clothes do not come between the bulb of the thermometer and the skin, and that no hot-water bottle, poultice, or anything which

might affect the temperature, is near it. Clinical thermometers will be carefully washed with antiseptic solution before and after use.

Temperature chart.

203. Temperatures are recorded upon an official chart (Army Form B 181), the heading of which must be accurately filled in, the chart mounted upon a piece of cardboard and hung over the patient's bed. Each temperature observation is recorded by placing a dot upon a line corresponding with the height of the temperature exhibited by the clinical thermometer, and under the proper column for the day of observation. As a general rule these observations are made twice daily, *i.e.*, in the morning and evening, but in important and critical cases it may be necessary to repeat the observations every two, three, or four hours. The dots on the chart which represent each observation are day by day connected by a carefully ruled line. By this means the variations of the temperature may be seen at a glance.

In fevers, an evening temperature of 103° is of frequent occurrence. A temperature of 104° or over, must be at once reported, for the information of the officer in charge of the case.

Respiration.

204. The signs presented by respiration are of the highest importance. In diseased conditions it may be frequent or slow, rapid or prolonged, forcible or feeble, spasmodic, wheezing, or stertorous, and it may be difficult or laboured so that the patient cannot lie down.

Associated with disturbed respiration may be sneezing, coughing, hiccough, or a blue and congested state of the face and upper part of the body.

Cough.

205. Cough is a sign of irritation in the air-tubes, and shows that an attempt is being made to get rid of some matter interfering with respiration. It may occur occasionally, incessantly, or in paroxysms. It may be dry, that is to say, without expectoration, or moist, that is, with expectoration. It may be short and hacking, harsh, or hollow. It may occur at some particular time of the day or night, and not at other times. Whatever character it presents should be carefully noted.

Expectoration.

206. Expectoration is the act of coughing up matters from the air passages. The matter expectorated is called *sputum*. Every patient who expectorates should be provided with a spitting cup, and the sputum should be kept for the medical officer's inspection. The sputum may be watery and frothy, yellow, thick, and purulent; rusty; or it may contain blood in varying amount, and then constitutes *hæmoptysis*.

Should blood be present, it should be carefully observed whether the patient coughs it up, vomits it, or brings it up from the back of the throat, the mouth, or the gums. While in use in the ward some disinfecting solution should be kept in the spitting cup, and the cup must be emptied at least once a day, after having been inspected by the officer in charge of the case.

Danger of it in consumption.

It must be remembered that the disease known as tuberculosis, of which consumption is the commonest form, is spread chiefly by the dried sputum of patients suffering from it being inhaled by healthy people. Therefore the greatest care must be taken to ensure that the sputum of such patients is not dropped about. They are supplied with spitting cups for use in the wards,

and with rags, into which they spit, and which are afterwards burnt.

207. The quantity and character of the urine and the manner in which it is passed vary in disease. The patient may pass it more freely than usual, with or without pain, in a large or small stream, even in drops, or he may be unable to pass it at all, a condition which is called *retention of urine.* Urine.

The quantity may be increased, or diminished, or even suppressed altogether. The colour may vary from pale yellow to smoky red, and there may or may not be a deposit. If urine is to be kept for the officer's inspection and examination, it should be passed into a very clean vessel, kept covered with paper, on which is written the patient's name and number and the date, and sent to the clinical laboratory if required.

208. The stools should be observed as to colour, consistence, frequency, and nature, particularly as to the presence of blood or slime; and whether or not there is pain, griping, or straining in passing them. Stools retained for the inspection of an officer should not be kept in the ward. Motions.

209. Any variation in the appetite, whether for better or worse, and any peculiarity or fancy should be noted. Patients often take a dislike to some particular article of food, or express a wish for some other. Thirst should always be attended to and gratified as far as possible. Appetite. Thirst.

17. MANAGEMENT OF WARDS.

210. Hospital wards must be kept clean, and free from dust, which always contains germs, which in their turn may produce disease; wards must be well ventilated, with a full supply of pure air, but without a draught. General instructions.

In warm climates, and in old buildings at home, the bedsteads and bedding are apt to become infested with bugs and other vermin. A careful watch should be kept to prevent this occurrence.

The ventilation and warming can be regulated by means of the doors, windows, ventilators, and fires.

211. Every attendant in charge of a ward is responsible for its proper management. The furniture should be neatly and systematically arranged, and the utensils and other articles kept each in its appointed place. The head of the bedstead should be not less than 6 inches from the wall. The diet board will be suspended on the wall over the head of the bed. On the top of the bedside table, which should be in a line with the bed-head, will be arranged the mug, bowl, plate, butter-pot, knife, fork, and spoon; on the centre shelf the comb and brush, and books; and on the lower shelf articles of clothing, neatly folded. Should the bedside table be provided with only one shelf, then all these articles must be arranged to the best advantage on it. As soon as the towel is dry, and in any case before the morning visit, it should be hung on the rail at the back of the bedside table. Arrangement of furniture, &c.

212. Every morning the floor of a ward should be first strewn with sawdust (or tea leaves) which has been damped with the common solution of carbolic acid, or water—in the case of beds Ward sweeping.

occupied by infectious patients, the floor underneath should be sprinkled with carbolic solution before sawdust is put down ; then swept from the top of the ward towards the door of the ward. When sweeping is finished, and the dust has been taken up and put into the dust-box for removal, the entire floor should again be gone over with a piece of dry house flannel under a long-handled, weighted, polishing brush.

The ward should again be swept in the middle of the day, after the patients' dinner, when their beds have been tidied and sheets drawn.

Much depends upon the manner in which ward floors are dealt with. If a floor be well dry-rubbed every day the surface of the boards will become smooth and polished : this will prevent the dust from adhering to them, thus obviating the necessity of washing them so often, as would otherwise be the case, which in itself is a matter of great importance to the welfare of the sick.

Polishing floors.

213. *Polished Floors.*—When the floors are polished they require to be first swept as described above ; then beeswax and turpentine should be used. This must be applied on house-flannel on hands and knees, and well rubbed on to a section of the floor, which must afterwards be well dry-rubbed by a heavily-weighted, long-handled brush, the corners being done by hand. This polishing should be done once a fortnight at least.

Washing of floors.

Floors should be washed once in six months at least. Before commencing, the floors should be swept clean as before described.

Materials Required.—Good soft soap, house flannel or pieces of old blanket, scrubbing brush, buckets of clean hot water, which should be frequently changed. This work must be done on hands and knees, knee-mats being used, or, better still, workman's knee-pads, to save knees.

Method.—(1) Wet a piece of floor with flannel lightly wrung out of hot water.

(2) Apply a little soft soap to scrubbing brush wetted, and scrub wet surface of floor.

(3) Rinse off soap from floor with wet flannel, rinsing flannel two or three times, and finally wiping floor as dry as possible with another cloth, old dusters, or such like.

On the following day floors to be polished with beeswax and turpentine, as before described.

Cleaning windows.

214. The woodwork of windows should be cleaned by washing it with warm water and soap. The glass itself is cleaned by smearing over it a mixture of whitening and water, about the consistence of cream, allowing it to dry, and then polishing it with a clean, thoroughly-dry duster. This mode of cleaning is not always necessary, for if the glass be wiped over daily with a duster it will generally suffice to keep it in good order. The cloths used should be free from nap or fluff.

Cleaning walls.

215. The walls of wards should be frequently dusted with a damp duster, and cobwebs removed with a duster tied over the top of a long hair-broom. Cement walls, in addition to dusting, require to be occasionally washed with hot water and soap and carefully dried.

Cleaning stoves.

216. In cleaning a stove care is required that other things are not dirtied. A good plan to prevent this is to hold a thin strip of wood with one hand against the surrounding wall, while the brush is used with the other. The blacklead should be made into a thin paste and applied with the small round brush over every part that is to be blacked. When the blacklead is dry on the stove, the polishing brush is to be used briskly until every part of the ironwork shines. The ends of the fire-irons are cleaned in the same way as the stove, the bright parts rubbed with bath brick and a piece of leather or coarse cloth.

The best time for cleaning a fire-place is before the fire has been lighted; but as this can seldom be done, it should be cleaned immediately afterwards before it gets hot.

Cleaning paintwork.

217. The paintwork of a ward will require to be occasionally scrubbed with hot water and soap. Soda should not be used, as it soon destroys the paint.

Cleaning furniture and utensils.

218. Tables and forms should be scrubbed with hot water and soft soap. Tumblers and such articles are best washed in cold water; it gives them a better polish and does not crack them. Mugs, basins, and such like must be washed in hot water. Vessels of tin and white metal are best cleaned by washing them with hot water to remove the grease, and then polishing them with whitening. In washing knives and forks the blades only should be placed in hot water. Coal scuttles and brasses should be polished with a paste made of finely-powdered bath brick and water, and rubbed with a piece of leather or coarse cloth. When the brasses are very dirty they should be washed with hot water before being polished.

Dusting.

219. Every ward should be dusted at least twice in the day. In doing this great care is necessary, for if a dry duster be flipped about, as is frequently done, it merely raises the dust into the air to be again deposited in the same place or elsewhere. The duster should be slightly damp, and every article requiring to be dusted should be wiped over with it. By this means the cloth will take up the dust and not drive it from one place to another.

Emptying slops.

220. Slops should not be allowed to remain in the wards. All ward slops, such as the contents of chamber pots, bed urinals, bed pans, expectoration cups, washings of sores and wounds, and water used for washing bedridden patients, should be thrown down the slop closet, where such is provided; but where this does not exist, they must be thrown down the water-closet, care being taken in doing so not to soil the seat. These vessels should not be kept in the wards; all such vessels should be washed in hot water, to which chlorinated soda has been added, once in 24 hours. Slops are never to be emptied into the scullery sink. Old dressings, such as lint, poultices, tow, plasters, &c., should on no account be thrown down the slop closet or water closet, as they will block the pipes. Such articles should be removed to the dust bin to be burnt. (Refer to Standing Order 300.) The utensils from which slops have been emptied must be well washed, by running water freely into them from the tap, and using disinfecting fluid when necessary. They will then be dried, and cloths used for this purpose must be carefully washed, dried in the open air, and not used for any other purpose.

Warming.

221. The stoves in use in military hospitals are either set in the wall or stand in the centre of the room. The fires should be properly built up before lighting, and afterwards so replenished with fuel as at all times to be bright and cheerful ; they should not be allowed, as is too often the case, from having been too long neglected and then heaped up with a large quantity of coal, to become a mere spark, half smothered in cinders and coals. The temperature of the ward should be kept as near 60° F. as possible, and sudden alterations of heat and cold avoided as far as practicable.

Lighting by gas.

222. Where gas is used in wards it should not be kept higher than is necessary to give sufficient light, as the combustion of the gas renders the air impure, and the greater the quantity burned, the more impure will the air become ; moreover, too bright a light is often distressing to patients.

Ventilati

223. By ventilation is meant the supply of fresh air to, and the removal of impure air from, an apartment. If the air of a ward be not constantly changing, it becomes loaded with impurities given off from the lungs, from the skin, from the excretions of the occupants, and from combustion. Ventilation is of the greatest importance to the sick, and requires constant attention.

The effect of an atmosphere thus rendered impure is to favour the development of fevers, the spread of gangrene, erysipelas, and other diseases, to retard the healing of sores and wounds, and to lower generally the health of patients. A ward should be kept properly ventilated without making the patients cold, and patients can always be kept warm by hot bottles and extra blankets, if necessary. Wounds should not be dressed with the draught from an open window blowing on them.

The principle to be kept in view is, that the air within the ward shall be, as nearly as possible, as pure as that outside the building, while at the same time the temperature is maintained at the proper standard. To effect this the air of the ward must be constantly changing, fresh air entering as impure air escapes. There must therefore be both inlets and outlets. In hospitals the inlets are so arranged that the amount of air entering by them can be regulated by opening or closing them. They are so placed that the air, as it enters, is diffused generally over the apartment, and currents of air with a high degree of velocity—that is to say, draughts—are thus prevented. Sheringham's ventilators placed in the walls, and Moore's louvre ventilators in the windows, are the inlets most generally employed. Galton's stoves also have a channel communicating with the outer air, and opening into the wards, by which means air, that has been heated during its passage, is admitted. The outlets are generally placed in the ceiling, and lead into a shaft. The chimney also acts as an outlet. By means of these several openings an interchange of air is constantly carried on. The air within, as it becomes heated and impure, ascends and passes away through the outlets, while the pure air from without, being colder and consequently heavier, rushes in through the inlets to supply its place, and thus a continuous current is established. Where these means of ventilation are insufficient, they may be supplemented by drawing the window sashes down from the top, but they should not, as a rule, be raised from the bottom.

If the ward is properly ventilated there should be no smell perceptible on entering it from the open air. The orderly should from time to time go into the open air and return into the ward to test its sweetness or otherwise. The temperature should not exceed 65°, and there should be no draughts.

Making beds.

224. The comfort of a patient depends much upon the manner in which his bed is made. Care should therefore be taken to keep it as comfortable as possible. Before making up the bed, the whole of the bedding should be thoroughly aired, and afterwards well shaken, particular care being taken to remove all lumps and irregularities from the mattress. A bed is very apt to become hollow in the centre. This may be caused by the lacing of the sacking getting slack, which defect should be at once remedied by tightening the cord. If due to packing, the mattress should be well shaken up and turned over.

These preliminaries having been attended to, the mattress is laid on the sacking, and a blanket spread out evenly over the mattress ; the sheet is now laid out over the blanket, leaving sufficient of the former at the head end of the bed to roll round the bolster, which is then placed across the sheet and enveloped in it. Both blanket and sheet being smoothed out free from folds or wrinkles, should then be tucked firmly and neatly under the edges of the mattress. This tends to keep them smooth, and prevent them getting into folds. The pillow, having first been well shaken, should be placed on the bolster. The oversheet, the blankets, and counterpane are now spread, tucked in round the sides and the foot of the mattress, and neatly folded down at the head.

The following are the directions for lacing the bed sacking :— Pass the ends of the rope from below upwards through the two centre holes at the head end of the bed frame, equally dividing it so as to have its centre between the two centre holes. Pass an end from above downwards through each of the two centre holes of one end of the sacking, work round towards the two sides, passing the rope ends alternately through the holes in the framework and sacking, from below upwards in the former, and above downwards in the latter. Each corner eyelet in the sacking must have four strands of rope passed through it, namely, those from the last two holes of the head end and the two first of the side. This ensures the head end of the sacking being opposite the second side hole, and the other end in a corresponding position from the foot of the bed. The lacing is continued down the sides and round the corners at the foot end in a similar manner, the ends being secured in a firm hitch when the lacing is completed at the centre of the foot. The sacking and rope must be pulled perfectly taut before fastening off.

The bedsteads now used commonly in the large hospitals have wire mattresses and require no sacking. These require little or no adjustment.

Folding up beds.

225. The bedding of patients who are able to get up will be folded up in the following manner :—The bed-clothes, pillow, and bolster having been removed from the bed, and placed on a form or chair close by, the pillow will be laid across the mattress at the foot of the bed, and on it the bolster ; the attendant, now placing him-

self at foot of the bed, will roll the mattress, pillow and bolster twice over into as compact and even a roll as possible, drawing the mattress towards him as he does so, and will then arrange it in a line with the end of the bedstead. The next step will be to fold and arrange the bed-clothes neatly on top of the roll formed by the mattress. The counterpane is first taken and spread out lengthwise across the bedstead, and with the "right" side downwards; the side border next the foot of the bed is then turned over upon itself to the extent of about 6 inches, and the fold so formed then drawn down, and laid across the centre of the roll of mattress. A blanket is next taken, doubled up on itself lengthwise, and placed on the bedstead; this the attendant now takes hold of, draws a fold of it towards him (the fold should be about 10 inches wide), and lays it on the counterpane fold, and, on top of this, then the remainder of the blanket in three other similar folds, so that four doubles of the blanket overlie each other facing him. A fold of the counterpane is next lifted up, and laid on the blanket folds. A second blanket is taken, doubled upon itself lengthwise, placed on the bedstead, and two folds lifted and laid on the counterpane fold; on this the pair of folded sheets are then laid (a sheet is folded by doubling it crosswise, then folding it again in the same direction until the width equals the width of the mattress roll, then folding it crosswise in four folds, and lastly doubling these folds over once); on top of these, two more blanket folds, and on top of the blanket folds a counterpane fold. The third blanket will then be taken, arranged in four folds—in a similar manner to the first blanket—and laid on top of all. When there are only two blankets the package of bed-clothes will be so arranged as to have the blankets in four folds with the folded sheets in the centre, separated from the blankets by a fold of counterpane on either side. The last thing to do is to bring the free ends of the counterpane up to meet each other, to draw them tightly together, and cross them, to reverse the package of bed-clothes, the face of which now should be quite square towards the man folding the bed, and arrange it neatly on the centre of the roll.

Preparing an air-bed.

226. An air-bed is laid on the top of the ordinary mattress, the smallest of the three compartments of the bed being laid towards the head of the bedstead. Each compartment of the bed being distinct and separate from the others, will require to be filled separately in the following manner:—

Insert the nozzle of the small round bellows provided for the purpose into the inlet tube, and turn the ferrule on the inlet tube to the left until it stops. This opens the inlet, and at the same time attaches the bellows. Pump in air with the bellows in the ordinary way. When sufficiently full the inlet is closed by turning the ferrule to the right until it stops. This closes the inlet and at the same time detaches the bellows. The compartments should not be filled too full, or the bed will be hard and unyielding, but should contain just sufficient air to render them soft and elastic. As air-beds usually leak, the bellows should be kept at hand and fresh air forced in occasionally to replace that lost by leakage. At least two under-blankets should be laid on to absorb perspiration, and the bed made in the usual way.

227. A water-bed is placed on the ordinary hair mattress, with the funnel or opening by which it is filled towards the foot of the bedstead. The foot of the bedstead should be raised four or five inches by a couple of bricks under the two lower feet. By this the water when poured in will run towards the head of the bed. One person taking charge of the funnel, holds it firmly in an upright position. Water at a temperature of about 70° F. should now be poured in until the bed is about three-fourths full. The mouth of the inlet should now be secured, and the bed made in the ordinary manner, using, as in the case of the air-bed, at least two under-blankets to absorb perspiration. Preparing water-bed.

Cold water must not be used to fill a water-bed, as it is liable to chill the patient; at the same time, the water must not be too hot, or it will injure the indiarubber material of which the bed is made. If more than three-fourths full the bed becomes hard and unyielding, and does not accommodate itself to the shape of the body.

Both on air and water-beds the sheet and blankets beneath the patient require frequent changing, as they quickly become wet from perspiration, which the waterproof material of the bed does not allow to escape. No attempt must be made to move a water-bed when filled; it must first be emptied in order to guard against such an expensive article being torn or strained.

228. Where there is a discharge of any kind from a patient, the bed should be prepared in the following manner:—A waterproof sheet should be laid across the bed where it is necessary to protect it, and over this a draw-sheet is placed. The draw-sheet is made by folding an ordinary cotton or linen sheet lengthwise to nearly the same breadth as the waterproof sheet on the top of which it is placed. One end is tucked in under the mattress, and the other rolled up on the opposite side of the bed. When the part of the draw-sheet under the patient gets soiled, it may be withdrawn a little towards one side of the bed, and thus a dry part can be constantly kept under the patient without the necessity of replacing it by a fresh sheet whenever it is soiled. In cases of amputation, where, to support the stump, pillows are used, precautions should be taken to keep them dry by covering them with waterproof material of some kind. The draw-sheet.

18. PREVENTION OF SOME COMMON DISEASES.

229. Non-commissioned officers and men of the corps can do a great deal to prevent the outbreak of sickness, not only by strictly carrying out sanitary orders themselves, but by seeing that others do the same. It is clearly the duty of every non-commissioned officer and man in the corps to do all that he can to prevent an outbreak of disease.

230. *Enteric or Typhoid Fever.*—This is caused by a minute germ, called the *bacillus* of typhoid fever, which may be swallowed in contaminated water or food, or, perhaps, may be breathed in in contaminated air. The germs of the disease are discharged from the body of a fever patient in the stools and in the urine. When water or food becomes polluted with such stools or urine it is likely Enteric fever.

to convey the disease to any man who partakes of such water or food. Therefore every care must be taken only to drink water that is known to be pure ; or water that has been carefully sterilised as mentioned in Section II, § 43. Milk is liable to be contaminated, and if there is any doubt about its purity it should be boiled. Shellfish should be boiled before being eaten. Soda water and lemonade often convey the infection, and should be looked on with the same suspicion as water ; the water from which they are prepared should be boiled if there is any doubt about its purity. As the germs of the disease are contained in the stools and urine, it is necessary that these matters should be carefully disposed of, so as not to foul the ground or any water-supply (*see* Section II, § 42). If the stools or urine are spread about on the ground, they may get dried and turned into dust ; this will then be blown about, and may lodge on milk or other articles of food, and so spread the disease. Flies also spread typhoid fever by carrying the germs from latrines to cookhouses and settling on food, therefore flies should be kept out of kitchens or hospital wards, and should be got rid of as much as possible. They will only collect where refuse or foul matter is allowed to accumulate. Great care must be taken with the linen and bedding of typhoid patients, to prevent its being soiled, and if soiled, to remove it immediately to be disinfected. Enteric fever is sometimes spread from one man to another in a barrack room or hospital ward, probably through soiling of the bedding or clothing ; care must be taken to prevent this, especially as men often go about their duty for several days when they are suffering from the disease, but do not know what is the matter with them. When in camp the greatest care is required in dealing with the stools and urine of enteric patients : they must be disinfected either by boiling or burning, or by disinfectant solution, according to the orders that may be given. Orderlies must always carefully cleanse their hands after attending on typhoid patients, and they must never on any account take their meals, or eat any food at all, in the fever ward.

Cholera. **231.** *Cholera* is caused by a germ contained in the stools and vomit of patients suffering from the disease ; therefore these matters must be carefully and immediately disinfected according to orders. Infection is most often spread through contamination of water supplies. The chief preventive measures are : No water must be drunk that has not been boiled or sterilised ; aerated waters must not be drunk unless they are known to have been prepared from boiled or sterilised water ; all milk must be boiled. In addition, care must be taken not to eat any unripe fruit, or anything that will cause looseness of the bowels ; (2) the least tendency to diarrhœa should be checked ; (3) the abdomen should be protected against chill, and a flannel belt should be worn ; and lastly (4), when cholera is about, always take a little food before going out in the morning—a biscuit and a cup of coffee, for instance ; because the cholera germ is much more likely to cause the disease when a man has an empty stomach, than when he has some food inside him. Any kind of alcoholic drink is harmful.

Dysentery. **232.** *Dysentery* is caused by impure water, by bad food, and by exposure to chill. Attention to the purity of the water, to preven-

tion of contamination of food, to the proper care of latrines, to disinfection of the stools of dysenteric patients, and guarding against chill, especially chill to the abdomen (which may be prevented by wearing a flannel belt) are the chief measures of prevention.

Malaria.

233. *Malarial fever* is caused by a minute organism which enters the body by inoculation through the bite of certain kinds of mosquitoes. These insects, when they suck the blood of a person suffering from malaria, take in the organism that causes the disease and inoculate it into the blood of a healthy person whom they may bite afterwards. In order to prevent the spread of malaria, therefore, one must take care to (1) prevent mosquitoes biting any person suffering from fever and so sucking up the malarial parasite ; (2) guard against being bitten by mosquitoes as far as possible ; (3) exterminate mosquitoes as far as possible and prevent them from breeding. Fever patients should be protected by mosquito curtains or by punkahs, and should be looked upon as *infectious cases*. The best way to get rid of mosquitoes is to fill up the small puddles or pools in which they breed ; or if the pools are too large to be filled up or drained, apply kerosene oil or tar to the surface of the water.

Yellow fever.

234. The exact cause of *yellow fever* is not known, but it is probably a minute organism living in the blood, and it is certainly conveyed from the sick to the healthy by the bite of a particular kind of mosquito. The same measures of prevention should be taken as laid down for malarial fever ; filth and over-crowding are conditions that encourage the spread of yellow fever, therefore cleanliness of the person, of the clothing, and of the dwelling, and plenty of fresh air are means of protection. The stools and vomit of patients must be disinfected.

Plague.

235. *Plague* is caused by a germ, which is discharged from the body of a patient in the stools, urine, and sputa ; it enters the body by inoculation through any slight wound or scratch, also in the food by swallowing ; monkeys, rats, and other small animals are means of spreading the disease, as are fleas and other vermin. The chief protective measures to be taken are : To seal up all wounds and scratches, especially on the hands and feet ; to protect all food from contamination, and never to eat any in a ward where plague patients are lying ; to use disinfectants freely for all discharges from the patients ; to destroy rats, mice, and vermin generally ; and to secure cleanliness of person, clothing, and dwelling, with plenty of fresh air ; the plague germ flourishes in dark and dirty corners, and is destroyed by sunlight.

Tubercle.

236. *Tubercle* (consumption) is caused by the tubercle *bacillus*, which is contained in the expectoration of consumptive patients. The disease is chiefly spread through particles of this dried expectoration floating about in the air, and being breathed in by people who are liable to take the infection ; or the particles may lodge on milk or other kinds of food and so convey the disease. Cows are liable to tubercle, and milk from tuberculous cows can convey the poison to healthy children. The expectoration of patients must be received into proper spittoons containing disinfectant solution ; handkerchiefs used by patients should be well boiled

after use, or rags should be used instead, which can be burned. No food must be kept in the ward. Plenty of fresh air (without draught) must be allowed. Milk that is of suspicious quality should be boiled or sterilised. As the ill results of indiscriminate spitting are undoubted, this being in some cases a dangerous habit, and in all cases a dirty one, non-commissioned officers and men of the corps should show a good example, and not only abstain from spitting themselves, but discourage the habit in others to the best of their power.

SECTION II.—ROYAL ARMY MEDICAL CORPS DRILLS AND EXERCISES.

I.—GENERAL RULES FOR THE CARRIAGE STRETCHERS.

1. Position of Patient, &c.

The following rules are condensed from Surgeon-General Sir T. Longmore's "Treatise on Ambulances":— Consideration of the nature of injury.

(1) 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 such a position of the broken bones being injured during transport.

In wounds of the chest there is often a difficulty of 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 be vertical, his legs should be extended.

(2) 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. Adjustment of slings.

(3) 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. Carriage of the patient.

Carriage of stretcher.

(4) 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.

Necessity for practice.

It is an important matter for bearers to practise the carriage of stretchers, so as to acquire facility in keeping the stretcher level on uneven ground. Bearers trained and habituated to this duty perform it with ease and dexterity, irrespective of differences in their heights ; while those who have not practised it are not unlikely to cause considerable distress to the patient when they have to carry him up and down hill. A concerted action of the front and rear bearers is necessary, and each must be aware what part he is to perform according as the end of the stretcher at which he is placed is rendered higher or lower by the unevenness of the surface over which they are passing. This can best be acquired by practising the carriage of the stretcher up and down steps, or over uneven ground.

Passing a wall or fence.

No attempt will be made to carry a helpless patient over a high fence or wall, if it can possibly be avoided, as such is always a dangerous proceeding. A portion of the wall should be thrown down, or a breach in the fence made, so that the patient may be carried through on the stretcher ; or, if this be not practicable, the patient should be carried to a place where a gate or opening already exists, notwithstanding the distance to be traversed may be increased by the proceeding. It is better to do this than risk the safety of the patient.

Crossing a ditch

In crossing a ditch, the stretchers should be first laid on the ground near its edge. Nos. 1 and 2 then descend. The stretcher, with the patient upon it, is afterwards advanced, Nos. 1 and 2 in the ditch supporting the front end of the stretcher, while its other end rests on the edge of the ground above. While thus supported, Nos. 3 and 4 descend. All the Nos. now carry the stretcher to the opposite side, and the fore part is made to rest on the edge of the ground while the rear part is supported by Nos. 3 and 4 in the ditch, and Nos. 1 and 2 climb up. The stretcher is lifted forward on the ground above, and rests there while Nos. 3 and 4 climb up. The bearers then resume the carriage of the stretcher.

Stretcher not to be carried on shoulders.

On no account will bearers carry a stretcher on their shoulders, as it is necessary that one of them should have the patient in view. In the event, also, of the patient's falling from such a height, owing to one of the bearers tripping or being wounded, his injuries might be considerably aggravated.

II.—IMPROVISED STRETCHERS.

2. Varieties of Stretchers.

When field stretchers are not available, the wounded may be carried short distances by means of improvised stretchers. The principal of these is the *rifle stretcher*, formed of two rifles with fixed bayonets and a rug, by which four bearers can remove a patient in the recumbent posture.

The following is a very simple and excellent way of forming a rifle stretcher:—Spread a blanket on the ground; lay two rifles parallel to one another, each ten inches from the centre of the blanket, both muzzles pointing in the same direction, trigger guard outwards; turn a fold of the rug, six inches wide, over the ends of the butts; fold the right side of the rug over the rifle on that side to the rifle on the opposite side, then similarly fold the left side. A stretcher is thus formed, consisting of three folds of blanket, the end at which the butts are being the head end. It can be lifted and carried in the same manner as is laid down for carrying field stretchers when loading wagons.

A rifle, before being used as a stretcher pole, will invariably be inspected, and if found to be loaded the cartridge will be withdrawn, and the magazine emptied.

Improvised stretchers can also be made of lances, or other poles, bamboo, &c., with rugs, great-coats, cloaks, canvas, &c.

III.—STRETCHER DRILL.

I. GENERAL REGULATIONS.

3. Preliminary Instruction and Dress.

Men detailed for this drill must be well grounded in Infantry squad and company drill, and the principles of working in extended order. Knee-caps will be worn at all exercises in which the men require to kneel, and on the left knee except where otherwise ordered. Soldiers to act as "patients" will wear canvas suits to protect their clothing.

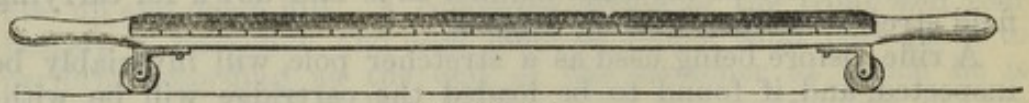
4. Description of Stretchers.

The regulation ambulance stretchers in use are those known as Mark I and Special Mark I.

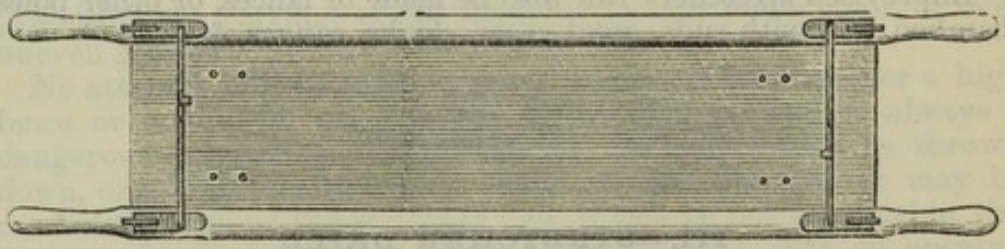
In these stretchers the canvas, which is tanned, is fastened to the poles by copper nails through an edging of leather; the poles are square and kept apart the required distance by two flat, wrought-iron jointed bars called *traverses*, and they are fitted with four *rackets* each carrying a three-inch gunmetal or wooden *roller*. A pillow and pair of shoulder slings are provided with each stretcher. The pillows are wedge-shaped, varying from three and a-half to one and a-half inches in thickness, and are kept in the ambulance wagon for use with the stretchers supplied with the wagon. There are eyelet holes in the canvas of the stretcher at both ends for the attachment of the pillow at either end by strings. The *sling*, which is either a broad leather strap, or, if of the latest pattern, a strip of tanned web, has at either end a loop, one of which is

furnished with a buckle by means of which the sling can be lengthened or shortened, and at the opposite end is a narrow *transverse strap* fixed at right angles, which is buckled round the stretcher when closed.

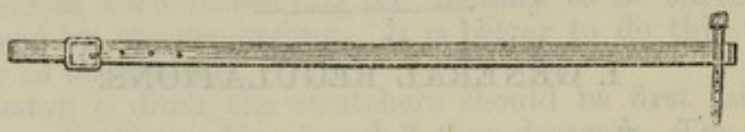
The ambulance stretcher, Special Mark I, is fitted with a hood for use in hot climates, and four handles, two on each side, so that it can be carried by six bearers. It is also provided with four shoulder pads. This stretcher is adapted for carrying a wounded man a long distance.



Side Elevation.



Plan (under).



Sling, with Transverse Strap.

FIG. 44.—AMBULANCE STRETCHER, MARK I.

The following are the dimensions and weight of the field stretcher :—

		ft.	ins.
Length	canvas	6	0
	pole	7	9
Width, total		1	11
Height		0	$5\frac{7}{8}$
Weight		34 lbs.	
Tonnage		·08 tons.	

5. FORMATION OF A COMPANY FOR STRETCHER DRILL.

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

The company will be sized, formed, and numbered as in Infantry (ceremonial) Drill.

COMPANY—FORM FOURS. } As in Infantry Drill.

Each section of four forms a stretcher *squad.*

Four squads form a stretcher *section.*

FIRST RANK. No. 1 BEARERS—STAND AT EASE.
SECOND RANK. No. 2 BEARERS—STAND AT EASE.
THIRD RANK. No. 3 BEARERS—STAND AT EASE.
FOURTH RANK. No. 4 BEARERS—STAND AT EASE.
} The bearers will thus be proved

COMPANY—ATTENTION. As usual.

NUMBER THE SQUADS. On the word SQUADS the Nos. 1 number from right to left.

No. 4, 8, 12, 16, &c. On the number being called the Nos. 1 of the named squads raise the left hand level with the elbow.

LEFT OF SECTIONS. On the word SECTIONS the hands are dropped smartly to the side.

Section Commanders will now be posted.

Commanders of outer sections will be on the flanks of the first rank.

TELL OFF THE COMPANY. On the word COMPANY, the section commanders number.

No. 1, 2, &c., SECTION—STAND AT EASE. } The sections will thus be proved.

COMPANY—ATTENTION. As usual.

NOS. 3—LEFT (OR RIGHT) TURN. The Nos. 3 turn to the flank named.

ON STRETCHERS—QUICK MARCH. On the word MARCH the commander of the section on the flank named leads the Nos. 3 by the nearest route to the stretchers; each bearer in turn, while marching, grasps and raises the near handles of a stretcher, turning the rollers to the front, places the stretcher against the right shoulder, stoops, grasps the lower rackets with the right hand, and rising to the erect position brings the stretcher to the *slope*.

Mark Time in Front. The section commander will give the command *Mark Time in Front* as soon as the leading bearer has gained sufficient ground to allow the last bearer to reach the stretchers, when he will give the command *About turn—Forward* and marches the bearers back to their places, when he will give the commands *Halt—Left (or right) turn—Lower Stretchers.*

About turn.
Forward.
Halt.
Left (or right) Turn.
Lower Stretchers.

On the word *Stretchers* the stretchers will be placed on the ground, the lower ends being passed to the front, rollers to the right of the company.

No. 4 Bearers will now be warned that they will be in command of their respective squads whenever these are acting independently.

STAND TO STRETCHERS. — On the word STRETCHERS, the Nos. 1 place themselves with their toes in line with the front end of the poles, Nos. 3 with their heels in line with the rear end of the poles, Nos. 2 placing themselves at the centre of the poles; all three touch the stretcher with the right foot. The Nos. 4 are one pace in rear of and covering Nos. 3. (See Fig. 45.)

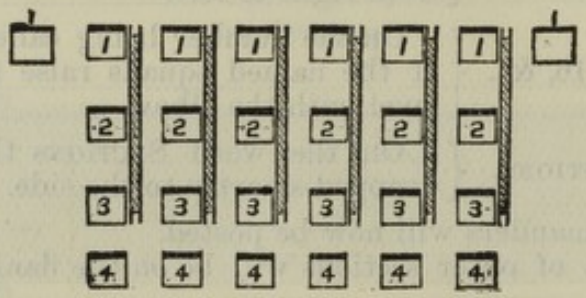


FIG. 45.—STAND TO STRETCHERS.
No. 2 in position at centre of stretcher.

LIFT STRETCHERS. — On the word STRETCHERS the Nos. 1 and 3 stoop, grasp both handles of the poles with the right hand, and rise smartly together, holding the stretcher at the full extent of the arm, rollers to the right of the company.

The Nos. 1 take up their own dressing by the right, the other bearers will cover and correct their distance.

LOWER STRETCHERS. — On the word STRETCHERS, the Nos. 1 and 3 stoop, place the stretchers on the ground, and rise smartly together.

6. DISMISSING.

LOWER STRETCHERS. BY THE RIGHT—QUICK MARCH. — The company is marched clear of the stretchers.

COMPANY—HALT. REFORM TWO DEEP. STAND EASY. — As usual.

REMOVE KNEE-CAPS. — Knee-caps are taken off and collected.

COMPANY—ATTENTION. DISMISS. — The company will break off as in Infantry Drill.

II. EXERCISES WITH CLOSED STRETCHERS.

7. Marching.

Lift Stretchers.	As before detailed.
By the right (or left)— Quick March.	The Company will advance.
The Company will Retire. About Turn.	In turning about, the stretcher will be passed from one hand to the other by the Nos. 1 and 3.

8. Changing Stretchers.

Change Stretchers.	If the company is advancing, on the word Stretchers 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 in front of them from one hand to the other, the Nos. 2 moving diagonally to their places. If the company is retiring the Nos. 1 act as above described for Nos. 3, and the Nos. 3 as for Nos. 1. Nos. 4 in each case continue in their respective positions.

The stretcher must be in the right hand when the command About Turn is given.

9. 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, and the Nos. 2, 3, and 4 a partial turn in the opposite direction.
Quick March.	On the word March, the No. 1 of the inner flank stands fast, the remainder step off and glancing to the right (or left) move by the shortest line to their places in the new alignment, halt, and take up their dressing independently.

When it is intended to move forward in the new direction after forming, the words *At the halt* will be omitted, the men will mark time when formed, and the word *Forward* will follow.

10. Moving to a Flank.

Where it is necessary to make a quick movement to either flank for a short distance only, the command *Right* (or *Left*) *Turn* will be 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 hand while turning about, resuming the grasp with the right hand after the turn has been completed.

11. Forming Column of Sections.

A company marching in line may move to a flank by sections The ordinary marching formation will be column of sections.

These "movements" are carried out as in Infantry Drill, except that in forming column of sections from the right the "remainder" will mark time four paces instead of two.

12. Extending.

From the right (left, or No. — squad) to four paces Extend.

On the march.—When a company on the march is ordered to extend, the squad named will continue to move on, stepping short; the remainder making a partial turn outwards, moving to their places in quick time, and then stepping short. As each squad disengages the Nos. 4 place themselves on the right side of the centre of their respective stretchers. When the extension is completed, on the word *Forward* the whole will advance.

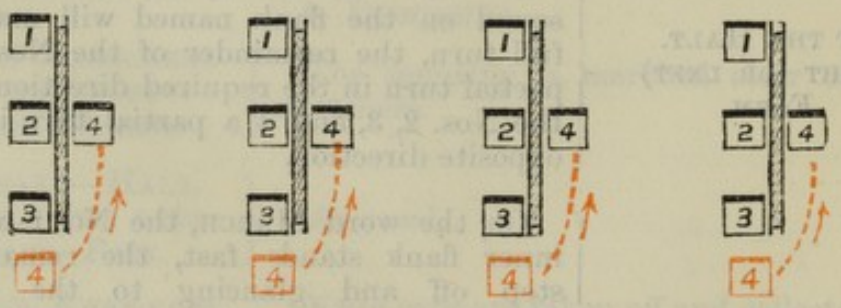


Fig. 46.—Positions in Extended Order

13. Closing.

On the right (left, or No.—Squad) close. — *On the march*, the named squad will continue to move on, stepping short; the remainder will make a half turn towards it and close in quick time, turning to the front and stepping short as they reach their places, the Nos. 4 resuming their places in rear of Nos. 3. When the closing is completed, on the word *Forward* the whole will advance.

III. EXERCISES WITH PREPARED STRETCHERS.

14. Preparing and Closing Stretchers.

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

Prepare Stretchers. — Nos. 4 take two side paces to the right, Nos. 1 and 3 turn to the right, kneel on the left knee, unbuckle the transverse straps, separate the poles and straighten the traverses. Each taking a sling, doubles it on itself, dressed side of the leather outwards, 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, working by the right.

Close Stretchers. — Nos. 1 and 3 turn to the right, kneel on the left knee, remove the slings and place them on the ground, push in the traverses, raise the canvas, approximate the poles, rise, lifting the stretcher, face one another, place the handles of the poles between their thighs, rollers to the right of the company, and roll the canvas tightly round the poles to the right. 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 rackets. Grasping both handles in their right hands, back of the hand to the right, they turn to the right of the company in a slightly stooping position, rise and turn to the left together, the Nos. 4 taking two paces to the left.

15. Changing the Numbers.

In order to instruct each man in a squad, the numbers must be changed. This can be done by the following method, when the men are standing to stretchers in extended order.

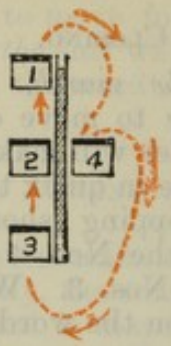


FIG. 47.—CHANGE NUMBERS.
Each bearer moves to the next place.

CHANGE NUMBERS. Nos. 4 turn about, and the whole step off, the Nos. 1 and 4 wheeling round by the foot and head of the stretcher respectively. Each man halts in the position of the bearer whose place he has taken. The new Nos. 4 turn about together.

16. LIFTING AND LOWERING STRETCHERS.

To facilitate instruction this should first be taught by numbers and afterwards judging the time.

LIFT 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, take a side pace to the right between the handles of the poles and place the sling over the shoulders, dividing it equally, buckle on the right.

Two. On the word *Two* stoop, slip the loops over the poles, 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.

ADJUST SLINGS. Nos. 2 take two paces to the front, the Nos. 2 and 4 turn about together (the Nos. 4 turning away from the stretcher) and Nos. 4 step forward one pace. They adjust the slings over the shoulders of Nos. 1 and 3, taking care that they lie below the collar of the frock behind, and in the hollow of the shoulders in front, and, if necessary, regulate the length of the slings by means of the buckles. Nos. 2 take two paces to the rear, Nos. 2 and 4 turn about together, and Nos. 4 step up one pace.

LOWER 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, double them as before described, and hold them at their centre between the forefinger and thumb of the right hand, buckle to the front, hand close to the side.
Two.	On the word *Two* they stand to stretchers, stoop, place the sling on the poles as in preparing stretchers and rise together.

17. MOVEMENTS.

The directing squad will be named.

NO. — SQUAD WILL DIRECT— ADVANCE.	Nos. 1, 2, and 4 step off with the left foot, No. 3 with the right, stepping short, knees bent, feet raised as little as possible. The Instructor will see that the squad of direction marches straight on the point given, takes the correct pace, both as regards length and cadence, and that the remainder preserve their interval and alignment.
RETIRE.	Each squad will move round on the circumference of a circle of which its No. 3 is the centre. No. 3 will mark time, turn gradually in the direction named, and 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.
HALT.	The whole halt.

18.—MOVING TO A FLANK.

RIGHT (OR LEFT) INCLINE.	Each squad will move round on the circumference of a circle, of which its No. 3 is the centre, one-eighth to the right (or left). No. 3 will mark time, turn gradually in the direction named and the whole will move forward when facing in the new direction.

If the INCLINE is repeated the squads will be in "column" of squads, moving direct to the flank indicated with an interval of one pace between them.

19.—LOADING AND UNLOADING STRETCHERS.

A party of orderly men to act as "patients," proportionate to the number of stretcher squads, will be marched in front of the company, extended to four paces, and directed to lie down with their heads towards the company.

TAKE POST—ADVANCE. Each stretcher squad moves off by the nearest way towards its corresponding "patient," the No. 4 placing himself on the right of the centre of his stretcher as the squad disengages. Each squad halts when the No. 1 arrives one pace from the "patient's" head, Nos. 2 and 3 covering correctly in a line with the "patient." (See Fig. 48.)

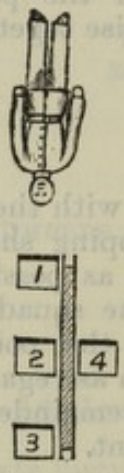


FIG. 48.—TAKE POST—ADVANCE.
The Squad has advanced and halted in position for loading.

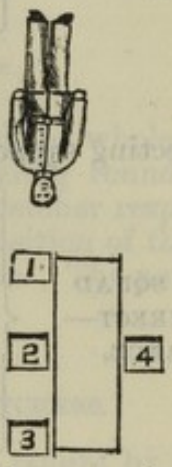


FIG. 49.—PREPARE STRETCHERS.

LOWER STRETCHERS. As before detailed.

PREPARE STRETCHERS. As before detailed. (See Fig. 49.)

FOR LOADING—PREPARE. Nos. 1, 2, and 3 advance to the left side of the "patient," Nos. 4 to his right, Nos. 1 halting opposite the knees, Nos. 2 and 4 opposite the hips, and Nos. 3 opposite the shoulders (See Fig. 50.) The whole then turn inwards together

FIG. 50.—FOR LOADING—PREPARE.
The bearers march direct to the wounded.

Two. On the word *Two*, kneel on the left knee and take hold of the "patient," No. 1 passing his hands and forearms beneath the "patient's" legs, hands wide apart. Nos. 2 and 4 pass their hands and forearms beneath the "patient's" hips and loins, No. 3 passes his left hand across the "patient" and under his right shoulder, the right hand beneath the left shoulder of the "patient."

LIFT. On the word LIFT, all slowly lift the "patient" off the ground and rest him on the knees of 1, 2, and 3, No. 4 disengages, doubles to the centre of the stretcher, grasps a pole in each hand, left hand across, lifts the stretcher and places it directly beneath the "patient," kneels on the left knee and again assists in supporting the "patient."

LOWER. The "patient" is lowered slowly and gently on to the centre of the canvas, the bearers disengage, stand up and Nos. 1, 2, and 3 turn to the left, and No. 4 to the right, No. 1 stepping forward and No. 3 stepping back to place themselves opposite the handles of the stretcher.

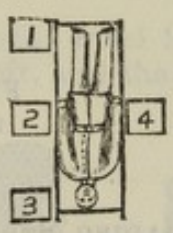


FIG. 51.—LOWER.
Bearers turn to front after rising.

FOR UNLOADING—PREPARE. The whole turn inwards together, No. 1 placing himself opposite the knees, and No. 3 opposite the shoulders of the "patient"; they kneel on the left knee and take hold of the "patient" as described for loading.

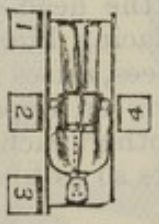


FIG. 52.—FOR UNLOADING—PREPARE.
Bearers turn inwards.

LIFT. On the word LIFT, the "patient" is lifted and supported as before. No. 4 grasps the stretcher as described, and lifting it clear of the "patient," carries it forward, placing it on the ground one pace clear of the "patient's" feet. He then rejoins his squad and resumes the support of the "patient."

LOWER. The "patient" is gently lowered to the ground, the bearers disengage, stand up, turn to their front and march straight forward to their position at the stretcher, where they halt.

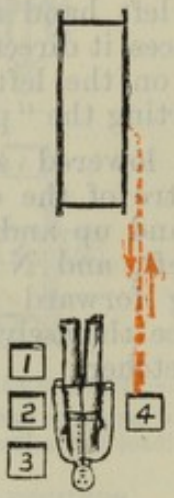


FIG. 53.—LOWER.
Bearers turn to front after rising.

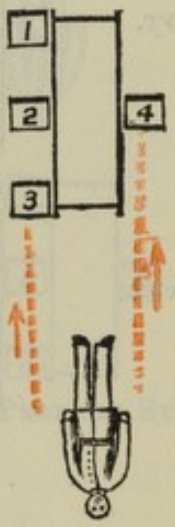


FIG. 54.—LOWER—(*continued*).
Bearers march straight to positions on the stretcher.

20. LOADING AND UNLOADING STRETCHERS WITH REDUCED NUMBERS.

With Three Bearers.

(1) In the event of there being only three bearers available, the stretcher will be placed at the "patient's" head, and in the same line as his body. The bearers will then lift the "patient," rise to the erect position, carry him head foremost over the foot of the stretcher, the horizontal position of his body being maintained throughout the movement, and then lay him in a suitable position on the canvas. When unloading, the "patient" will be lifted and carried head foremost over the head of the stretcher. To lift the "patient":—one bearer, placing himself on the injured side in a line with the "patient's" knees, raises and supports the lower limbs, while the other two, kneeling on opposite sides of the "patient" near his hips, facing each other, each pass an arm under his back and thighs, lock their fingers so as to secure a firm grasp, and raise and support the trunk.

With Two Bearers.

(2) When only two bearers are available, the stretcher will similarly be placed at the "patient's" head, and in the same line as

his body. The bearers will then lift the "patient," rise to the erect position, carry him, in loading, head foremost over the foot of the stretcher, and in unloading, head foremost over the head. The method of lifting will vary according to whether the lower limbs are severely injured or not. (*a*) With a severe injury of one of the lower limbs, both bearers place themselves on the injured side; the one in a line with the "patient's" knees must raise and support the lower limbs, the one near the "patient's" hips, the body; assisted by the "patient" himself as far as possible, the horizontal position of the "patient's" body being maintained throughout the movement. (*b*) With the lower limbs intact, or only slightly injured, the "patient" may be lifted by one of the improvised seats described in the next section, provided there are no symptoms of shock present; in the latter case, method (*a*) must be resorted to.

IV.—HAND SEAT DRILL.

21. Formation of Hand Seats.

The company will be drawn up in double rank and numbered; odd numbers right files, even numbers left files.

Form Two-handed Seats. { On the word Seats, the right files turn to the left, and the left files turn to the right

Fig. 55.—Two-handed Seat.

Two. — On the word *Two*, each even No. locks the fingers of his left hand with the fingers of the right hand of the odd No. facing him, palms uppermost, and each places the disengaged hand upon the other's hip.

FILES RIGHT AND LEFT—TURN. — The files resume the position of attention and turn in the original direction.

FIG. 56.—THREE-HANDED SEAT.

FORM THREE-HANDED SEATS. — As in two-handed seats.

Two. — On the word *Two*, each odd No. grasps his own left forearm. Each even No. grasps the right forearm of the odd No. with his left hand, and the odd No. the left forearm of the even No. with his left hand, the even No. placing his right hand on the left shoulder of the odd No.

FILES RIGHT AND LEFT—TURN. — As before.

FORM FOUR-HANDED SEATS. — As in two-handed seats.

Two. — On the word *Two*, both bearers grasp their own left wrists with their right hands, and each other's right wrists with their left hands. Backs of the hands uppermost.

FILES RIGHT AND LEFT—TURN. — As before.

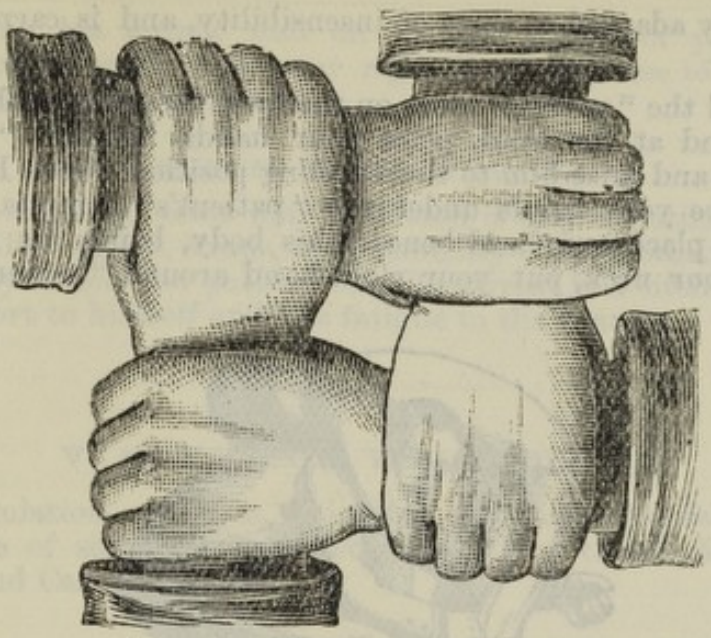


Fig. 57.—Four-handed Seat.

Further instruction in the use of two-handed seats may be found under cacolet drill. Three and four-handed seats are seldom useful.

22. Method by which a Helpless "Patient" may be Carried by One Bearer.

In certain emergencies it may be necessary for a bearer to carry a helpless "patient" unaided; this may be accomplished either by "pick-back," or by means of the "fireman's lift." The latter

Fig. 58.

is specially adapted to cases of insensibility, and is carried out as follows :—

(1) Roll the "patient" over on the face, the arms to the side.

(2) Stand at the head, place your hands beneath "patient's" shoulders and raise him to the kneeling position. (See Fig. 58.)

(3) Place your hands under the "patient's" armpits, raise him up, stoop, place your head beneath his body, bring his right arm around your neck, put your right hand around "patient's" right

Fig. 59.

Fig. 60.

thigh, bring his weight well on to the centre of your back, grasp his right wrist with your right hand, and rise to the erect position. (See Figs. 59 and 60.)

23. Varieties of Improvised Seats.

Besides the hand seats here described it may sometimes be possible to utilize canvas, straps, a conveniently-shaped board, or other material by which the patient may be carried in a sitting posture with comfort to himself and less fatigue to the bearers.

V. AMBULANCE WAGON DRILL.

The regulation carriages, which are designed expressly for the conveyance of sick and wounded troops, are called Ambulance Wagons and Carts.

24. Description of Ambulance Wagons and Ambulance Cart.

The two latest patterns of Ambulance Wagons, in use in the Service at the present time, are Mark III and Mark V.

Mark III Ambulance Wagon.

This wagon affords accommodation for six wounded persons, two lying on field stretchers on the floor of the wagon, two seated in

Fig. 61.—Ambulance Wagon (Mark III).

front and two in rear. There is room on the back seat also for the wagon orderly. The front seat is reached by a ladder, and the hind seat by a step attached to the tailboard.

The wagon consists generally of a wood framed body, a roof, and a forecarriage (to lock under) mounted upon steel springs. It is provided with a cover, curtains and hood of canvas, extended on a skeleton framed roof attached to and supported by six galvanised tubular standards fitting into sockets in the wagon sides. A corn locker and a water tank are carried under the body. The locker is accessible from two openings with lids formed in the bottom of the body, and will contain three bushels ; the tank is fitted with a leather funnel and tube, and will contain nine and a half gallons : a movable box is carried on each side, one for wine, the other for tools, small stores, &c. The interior of the wagon is divided by a longitudinal partition. Accoutrements, &c., are carried at the head and foot of each stretcher. Straps are fixed to the centre of the roof, to carry the pillows belonging to the stretchers, and to the front and hind standards, to admit of four closed field stretchers being carried two on each side of the wagon. There are loops at the bottom of the wagon, under each stretcher, for securing rifles. The weight of this wagon complete is 17 cwt. 2 qrs. 6 lbs. Its tonnage for shipment is 8·292 tons, and the rectangular space occupied in boats is 11·66 × 6·25 × 9·083 feet. The driver occupies a seat on the box.

Mark V Ambulance Wagon.

This wagon is constructed to accommodate twelve men seated, or two men on stretchers and four seated.

It is fitted with a perch, and a "Jacob's" lock fore-carriage, which reduces the strain on the body in travelling, and admits of large front wheels being used, so as to minimise the pull on the horses. It is also fitted with a pole and swingletrees for long-rein driving.

The front part of the wagon body is partitioned off, and provided with seats to accommodate two men. Entrance to this part gained from the front of the wagon, over the driver's seat, the back rail of which can be folded up out of the way. The remaining part of the body is fitted with seats along the sides, arranged to fold upwards when not in use, to make room for two stretchers. A sliding step to the back of the wagon, which, when not in use, can be raised and pushed close up to the tail-board in guides fixed along the bottom for that purpose. The sides are fitted with ventilators, staples for the bale hoops, and standards for the back rail. 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. Sockets are fixed to the sides for supporting the lamp brackets.

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 facilitate lifting it into position when required.

The splinter bar is arranged to allow a vertical play to the pole ; and spiral "draw springs," through which the loops for the swingletrees pass, are fixed at the rear of the bar. These are intended to ease the strain of draught upon the horses, particularly at starting.

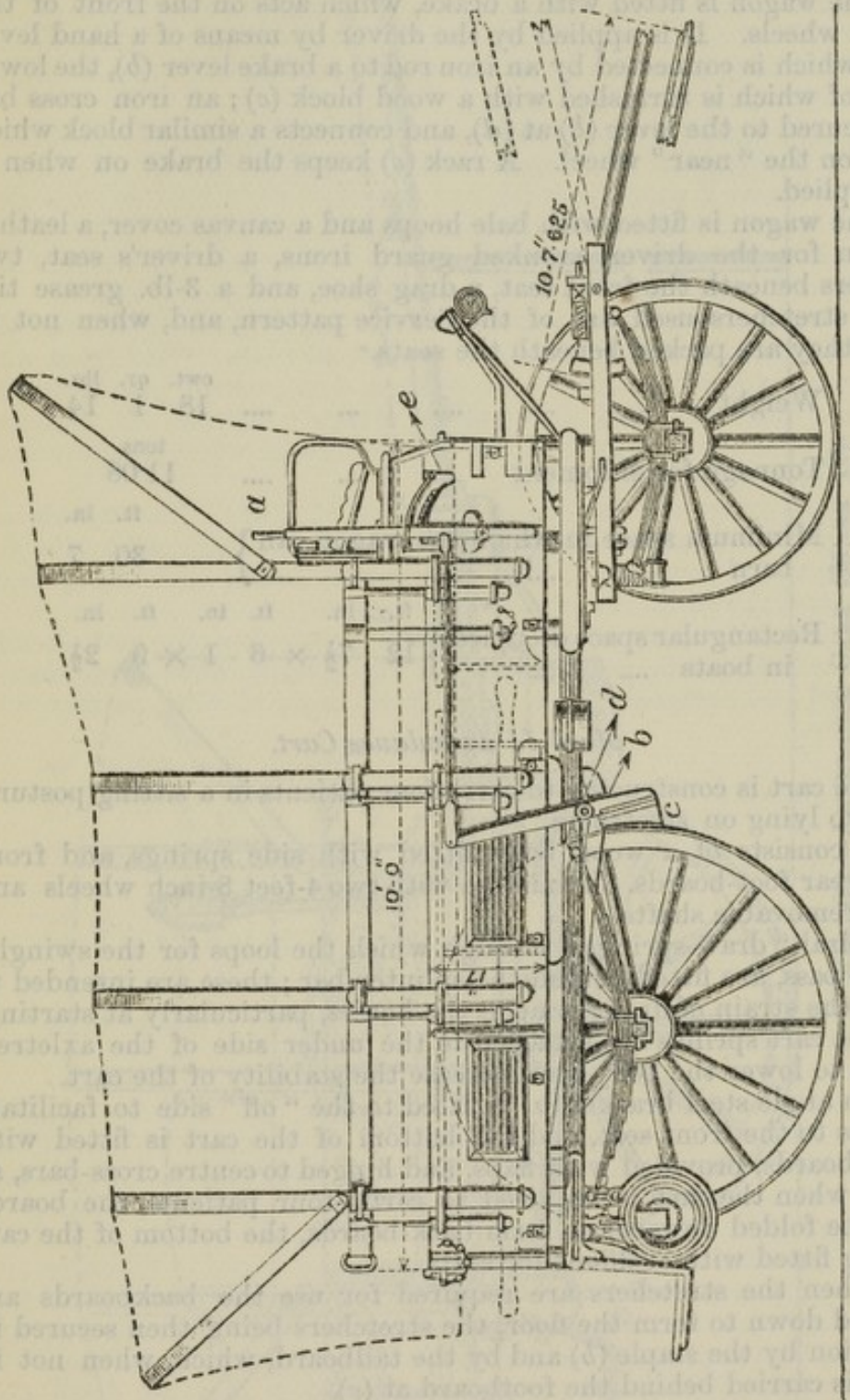


FIG. 62.—AMBULANCE WAGON (MARK V).

The wheels have wooden naves and phosphor-bronze pipes.

The fore wheels are 3 feet 9 inches diameter, the hind 4 feet 8 inches. The tires are $2\frac{1}{2}$ inches wide.

The wagon is fitted with a brake, which acts on the front of the hind wheels. It is applied by the driver by means of a hand lever (*a*), which is connected by an iron rod to a brake lever (*b*), the lower end of which is furnished with a wood block (*c*); an iron cross bar is secured to the lever (*b*) at (*d*), and connects a similar block which acts on the "near" wheel. A rack (*e*) keeps the brake on when it is applied.

The wagon is fitted with bale hoops and a canvas cover, a leather apron for the driver, cranked guard irons, a driver's seat, two lockers beneath the front seat, a drag shoe, and a 3-lb. grease tin. The stretchers used are of the Service pattern, and, when not in use, they are packed beneath the seats.

	cwt.	qr.	lbs.
Weight	18	1	14

	tons.
Tonnage for shipment	11·08

	ft.	in.
Minimum space in which the wagon can turn	30	7

	ft.	in.		ft.	in.		ft.	in.
Rectangular space occupied in boats	12	$7\frac{1}{2}$	×	6	1	×	9	$2\frac{1}{2}$

Mark II Ambulance Cart.

The cart is constructed to carry four patients in a sitting posture, or two lying on stretchers.

It consists of a wood body fitted with side springs, and front and rear foot-boards, an axletree with two 4-feet 8-inch wheels and two removable shafts.

Spiral "draw-springs," through which the loops for the swingle-trees pass, are fitted behind the splinter-bar; these are intended to ease the strain of draught upon the horses, particularly at starting.

The cart springs are attached to the under side of the axletree, so as to lower the body and increase the stability of the cart.

An angle steel bracket (*a*) is fitted to the "off" side to facilitate access to the front seat, and the bottom of the cart is fitted with two boards, provided with flaps, and hinged to centre cross-bars, so that when the cart is required to carry four patients, the boards can be folded upwards to form back-boards, the bottom of the cart being fitted with cushions for seats.

When the stretchers are required for use the backboards are folded down to form the floor, the stretchers being then secured in position by the staple (*b*) and by the tailboard, which, when not in use, is carried behind the footboard at (*c*).

A removable wooden partition is placed between the stretchers to divide the patients. When not in use the partition and stretchers are strapped to the bale hoops at (*d*), and the stretcher pillows to the top of the centre bale hoops. The sides of the cart are furnished with iron handles (*e*) for leather breast straps, steel staples for the

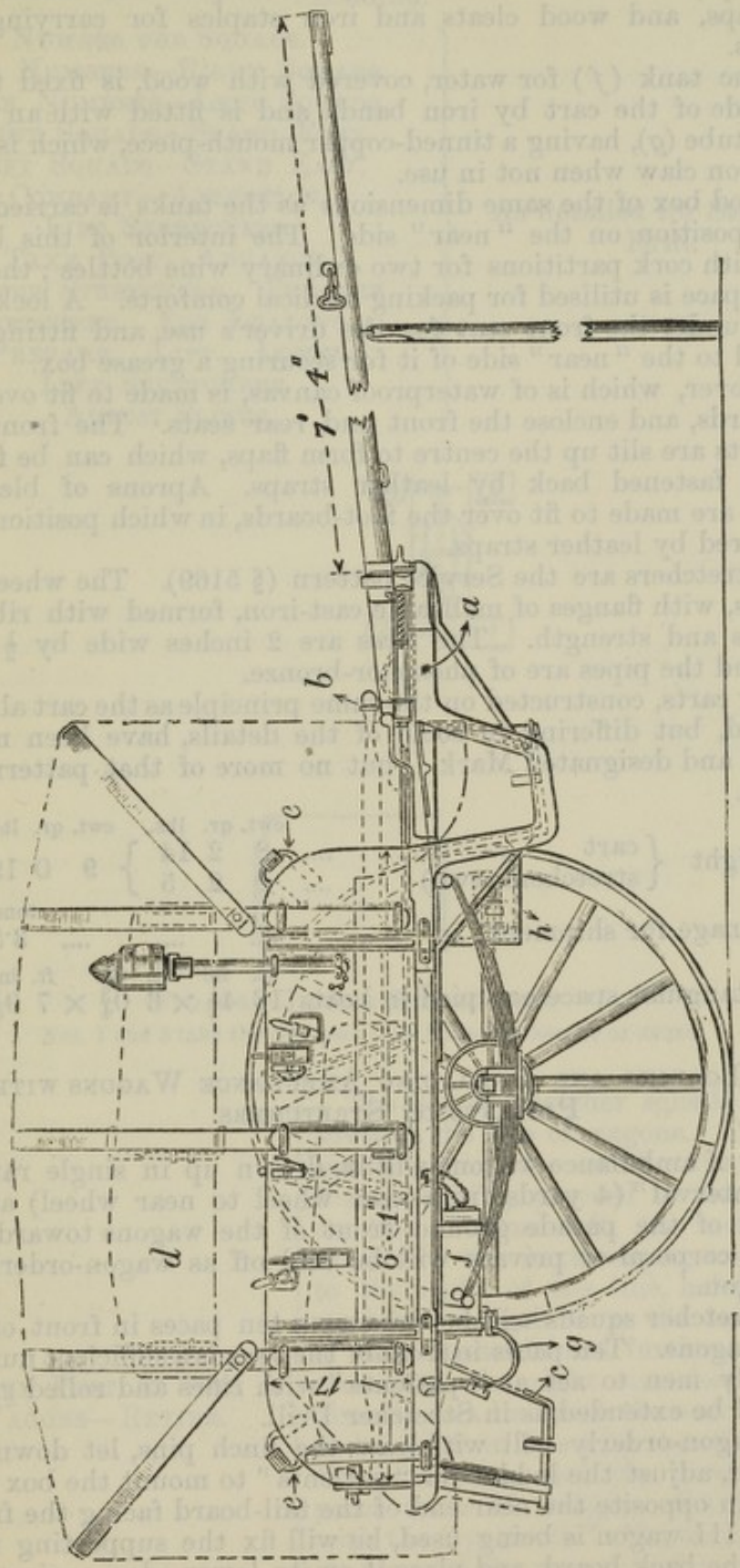


FIG. 63.—AMBULANCE CART (MARK II).

bale hoops, iron hooks for the cover, iron staples and brackets for the lamps, and wood cleats and iron staples for carrying two carbines.

A zinc tank (*f*) for water, covered with wood, is fixed to the "off" side of the cart by iron bands, and is fitted with an india-rubber tube (*g*), having a tinned-copper mouth-piece, which is hung on an iron claw when not in use.

A wood box of the same dimensions as the tanks is carried in a similar position on the "near" side The interior of this box is fitted with cork partitions for two ordinary wine bottles ; the rest of the space is utilised for packing medical comforts. A locker (*h*) is fixed under the front seat for the driver's use, and fittings are attached to the "near" side of it for securing a grease box.

The cover, which is of waterproof canvas, is made to fit over the foot-boards, and enclose the front and rear seats. The front and rear parts are slit up the centre to form flaps, which can be folded up, and fastened back by leather straps. Aprons of bleached "duck" are made to fit over the foot-boards, in which position they are secured by leather straps.

The stretchers are the Service pattern (§ 5169). The wheels are 3rd class, with flanges of malleable cast-iron, formed with ribs for lightness and strength. The tires are 2 inches wide by $\frac{1}{2}$ inch thick, and the pipes are of phosphor-bronze.

A few carts, constructed on the same principle as the cart already described, but differing in some of the details, have been manufactured and designated Mark I, but no more of that pattern will be made.

		cwt.	qr.	lbs.	cwt.	qr.	lbs.
Weight	cart	8	2	14	9	0	19
	stretchers (two)	0	2	5			
							tons.
Tonnage for shipment		....		....	....		3·5
		ft.	in.		ft.	in.	
Rectangular space occupied in boats		16	$4\frac{1}{2}$	× 6	$0\frac{3}{4}$ × 7		$9\frac{1}{4}$

25. Loading and Unloading Ambulance Wagons with Patients on Stretchers.

A line of ambulance wagons will be drawn up in single rank at "close interval" (4 yards from near wheel to near wheel) at the rear end of the parade ground, front of the wagons towards the rear. A corporal or private will be told off as wagon-orderly to each wagon.

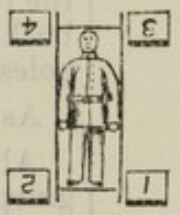
The stretcher squads will be drawn up ten paces in front of the line of wagons. Ten paces in front of the squads a sufficient number of orderly men to act as "patients" with rifles and rolled great-coats will be extended as in Stretcher Drill.

The wagon-orderly will withdraw the linch pins, let down the tail-board, adjust the ladder for "patients" to mount the box seat, and fall in opposite the near end of the tail-board facing the front. If Mark III wagon is being used, he will fix the supporting rods, remove the back board, and place it on its lower edge against the near hind wheel

Loading.

NUMBER THE SQUADS.
ODD NUMBERS—RIGHT SQUADS.
EVEN NUMBERS—LEFT SQUADS.
RIGHT SQUADS—STAND EASY.
LEFT SQUADS—STAND EASY.
COMPANY—ATTENTION.
LIFT STRETCHERS.
TAKE POST—ADVANCE.
LOWER STRETCHERS. PREPARE STRETCHERS. FOR LOADING—PREPARE. LIFT. LOWER.
LIFT STRETCHERS.
ADJUST SLINGS.

} As detailed for Stretcher Drill.



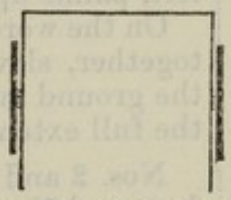


FIG. 64.—LOWER STRETCHERS.
Nos. 1 and 3 take the side pace over Stretcher handle as usual.

TAKE POST AT THE WAGONS—RETIRE.

The line of stretcher squads retires towards the line of wagons. The two squads which are on the left, as the line is retiring, proceed to the wagon on the extreme left, the next two squads to the next wagon, and so on to the right of the line, halting one stretcher's length from the tail-board of the wagon without further word of command, the right stretcher squads directly in a line with the near wheels, and the left in line with the off wheels. While retiring, each No. 2, when ten paces from his wagon, doubles out with the "patient's" rifle, secures it in its place in the wagon, and rejoins his squad, placing himself on the right of

	his No. 1. As No. 2 doubles out, the No. 4 marks time, two paces, and places himself on the right of No. 3.
LOWER STRETCHERS.	As usual.
FIX SLINGS.	Nos. 1 and 3 turn to the right, kneel on the left knee, and arrange the slings on the handles of the poles as follows :—Pass the loop of the buckle end, dressed side of the leather 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 the pole, between the racket and traverse, and fasten the buckle outside the sling between the poles, and stand to stretchers.
STAND EASY.	As usual.
LEFT SQUADS—ATTENTION. FOR LOADING—LIFT STRETCHERS.	All turn inwards together, stoop and grasp the stretcher poles, Nos. 1 and 4, the handles with their left hands, and the centre of the poles with the right. Nos. 2 and 3, the handles with their right hands, and the centre with their left, palms uppermost.
Two	On the word *Two*, the bearers, acting together, slowly lift the stretcher off the ground and stand up, holding it at the full extent of the arms.
LOAD.	Nos. 2 and 4 step off with the right foot, and Nos. 1 and 3 with the left, halting, without further word of command, one pace from the floor of the off compartment.
Two.	On the word *Two*, the stretcher is raised on a level with the floor, and the front pair of rollers rested on it. Nos. 1 and 2 stand by, allowing the stretcher to be passed through their hands by the Nos. 3 and 4, who give it the proper direction and gently push it home. The bearers then fall in one pace from, and facing the wagon, the Nos. 1 on the left, Nos. 4 on the right, and Nos. 2 and 3 between them.
LEFT TURN. LEFT WHEEL. QUICK—MARCH. HALT. STAND EASY.	The order to HALT is given when clear of the right squads.

RIGHT SQUADS—ATTENTION. FOR LOADING, &c. &c.	The right squads will now be ordered to load the near compartments, and when this is done the wagon orderlies replace the backboards and ladders, and seat themselves on the back seat of their respective wagons.
COMPANY—ATTENTION. ADVANCE.	The company moves off, the squads opening out to their proper interval as they advance.
HALT.	The order to HALT is given when the squads are in the position from which they retired.

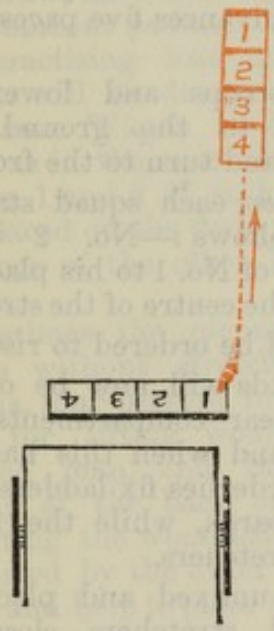


FIG. 65.

Bearers shown, having fallen in after loading and marched to front.

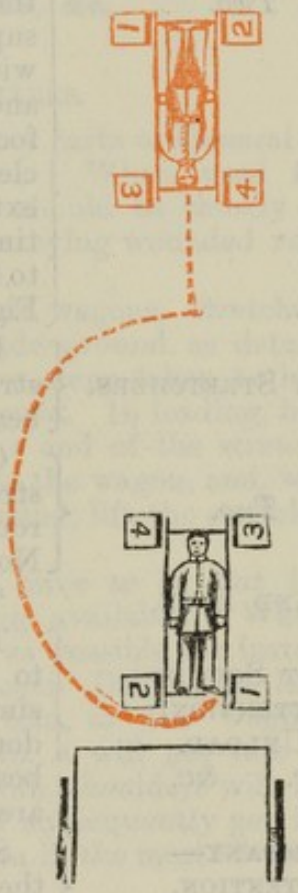


FIG. 66.

Unloading.

TAKE POST AT THE WAGONS. RETIRE.	Each squad, wheeling by the right, retires on the line of wagons as before detailed, except that Nos. 2 remain with their squads. Wagon orderlies prepare wagons as for loading.
STAND EASY.	As usual.

LEFT SQUADS. ATTENTION. UNLOAD.	Nos. 2 and 4 bearers take a side pace of 27 inches to the right and one of 30 inches to the front, aligning themselves with Nos. 1 and 3.
Two.	On the word *Two*, each squad steps forward three paces, the Nos. 3 and 4 pass up between the Nos. 1 and 2, the latter closing outwards, stand by to support the stretcher as it is withdrawn; the Nos. 3 and 4 now take hold of the handles nearest to them, the Nos. 3 with the right the Nos. 4 with the left hand; withdraw the stretcher till the rollers at the foot end rest on the edge of the floor, supporting it at the centre of the poles with the disengaged hands; the Nos. 1 and 2 now take hold of the handles at the foot end, and the whole lift the stretcher clear of the wagon and lower it to the full extent of the arms. Each squad taking time from the right wheels (by the right) to the front and advances five paces. (See Fig. 66.)
LOWER STRETCHERS.	Each squad stoops and lowers the stretcher gently to the ground; the bearers stand up and turn to the front.
Two.	On the word *Two*, each squad stands to stretchers as follows:—No. 2 wheels round by the left of No. 1 to his place, and No. 4 steps up to the centre of the stretcher.
STAND EASY.	"Patients" will be ordered to rise.
RIGHT SQUADS— ATTENTION. UNLOAD. &c. &c.	The right squads will now be ordered to unload the near compartments in a similar manner, and when this has been done the wagon orderlies fix ladders, backboards and tailboards, while the squads are standing to stretchers.
COMPANY— ATTENTION. CLOSE STRETCHERS.	Slings will be unfixed and placed on the ground, and stretchers closed, as before detailed.
BY NO. — SQUAD, QUICK MARCH, ON THE RIGHT (LEFT, OR NO. — SQUAD) — CLOSE. BY THE RIGHT — QUICK MARCH. HALT. LOWER STRETCHERS. &c.	As detailed in Stretcher Drill.

Ambulance carts will be *Loaded* and *Unloaded* on similar principles.

Loading and Unloading Ambulance Wagons and Carts with Patients able to sit up.

After the men have been thoroughly instructed in the preceding exercise, they will be taught to assist into the front and back seats, patients supposed to be able to sit up. Practice will be given in lowering the ladder and in lashing it up again, and in putting away articles of equipment, rifles, &c., in the various positions assigned to them in the wagon or cart.

VI.—DRILL WITH COUNTRY CARTS, GENERAL SERVICE WAGONS, &c.

26. General Remarks.

It may be necessary to employ country carts or General Service wagons for the transport of wounded. When used for this purpose the floors of such conveyances should be thickly covered with straw, on which the stretchers conveying 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 2 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, four bearers, following as far as possible the instructions given for lifting wounded in Stretcher Drill 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.

VII.—RAILWAY WAGON DRILL.

The railway wagons in this country which can be made use of for the purpose of transporting wounded men are passenger carriages, in which the patients can, if necessary, be laid on the seats, and goods wagons.

No special instructions appear to be necessary for loading and unloading such wounded men as are able to walk and assume the sitting posture, recumbent patients alone being alluded to in the text.

27. Preparation of Wagon by Zavodovski's Method.

To prevent jarring, these wagons require to be fitted with some special apparatus. That most generally used is known as

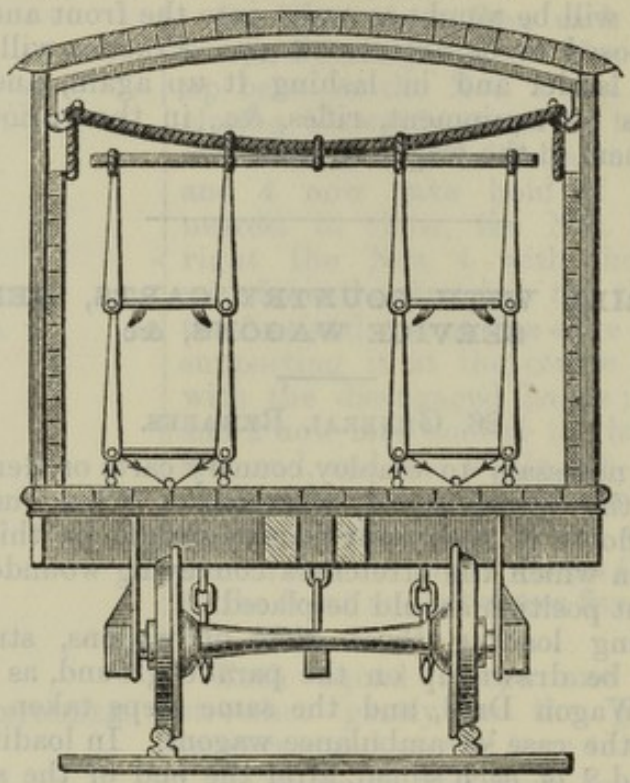


Fig. 67.—Transverse section of a Goods Wagon fitted on Zavodovski's Plan.

Zavodovski's. (Fig. 67.) To prepare a wagon according to Zavodovski's method the following stores are required :—

4 cables,
16 ropes prepared with loops,
8 large hooks and rings,
32 small ring bolts,
4 stout poles of suitable length,
8 field stretchers, and
28 stout cords for lashings.

The large hooks and rings are inserted in the sides of the wagon near the roof ; from these the cables are suspended across the wagon, the poles are secured lengthwise to the cables and the looped ropes attached to them. By means of these, two tiers of stretchers are supported, four stretchers in each tier. The lower tier is made fast to the small rings on the floor.

28. Loading and Unloading.

The company, with lowered loaded stretchers, will be drawn up in extended order ten paces from and facing the goods wagon.

Loading.

Fix Slings.	As in Ambulance Wagon Drill.
Stand Easy.	As usual.

SQUADS—IN SUCCESSION FROM THE RIGHT—WILL LOAD.	Each No. 4 in succession from the right assumes charge of his squad, and gives the words of command as follows :—
No.—Squad—Attention. *For Loading—Lift Stretcher.*	As in Ambulance Wagon Drill.
Load.	The squad marches by the nearest way to the wagon, wheeling when opposite to and one pace from the doorway, and the stretcher is carried into the wagon, head first, to the far right-hand corner where it is raised, and the handles of the poles are placed in the upper loops of the ropes.
Two.	On the word *Two*, the bearers fall in outside the wagon one pace from the doorway, No. 1 on the left, No. 4 on the right, Nos. 2 and 3 between them.
Right Turn. *Rejoin company.* *Quick March.* *Halt.* *Stand at Ease.*	As usual.

Similar words of command are given by the Nos. 4 of successive squads when they see the squad on their right falling in outside the wagon. No. 2 squad loads the upper near right-hand corner, No. 3 the lower far right-hand corner, No. 4 the lower near right-hand corner.

The lashings are fixed by No. 4 squad as follows :

The lashing attached to the ring in the floor of the wagon immediately beneath the handles of the stretcher is carried up round the handle, back through the ring and fastened off ; if long enough this may be repeated. The lashing attached to the ring lying between the handles is passed up round the left handle, back through the ring, round the right handle and back to the ring—thus forming a V, where it is fastened.

The upper tier is steadied by a lashing starting from a ring-bolt in the side of the wagon, which is carried across and secured to the opposite side, a firm hitch being taken round each handle. The lashings will be drawn tight to prevent swaying of the stretchers.

The left half of the wagon is loaded in a similar manner.

Unloading.

SQUADS—IN SUCCESSION FROM THE LEFT—WILL UNLOAD.	The converse of the above. The lashings of the left half of the wagon are unfixed, and the unloading commenced with the near lower stretcher on the left.
No. — Squad—Attention. *Unload.*	Nos. 3 and 4 enter the wagon first and proceed to the head end of the stretcher ; the stretcher is brought out foot first and carried to its original position, where the bearers wheel about.
Lower Stretchers.	As in Ambulance Wagon Drill.
Stand at Ease.	The "patients" will be directed to rise.

Company—Attention—Close Stretchers, &c., &c.	As in Ambulance Wagon Drill.

VIII.—PACKSADDLE DRILL.

29. Pack Transport.

In mountain and desert warfare it may be necessary to employ pack transport instead of wheeled transport for the conveyance of the wounded.

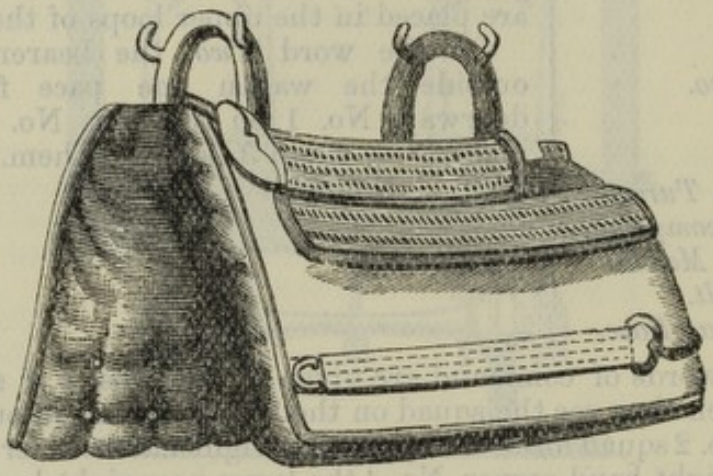


Fig. 68.—Packsaddle.

Cacolets, of which the so-called mountain equipment consists, are constructed to be hooked in pairs on packsaddles, one on each side.

Description of Packsaddle.

The packsaddle used is the large pattern, and weighs, with the following accessories, 53 lb. :—

Bit, bridoon with reins.
Breeching, with Ds and chains.
Covers, waterproof, 6′ × 6′.
Collar, breast, with Ds and chains, neck straps, and buckling pieces.
Collar, head stall.
Crupper, leather.
Girths, pair of.
Pannels, pair of.
Rein chain.
Surcingle or wantie, 14′ × 3′.
Tree with front and rear arch.

30. Saddling and Off Saddling.

The company will be drawn up in two ranks, and pack animals, saddled and bridled, will be brought ten paces in front of, and with their quarters towards the company, the animals to be ten paces apart.

—Files on the Right—Take Post at the Mules—Advance.

The named files advance towards the mules. The file on the right marches to the mule on the right, the next file to the next mule, and so on, from right to left. The front and rear rank man in each case separate immediately in rear of the mule, the front rank man passes to the off side and the rear rank man to the near side of the mule, both halting without word of command when opposite and close to the saddle.

Off Saddle.

The rear rank man turns to the right, unbuckles the girths, commencing with the rear one. The front rank man passes round under the neck of the mule to the near side, unbuckles the neck and breast strap, carries the latter back with him to the off side, and picking up the girths, places the whole upon the saddle. Both men then grasp the pannels of the saddle and sweep it back on to the mule's quarters. The front rank man removes the crupper and breeching and places them on the saddle. Seeing this done the rear rank man grasps the front arch with the left hand and passes his right arm under the pannels, lifts the saddle clear, takes a pace to his rear and places the saddle, resting on its front arch, on the ground.

Saddle.

The rear rank man stoops down, grasps the front arch with the left hand and passes his right arm under the rear arch as far as the elbow, lifts the saddle, takes a pace to his front and places it on the mule's quarters. The front rank man then adjusts the breeching and crupper,* and both men *lift* the saddle forward. The front rank man draws down the girths and breast strap, places the neck strap over the mule's neck, takes the breast strap in his left hand and passes round under the mule's head to the near side; buckles it and returns to the off side. The rear rank man buckles off the girths, commencing with the front one. Both remain steady, facing inwards.

The men exercised are then marched back to their places in the company.

The files in excess of the number of available mules will be similarly exercised.

* Care being taken that no hairs are left under the dock-piece.

IX.—CACOLET DRILL.

31. Description of Cacolets.

Cacolets, or folding chairs, are intended for the conveyance on pack animals of patients in the sitting posture.

A pair of the latest pattern (Mark III) cacolets weighs 56 lbs. Each cacolet consists of the following parts :—a seat, or cushion ; two hanging bars, terminating in hooks by which the cacolet is attached to the packsaddle ; certain parts designed to prevent the patient from falling out, namely, a foot-board and slings, two uprights, a side rail, and front and waist straps. When not in use, the pair of cacolets is closed by being folded against the saddle, to which they are then secured by a surcingle.

32. Preparing, Loading, Unloading and Closing Cacolets.

The company will be drawn up in two ranks, odd numbers being told off as right files and even numbers as left files. Knee-caps as in hand-seat drill.

The pack animals, loaded with closed cacolets, will be drawn up as in Saddling. Two patients will be directed to sit on the ground ten paces in front of each mule and two paces apart.

— Files On the Right—Take Post at the Mules—Advance.

The named files advance towards the mules. The two files on the right march to the mule on the right, the next two files to the next mule, and so on from right to left.

The files in each case separate immediately in rear of the mule, the right file passes to the off side, the left file to the near side, the whole halting without word of command when the front rank men are opposite and close to the cacolets.

Prepare Cacolets.

Each front rank man turns inwards ; the man on the near side unbuckles and removes the surcingle, doubles it twice and hangs it through the front arch towards the near side. Both men then draw down the seats (the rear rank men closing outwards to make room), raise and fix the side rail, unbuckle the waist and front straps, and front together.

Take Post—Advance.

Each file steps off towards its corresponding "patient," and when immediately in rear of him the front rank man goes to the right and the rear rank man to the left ; halting when in line with and close up to the "patient."

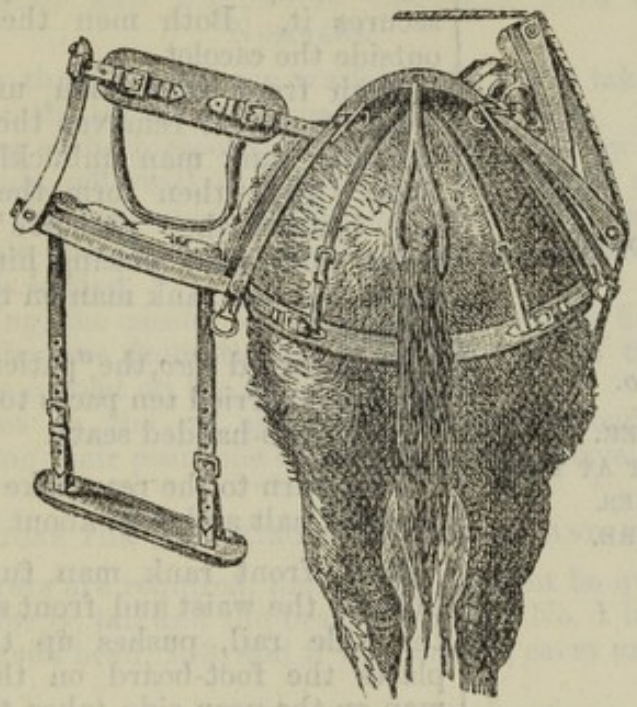


FIG. 69.—END VIEW OF A PAIR OF CACOLETS, SHOWING ONE PREPARED AND THE OTHER CLOSED.

BY TWO-HANDED SEATS—LIFT.

Two.

The bearers turn inwards, kneel on the knee nearest the "patient's" feet and form the two-handed seat beneath his thighs, grasping the "patient" round the loins with the disengaged hand and arm. The "patient" will be directed to pass an arm round the neck of each bearer.

On the word *Two*, the bearers rise steadily together, lifting the "patient" off the ground.

LOAD.

The bearers step off, the front rank with the right and the rear rank with the left foot, marching by a side step in which the feet are alternately crossed, one before the other.

Two.

The front rank man marks time and brings the rear rank man round, both moving on when square.

Each file retires towards the mule, advancing and halting when immediately in front of the cacolet.

On the word *Two*, the "patients" are raised and placed at the same moment in the cacolets. The "patients" will be directed to assist in this movement. The front rank man places the foot-board beneath the "patient's" feet, passes the front strap through the slot in the hanging bar and buckles it. The rear rank man passes the

waist strap round the "patient" and secures it. Both men then take post outside the cacolet.

UNLOAD. Each front rank man unbuckles the front strap and removes the foot-board; the rear rank man unbuckles the waist strap. They then form the two-handed seat beneath the "patient's" thighs, the front rank man placing himself on the right, the rear rank man on the left of the patient.

Two. On the word *Two*, the "patients" are lifted clear and carried ten paces to the front.

LOWER. As in two-handed seats.

TAKE POST AT THE MULES. RETIRE. Files turn to the rear, take post outside cacolets, halt and turn about together.

CLOSE CACOLETS. Each front rank man turns inwards, buckles the waist and front straps, lowers the side rail, pushes up the seat, and places the foot-board on the top. The man on the near side takes the surcingle, unfolds it and passes it through the loop between the girths to the man on the off-side, who pulls it through and throws the end over the top of the cacolets to the man on the near side, who buckles it opposite to the centre of the cacolet. Both men front together.

UNHOOK CACOLETS. Each front rank man turns inwards, the man on the near side unbuckles the surcingle, removes it and disposes of it as in *preparing* cacolets. Both men then grasp the closed cacolets, fingers on the cushions, thumbs on the seats, unhook and take a pace to their rear; stoop, place the cacolet on the ground with the hooks pointing away from the mule; place the footboard on the top of the cacolet and rise together.

HOOK ON CACOLETS. Each front rank man, stooping, removes the foot-board, takes hold of the cacolet, as before, and rises up; steps up to the mule, raises the cacolet, drops the hooks into their places, and lays the foot-board on the top, the men on either side working together.

The surcingle is then passed, and buckled as in closing cacolets.

The men exercised are then marched back to their places in the company.

The files in excess of the number of available mules will be similarly exercised.

33. Loading and Unloading Cacolets with Reduced Numbers.

When only three bearers are available, they will take post at the mules, two on the off side and one on the near side.

The loading of both cacolets will be carried out by the two men on the off side, who will commence with the cacolet on that side. The man on the near side holding down the near cacolet by the side rail while the opposite cacolet is being loaded, and until his own cacolet is loaded.

In unloading, the cacolet on the near side will be first unloaded by the two bearers from the off side, the man on the near side balancing the cacolet on the off side as before.

The cacolet on the off side will then be unloaded, and the bearers resume their positions outside their respective cacolets.

34. Directions for Assisting Wounded on and off Horses.

Three bearers are required, four if the patient be quite helpless, or if the horse be tall and the bearers short. No. 1 bearer always holds the horse's head, 2, 3, and if necessary 4, carry and steady the patient.

The practice can be carried out from either the near or off side

Dismounting.

(*a*) Injuries of the upper extremities not very severe :

No. 1 stands to horse's head.

No. 2 on the side at which the patient is to dismount.

No. 3 on the opposite side.

No. 2 steadies the patient.

No. 3 takes the patient's foot out of the stirrup and passes the leg across, over the pommel, to No. 2, who then grasps both legs, at the same time looking towards the horse's head and standing on the side of the patient farthest from it.

No. 3 passes round the horse's head and Nos. 2 and 3 ease the patient down and form a two-handed seat.

(*b*) Wounds of lower extremities :

The same detail, except that the patient should be dismounted on the side on which the injured limb is.

Mounting.

(*a*) In injuries of the upper extremities, if patient cannot walk :

Nos. 2 and 3 carry by two-handed seat, if to near side, No. 2 in rear, patient's back to the horse.

Raise and seat patient in the saddle, the patient assisting with the uninjured hand, which should be to the front, and, in injuries of the left arm, to the near side, and of the right arm to the off side.

The foot to the rear is placed in the stirrup and steadied by No. 2.

No. 3 passes by the head of the horse and steadies the patient, and the leg to the front is passed round over the pommel and placed in the stirrup.

Stirrups may be tied together under the horse's belly with the patient's straps.

Nos. 2 and 3 steady him while No. 1 leads the horse.

(*b*) In wounds of the lower extremities :

The patient is carried similarly by the two-handed seat, the legs tied together and the injured limb towards the horse's head, No. 2 in rear.

The patient is raised as before, but sits side-saddle ; the uninjured foot is placed in the stirrup, and the bearers steady from both sides.

(*c*) In the case of a patient being helpless, with an injury of the upper extremity :

No. 4 bearer mounts and covers the wallets with a coat.

The patient is raised as before by Nos. 2, 3 and 4 assisting, and seated on the wallets. The front leg is put across, and No. 4 steadies the patient between his arms, Nos. 2 and 3 assisting.

(*d*) In injuries of the lower extremity, the patient being helpless :

The procedure is the same, except that the leg is not put across.

The injured leg should be to the front.

Advantage should be taken of sloping ground, the bearers standing on the higher level in mounting and dismounting the patient.

If the horse be over fifteen hands, and the bearers are not tall, some difficulty is experienced in transferring a patient from a two-handed seat to the saddle. In this case a fourth bearer may be required to mount behind the saddle and help the patient to his place, then dismounting.

If the horse is unsteady, hold up one foreleg, the knee bent, and, if necessary, blindfold the horse.

A man accustomed to horses should always be No. 1.

If the patient be wearing spurs, these must invariably be removed.

X.—FIELD TRAINING.

35. Organization and Duties of Bearer Companies.

Personnel.

The personnel of the war establishment of a bearer company consists of 1 major in command, and 2 captains or lieutenants, 1 serjeant-major, 6 staff-serjeants and serjeants, 6 corporals, 44 privates and 1 bugler of the medical corps, and one warrant officer, 1 serjeant, and 37 rank and file of the Army Service Corps attached for transport duties.

Disposition in action.

In action the company is normally distributed thus .

I. Two stretcher sections under a captain or lieutenant, each section consisting of 1 serjeant and 4 stretcher squads.

II. 1 serjeant and bugler at the collecting station.

III. 5 corporals and 5 privates as wagon orderlies, each in charge of an ambulance wagon.

IV. The major, 1 captain or lieutenant, 1 serjeant-major, 2 serjeants (1 as compounder), 1 corporal and 4 privates (1 as cook) at the dressing station.

V. 1 staff-serjeant, 2 privates (company cooks), and 1 private (supernumerary) of the medical corps, and 4 bâtmen, 1 cook, and 2 supernumeraries of the transport section in rear with the company baggage, supplies, &c.

VI. The remainder of the Army Service Corps will be with their respective vehicles.

Wheeled transport.

The wheeled transport of a bearer company includes ambulance wagons, general Service wagons for equipment and medical stores, store carts and a water cart. The ambulance wagons or other sick carriage are divided into two Lines. The First Line is intended to convey the wounded from the collecting station to the dressing station, and the Second Line to carry them from the dressing station to the field hospital. The proportion of carriage detailed for each of these services will in every case be determined by the officer commanding the bearer company, failing the receipt of orders from higher authority. It will rest with him to decide, from consideration of the character of the enemy, the rapidity with which the wounded are being brought in, the state of the roads, the distance between the collecting station and the dressing station, and between the latter and the field hospital, how best to employ the ambulances at his disposal. It may in some cases seem advisable to employ, in the first place, the carriage of both lines between the collecting station and dressing station, while under other circumstances it may be better to at once employ the ambulances of the Second Line in evacuating the dressing station. A rapid review of the conditions referred to will enable him promptly to decide whether the rendezvous of both lines of ambulances shall in the first place be at the collecting station, or whether he will order only those of the First Line thither, and those of the Second Line to rendezvous at the dressing station.

Distribution of sick carriage.

Pack transport.

The pack transport of a bearer company for use in mountain warfare, or where there are no roads suitable for wagons or carts, consists of cacolets for the transport of the wounded, and field panniers, &c., for the transport of stores, the whole being carried by pack animals.

Duty of stretcher sections.

The stretcher sections will be sent out to succour and collect the wounded. The No. 4 of each squad will be in charge of his squad, and on the two men who are not actually carrying the stretcher will devolve the duty of removing the arms, ammunition, and accoutrements of the wounded to the rear, and of carrying the surgical haversack and water-bottle. The squads will bring the wounded to the collecting station and place them in the ambulance or other sick carriage, returning at once to the scene of action, and taking fresh stretchers with them. The stretcher squads will not pass in rear of the collecting station.

Collecting station.

The collecting station will usually be under shelter, and, if possible, near a road, but as near the fighting line as is consistent with safety. The serjeant in charge of it will have in his care a Field Companion and water-bottle, and a small reserve of bandages

and first dressings to replenish the surgical haversacks of the bearers.

Ambulance wagons of First Line.

The ambulance wagons or other sick carriage ordered to rendezvous at the collecting station will move off to the dressing station as they are loaded with wounded, each under charge of a wagon orderly. After taking the wounded to the dressing station, those of the First Line will return at once to the collecting station, and they will never go in rear of the dressing station until the field has been cleared.

Dressing station.

The dressing station will, if possible, be out of fire near a road, and advantage will always be taken of a good water supply and of buildings or other shelter in the vicinity of the scene of action. The necessary surgical and medical equipment, medical comforts, water cart, and, if so ordered, the ambulance wagons constituting the Second Line, or, in mountain warfare, the whole of the pack transport, will be assembled at the dressing station, and if no building is available the operating tent will be pitched. Here beef tea and stimulants will be got ready, and every preparation made to succour the wounded as they come in.

Ambulance wagons of Second Line.

After the wounded are dressed they will be placed in the ambulance wagons of the Second Line or other sick carriage, and taken to the field hospital. As soon as they have been transferred to the field hospital, the wagon orderlies will return with the ambulance wagons to the dressing station. Before despatching wounded to the rear, the officer commanding the bearer company will ascertain, by signal or otherwise, that the field hospital is ready to receive them.

Baggage party.

The remainder of the company left in charge of the baggage and supplies will have food ready for the company at the close of an action.

Application of general principle.

The foregoing instructions must necessarily be varied to meet the exigencies of the locality and warfare in which the army is engaged, and according to the need of advancing or retiring the collecting and dressing stations, on a forward or retrograde movement of the troops being made. The general principle will, however, always be kept in view of having the collecting station as near the fighting line as possible, and at no great distance from the dressing station, so as to shorten the journeys of the bearers and the ambulance wagons of the First Line and bring the wounded within reach of surgical aid as speedily as possible. In some cases, and invariably with mountain equipment, the collecting and dressing stations will be combined.

Distinguishing flags and lamps.

All medical establishments in the field are distinguished during daytime by a flag bearing a red cross on a white ground, and during the night by two white lamps placed side by side. Directing red cross flags will be placed between the collecting and dressing stations, and between the latter and the field hospitals, to mark the road.

Searching woods and ditches.

When all the wounded have been removed from the open, the woods and ditches in the neighbourhood will be methodically searched, so that there may be no possibility of any wounded remaining uncared for.

Search lanterns.

Lanterns for searching in the dark form part of the equipment of a bearer company.

Specification tallies.

When the necessary surgical treatment has been afforded, the

officer will attach* to the clothes of the wounded man a "specification tally" (Army Book 166), on which will be specified his regiment, number, rank, and name, with the nature of the injury, the treatment, and any precautions required in transport. The soldier's name and the nature of his wound will also be entered on the counterfoil of the tally book. Green-coloured tallies will be used for serious cases and for those requiring immediate attention, and white tallies for other cases.

Disposal of arms, ammunition, and accoutrements.

The arms, ammunition, and accoutrements of a wounded man will be carried with him to the Dressing Station and Field Hospital, and handed over to the quartermaster of the hospital into which he is received.

Rendezvous after an action.

At the close of an action, and when the Dressing Stations have been evacuated, the bearer companies will rendezvous with the brigades to which they are attached, and in the vicinity of the field hospitals, unless otherwise ordered.

36. Bearer Company Practice.

With Wheeled Transport.

Order of march.

The bearer company will be drawn up in column. (See Fig. 81, page 161.) The Collecting Station party and the Dressing Station party will be detailed before marching off. The ambulance wagons, each accompanied by a wagon orderly, general service wagons, carts and water cart will parade in rear. In front of the bearer company a party of men told off to act as "patients," in marching order, will be formed up as a separate company in charge of an officer or non-commissioned officer who will be provided with specification tallies (see para. 35) to be distributed one to each man, stating the nature of his supposed injury. These tallies will be numbered, and the non-commissioned officer in charge of the Collecting Station will enter in a note book, as each wounded man is brought in, the number of the tally and the name of the No. 4 of the squad, so as to trace by whom the dressing was applied.

Soldiers acting as patients to have tallies showing their supposed injuries.

COMPANY FORM FOURS—RIGHT (OR LEFT)—BY THE RIGHT. QUICK MARCH. — The officer in command having inspected the parade will march it off in column of route, the warrant officer in charge of the transport giving the executive command to the drivers.

Formation of Dressing Station.

On reaching suitable ground the HALT will be sounded and the order FORM DRESSING STATION given.

On this order the Dressing Station party will be detached from the main body, and with the General Service wagons, carts, water cart, and if so ordered the Second Line of ambulance wagons will take up their position on the ground selected, and proceed to form the Dressing Station under the orders of the officer commanding.

Formation of Collecting Station.

On the ADVANCE being sounded, the remainder with the First Line of ambulance wagons, will proceed further on and form a Collecting Station in a suitable place under the orders of one of

* Unless this has been already done by the medical officer accompanying the man's regiment.

KEY TO FIGS. 70, 71, 81, AND 82

the remaining officers. The Collecting Station should be in a sheltered position and at a sufficient distance from the Dressing Station to illustrate the method of working. It is formed by the wagons aligned at close interval with horses' heads to the rear. Its position should be marked by a Red Cross Flag.

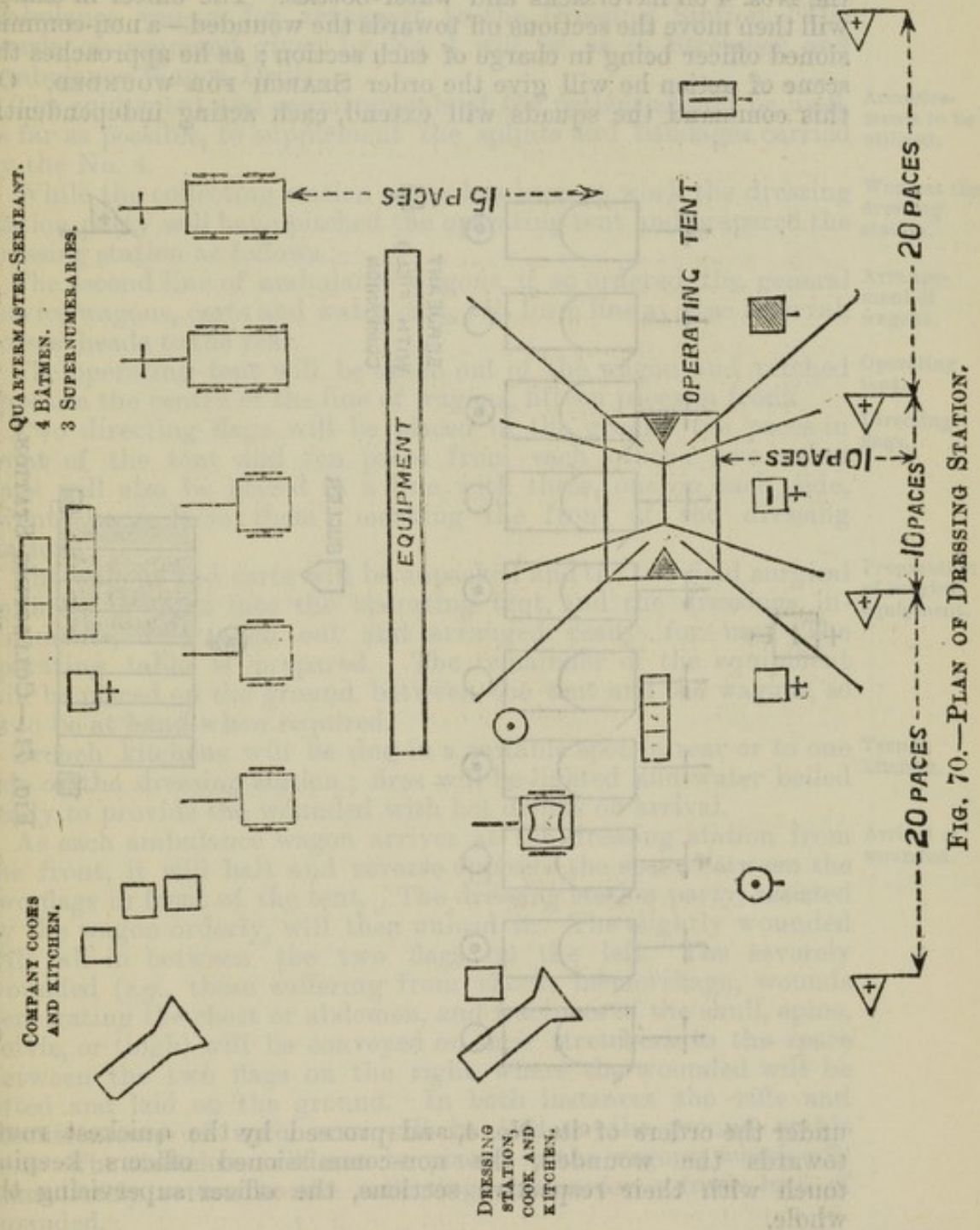


FIG. 70.—PLAN OF DRESSING STATION.

The patients will be marched on for about five hundred yards, distributed over the ground and directed to lie down. Distribution of patients.

As soon as the Collecting Station is formed the wagon orderlies will get out the stretchers, haversacks and water-bottles; place them together on one side, and prepare the wagons; the field Preparations by wagon orderlies.

companion being given over to the non-commissioned officer in charge of the Collecting Station.

Searching for wounded.

The bearers will be formed up and told off as in Stretcher Drill in front of the line of wagons. The Nos. 3 will be filed on stretchers, the Nos. 4 on haversacks and water-bottles. The officer in charge will then move the sections off towards the wounded—a non-commissioned officer being in charge of each section; as he approaches the scene of action he will give the order SEARCH FOR WOUNDED. On this command the squads will extend, each acting independently

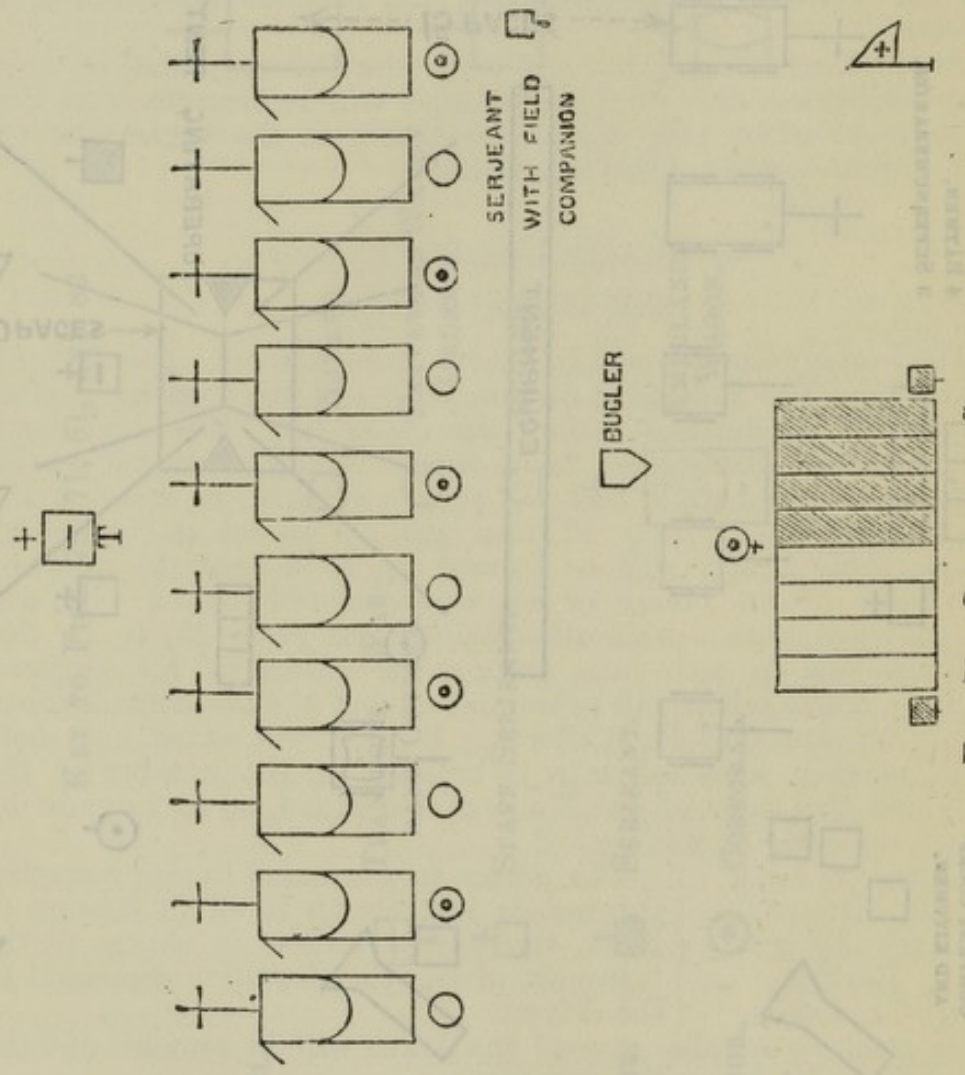


FIG. 71.—COLLECTING STATION.
Two stretcher sections facing the front. Wagons at close interval, facing the rear.

under the orders of its No. 4, and proceed by the quickest route towards the wounded, the non-commissioned officers keeping touch with their respective sections, the officer supervising the whole.

First aid to wounded.

On reaching a wounded man the squad halts, No. 1 one pace from the patient's head; the stretcher is lowered and prepared by the Nos. 1 and 3, the No. 4 giving the commands "Lower Stretcher," "Prepare Stretcher"; the No. 4 doubling to the right side, and No. 2 to the left attend to the patient, applying such dressings as are indicated by the nature of the supposed injuries;

removing and taking charge of his equipment. The patient will then be placed on the stretcher in the usual way, the No. 1 placing himself opposite the patient's knees, and No. 3 opposite the shoulders, unless his injury is so slight as to allow of his walking to the Collecting Station, where he will be placed in the ambulance wagon for transport to the Dressing Station. The words of command given by No. 4 will be as in Stretcher and Ambulance Wagon Drills.

Accoutrements to be utilized.

The equipment and accoutrements of the patient should be used, as far as possible, to supplement the splints and bandages carried by the No. 4.

Work at the dressing station.

While the collecting station party has been at work the dressing station party will have pitched the operating tent and prepared the dressing station as follows :—

Arrangement of wagons.

The second line of ambulance wagons, if so ordered, the general service wagons, carts and water cart, will form line at close interval, horses' heads to the rear.

Operating tent.

The operating tent will be taken out of the wagon and pitched opposite the centre of the line of wagons, fifteen paces in front.

Directing flags.

Two directing flags will be placed in the ground ten paces in front of the tent and ten paces from each other ; two other flags will also be placed in a line with these, one on each side, twenty paces from them ; marking the front of the dressing station.

Preparation of surgical equipment.

The wagons and carts will be unpacked and the two field surgical panniers brought into the operating tent, and the dressings, instruments, &c., taken out and arranged ready for use. The operating table is prepared. The remainder of the equipment will be placed on the ground between the tent and the wagons, so as to be at hand when required.

Trench kitchen.

Trench kitchens will be dug in a suitable spot in rear or to one side of the dressing station ; fires will be lighted and water boiled ready to provide the wounded with hot drinks on arrival.

Arrival of wounded.

As each ambulance wagon arrives at the dressing station from the front, it will halt and reverse opposite the space between the two flags in front of the tent. The dressing station party, assisted by the wagon orderly, will then unload it. The slightly wounded will fall in between the two flags on the left. The severely wounded (*e.g.*, those suffering from shock, hæmorrhage, wounds penetrating the chest or abdomen, and fractures of the skull, spine, pelvis, or thigh) will be conveyed on their stretchers to the space between the two flags on the right, where the wounded will be lifted and laid on the ground. In both instances the rifle and accoutrements of each man will be laid on the ground at his feet. The stretchers will now be placed in the wagons, which will immediately return to the collecting station for a fresh load of wounded.

Examination of work done.

The wounded having been all brought in, and roughly distributed in this way into two groups, the ambulance wagons will be retired in rear of the dressing station, the dressing station party will fall in two deep in front of the tent, and the company on its return from the front will be halted ten paces in front of the directing flags, and be ordered to stand at ease. The officer in

charge of the dressing station will now examine all the wounded, explaining to the men any mistakes that may have been made. This accomplished, the order will be given to take off the dressings.

The equipment of the bearer company and the arrangements of the dressing station will then be shown and explained. The dressing station party will strike the tent, and the stretchers, tent, surgical haversacks, water-bottles, &c., will be put away in the wagons, and the company formed up and marched home.

With Pack Transport.

Mountain equipment not carried beyond the dressing station.

On the line of march the pack animals in half-sections will follow the medical corps. As mountain equipment is not employed nearer the field of action than the dressing station, the mules will be halted wherever it is ordered to be formed, and the bearers will be sent forward to bring in the wounded either on stretchers or by one of the improvised methods. The equipment will be unpacked and the dressing station formed as for wheeled transport. The wounded having arrived at the dressing station, they will be placed in the cacolets and stretchers for conveyance to the field hospital. Subsequently they will be unloaded, and the company formed up and marched home.

XI.—BEARER COMPANY AND FIELD HOSPITAL ENCAMPMENTS; COOKING; SANITATION, &c.

37. Exercise in Forming Bearer Company and Field Hospital Encampments.

Choice of site.

The site having been chosen and the base line decided upon, the camp will be marked out as follows :—

Marking out camp.

Mark the base point with a flag; measure off the distance required for the front of the camp, viz. : for a Bearer Company 60 yards, or 72 paces of 30 inches ; for a Field Hospital 70 yards, or 84 paces ; mark this with a second flag. The front of the camp being thus laid down, the rear of the ground will now be determined. Place a flag, or man, on the front alignment 6 feet from the base point ; another flag, or man, 8 feet from the base point, towards the rear and 10 feet diagonally from the other flag, or man ; the angle thus formed will be a right angle. Place the third camp colour in the same straight line as the 8 feet side of the triangle and distant from the base point 100 yards, or 120 paces, for the Bearer Company, and 160 yards, or 192 paces, for the Field Hospital. The rear line of the camp will be equal in length and parallel to the base line, and will be marked by the fourth camp colour.

Pitching tents.

The several rows of tents will now be pitched in the manner described in para. 39. Each row of tents will be accurately dressed from the front as well as from the flank. The distances between tents, &c., to be in accordance with the plans given in the Encampment Regulations, as follows :—

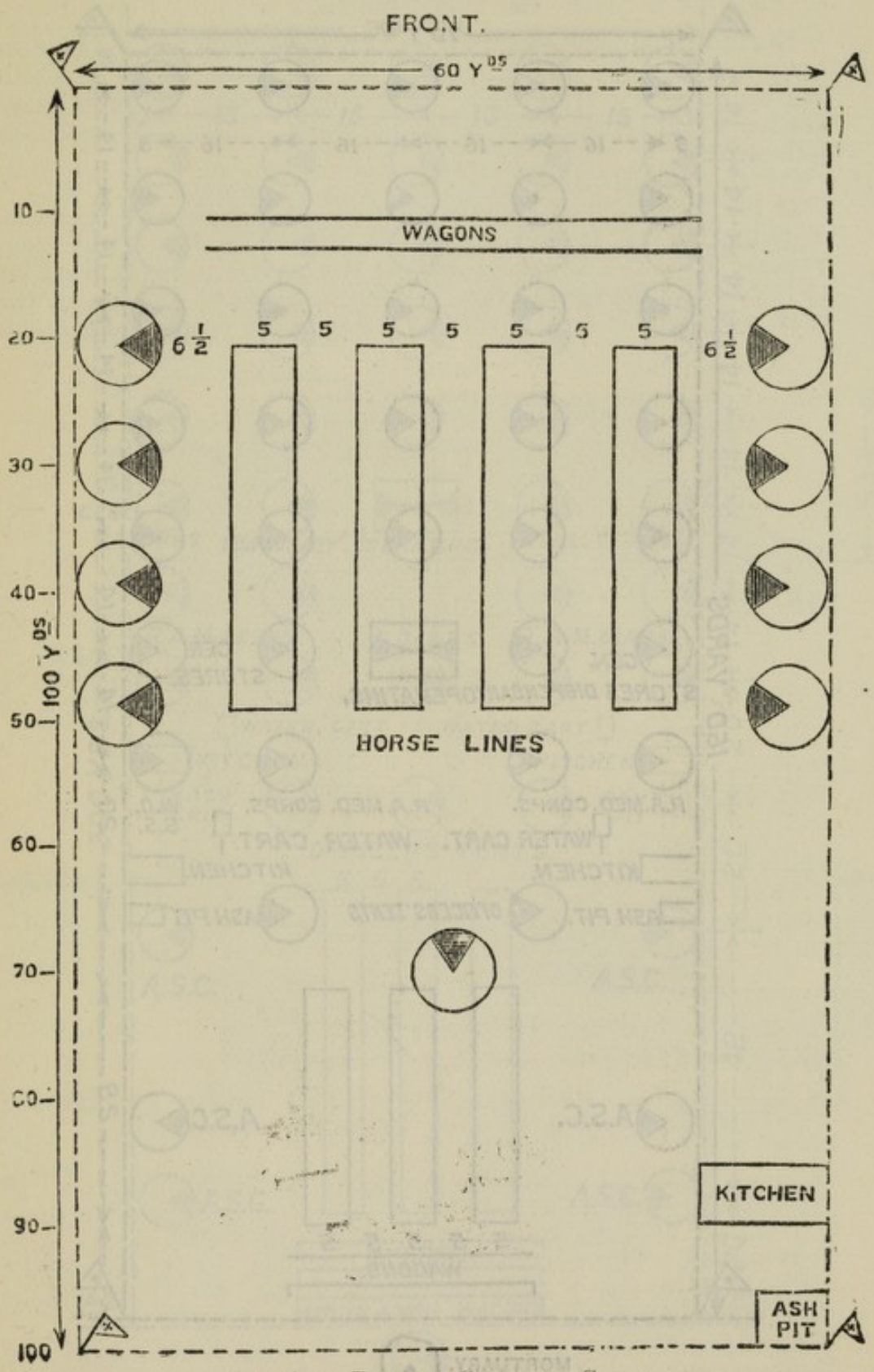


FIG. 72.—BEARER COMPANY CAMP.
(Service Abroad.)

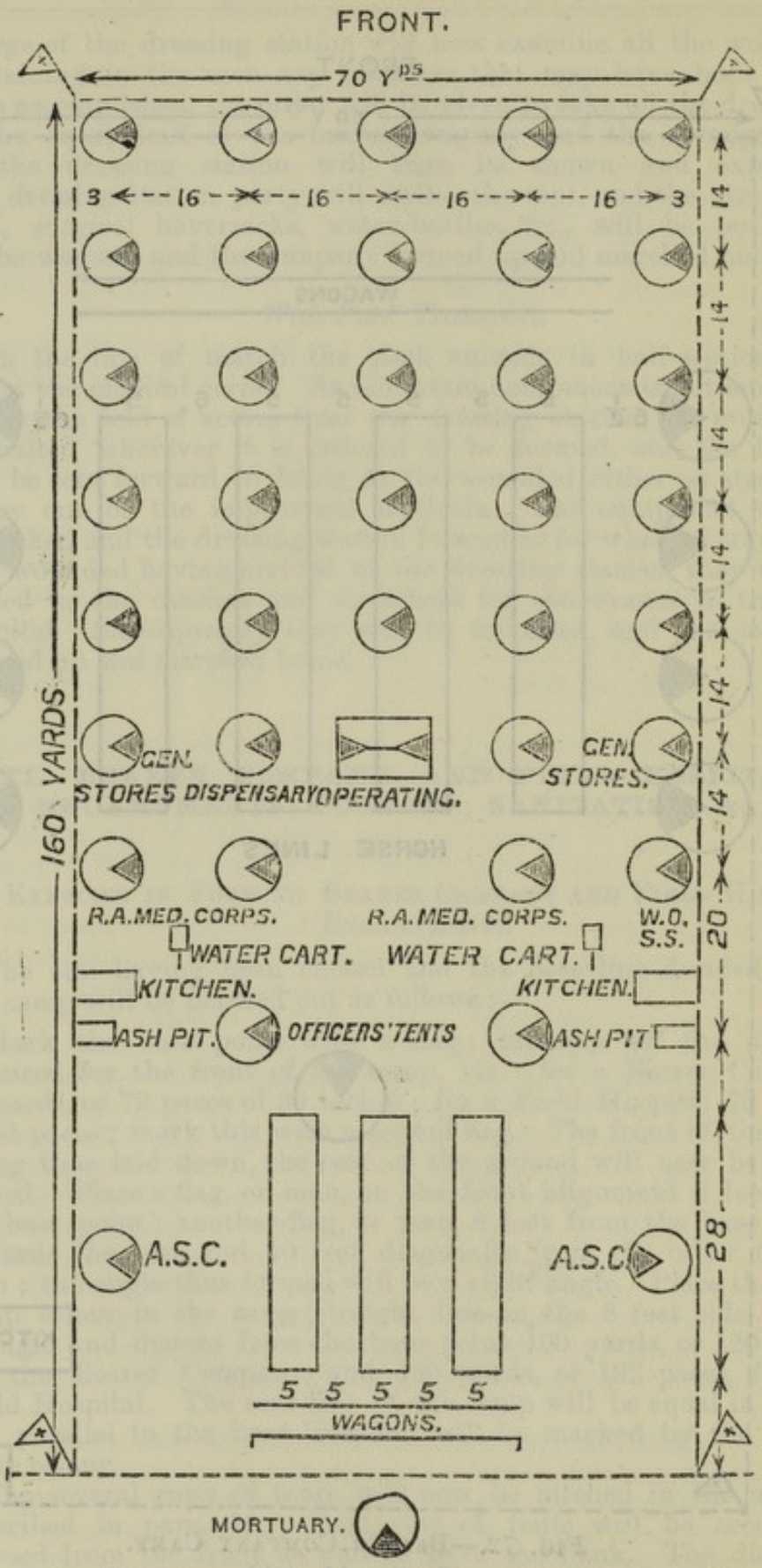


FIG. 73.—FIELD HOSPITAL CAMP. (Service Abroad.)
(Scale 30 yards to 1 inch.)
(Mortuary tent can be placed on a flank if convenient.)

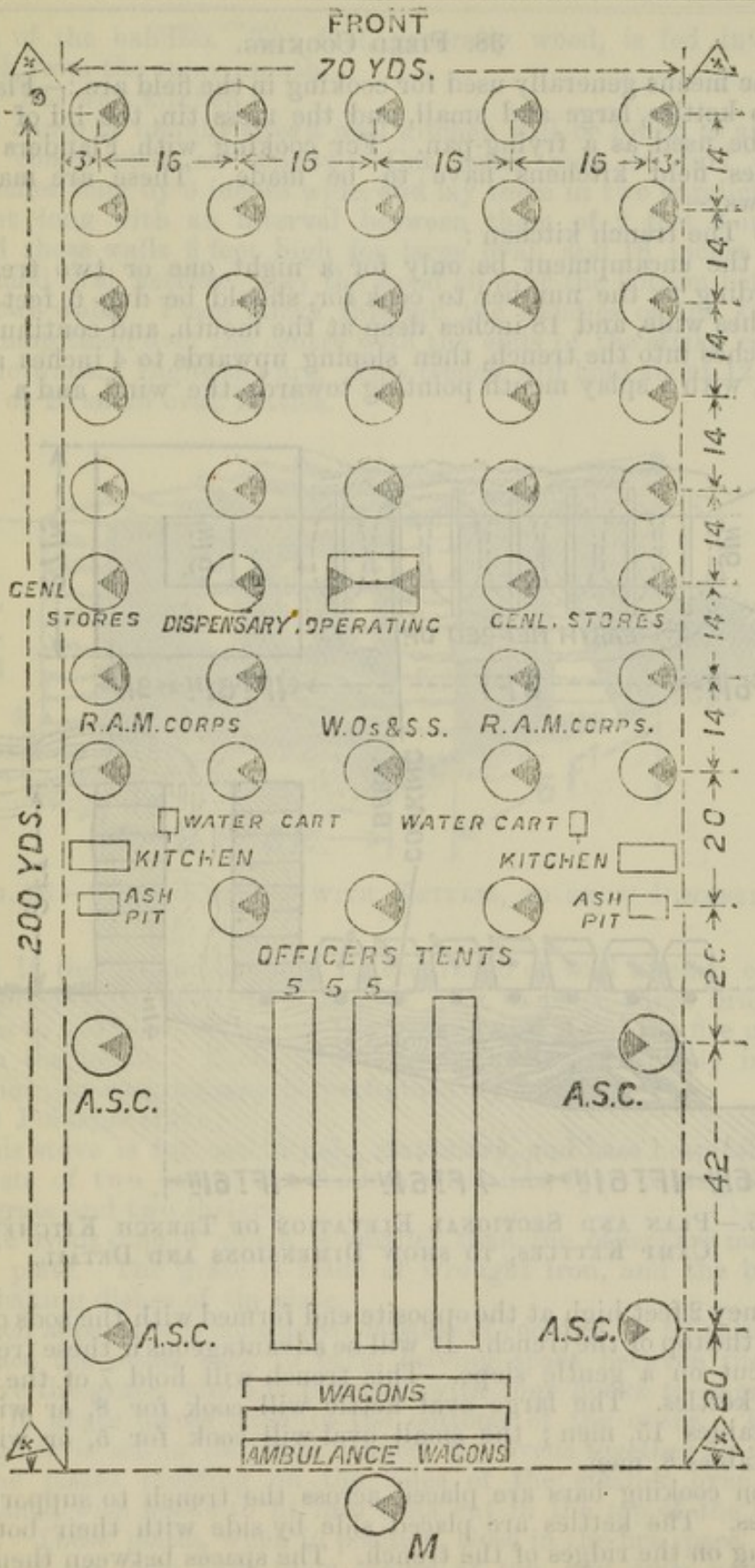


FIG. 74.—FIELD HOSPITAL AND BEARER COMPANY CAMP COMBINED.
(M—Mortuary Tent, which can be placed on a flank if more convenient.)

38. Field Cooking.

The means generally used for cooking in the field are :—Flanders camp kettles, large and small, and the mess tin, the lid of which can be used as a frying-pan. For cooking with Flanders camp kettles field kitchens have to be made. These are made as follows :—

(1) The trench kitchen :

If the encampment be only for a night, one or two trenches, according to the number to cook for, should be dug 6 feet long, 9 inches wide, and 18 inches deep at the mouth, and continued for 18 inches into the trench, then sloping upwards to 4 inches at the back, with a splay mouth pointing towards the wind, and a rough

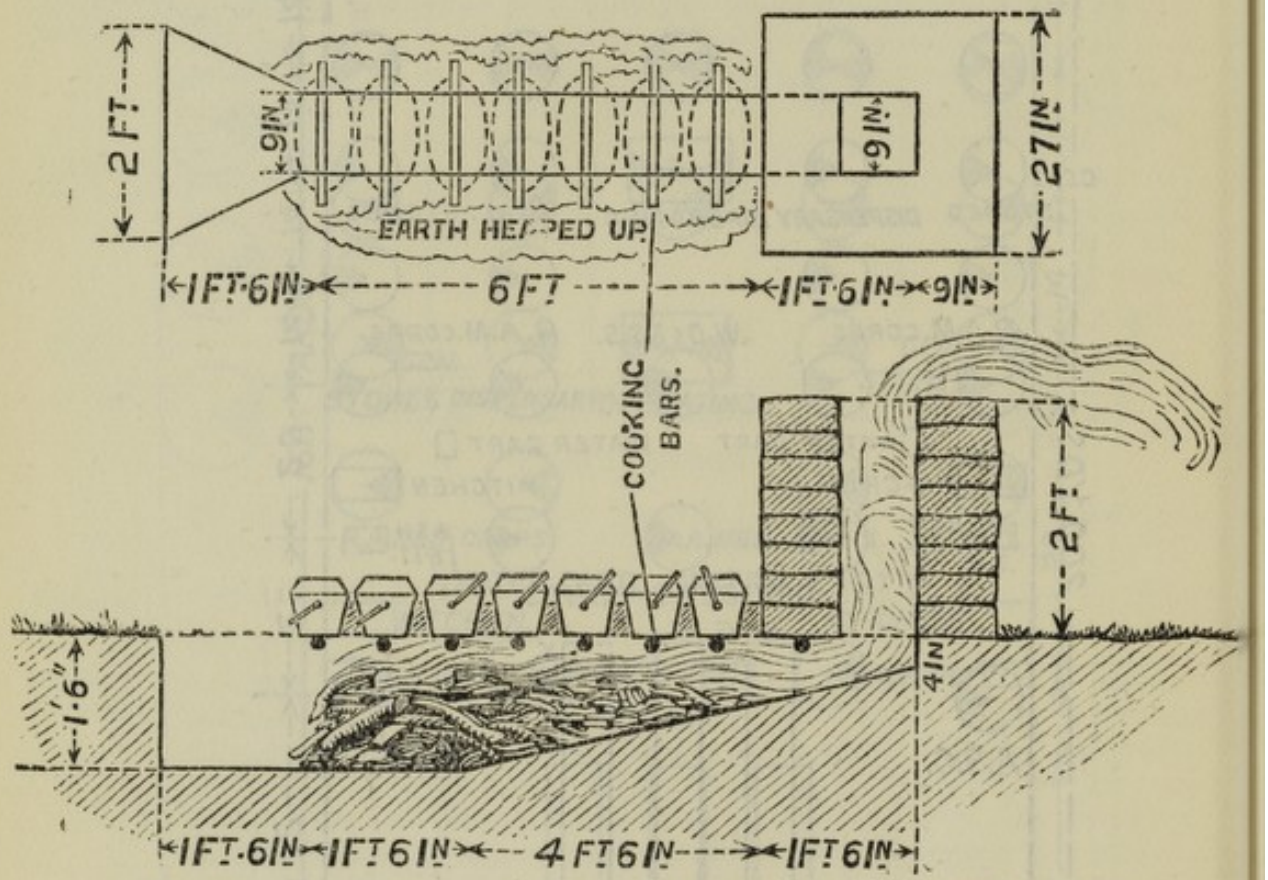


Fig. 75.—Plan and Sectional Elevation of Trench Kitchen with Camp Kettles, to show Dimensions and Detail.

chimney 2 feet high at the opposite end formed with the sods cut off from the top of the trench. It will be advantageous if these trenches are cut on a gentle slope. This trench will hold 7 of the large oval kettles. The large oval kettle will cook for 8, or without vegetables 15, men ; the small oval will cook for 5, or without vegetables 8, men.

Iron cooking bars are placed across the trench to support the kettles. The kettles are placed side by side with their bottoms resting on the ridges of the trench. The spaces between them are packed with wet earth or clay, which should reach as high as the

loops of the handles. The fuel, generally wood, is fed into the trench from the splay mouth.

(2) The wall kitchen :

On damp or marshy sites a wall kitchen will be found to answer best, constructed as follows :—Cut some sods of turf about 18 inches long by 9 inches wide, and lay them in two parallel lines 6 feet long with an interval between them of 2 feet 6 inches. Build these walls 2 feet high for large oval, and 18 inches high for small oval, kettles. Lay the wood all over the bottom between the two walls. Place sticks through the handles of the kettles, and hang them over the centre with the ends of the sticks resting on the walls. Light the fire. This trench will hold about 12 large oval, or 20 small oval, kettles.

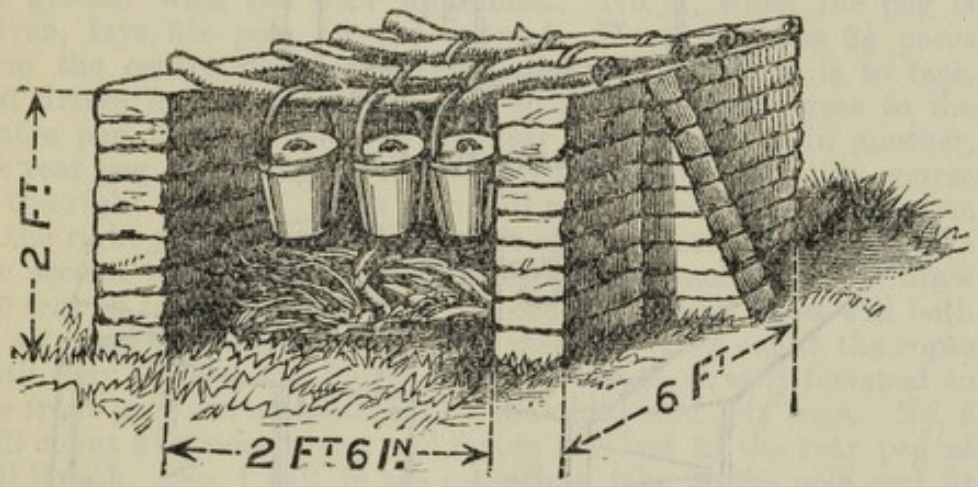


Fig. 76.—Wall Kitchen with Kettles, to show Dimensions.

(3) If the ground be such that a trench or wall kitchen cannot be conveniently made, it is a good plan to place three bricks or stones to keep the kettle off the ground and build the fire underneath the kettle. Each kettle can be heated separately in this manner ; or cooking may be performed by means of—

(4) Portable stove :

This stove is for use in field, stationary, and base hospitals. It consists of two ovens, two boilers with lids, four baking dishes, one grate and two shelves.

The ovens (one of which is smaller than the other) are made of steel plate. The grate is made of wrought iron, and the boilers and baking dishes of tin plate.

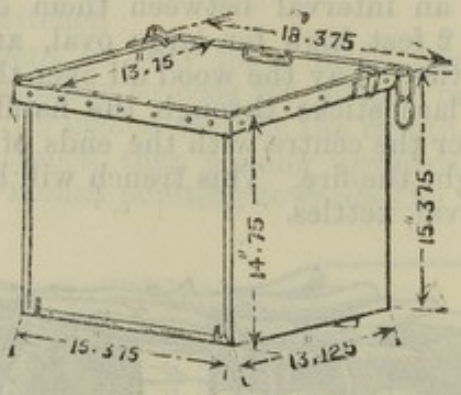
Each apparatus is considered capable of cooking for 50 patients.

Place the ovens back to back, leaving space between them to receive the grate, which is provided with four hooks to engage in slots in angle pieces fixed to the bottoms of the ovens. Before the grate is set in its place, connect the ovens together by means of the plates pivoting on the sides of the smaller oven, and furnished with hooks to fit into slots cut in the top of the larger oven. These plates, when in position, close in the fire space. The doors of the oven have their hinges at top, and open upwards. Each oven has a movable shelf of plate-iron to rest on a ledge,

and intended to receive one baking dish, the second being placed on the bottom of the oven. The boilers rest on the top of the ovens over the fire.

Troops should, under all circumstances, have their dinners ready one hour and a half after the rations are issued.

PACKED.



READY FOR USE.

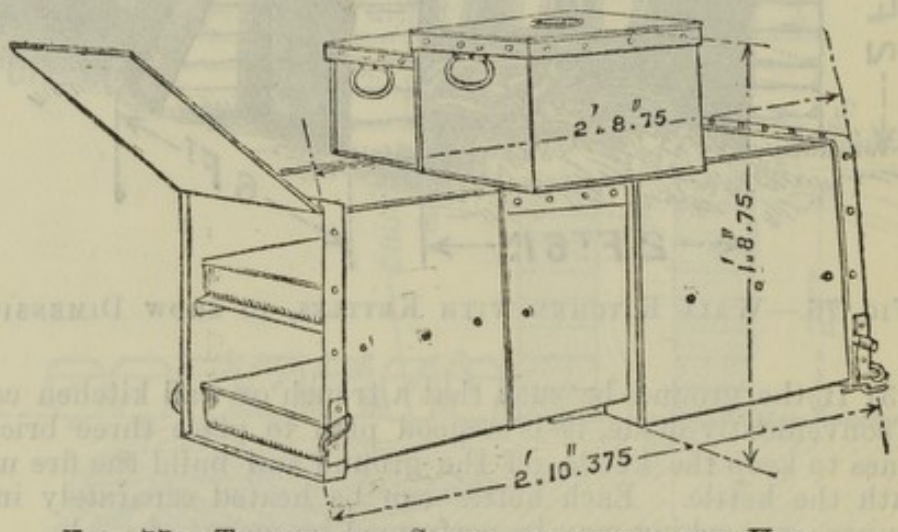


FIG. 77.—TO PUT THE STOVE TOGETHER FOR USE.

To pack the stove for transport.

Place the small oven inside the large one, with the large shelf on its top, and the small shelf at one side of it. Put the small boiler into the large one, and place the latter with the baking dishes inside the small oven. Place the grate in last, resting on the boiler. In packing the grate, place the bottom bars (not the hooks) next the boiler, or the latter will be injured.

The large oven is fitted with links for pack transport.

	lb.
Total weight	90½
Dimensions, packed for transport—	in.
Height	14
Length	18¾
Depth	16¾

39. Tent Pitching Exercise.

Patterns of circular tents.

In field hospitals two patterns of circular or bell tents are used. They are the single circular used for officers and men, and the double circular used for the sick.

Pitching tent by two men.

The following is the method of pitching a tent by two men :— 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 the tent out of its valise, and spreads it on the ground with the door uppermost. No. 1, when the peg is driven, lays his pole on the ground. He then takes $3\frac{1}{2}$ 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 $3\frac{1}{2}$ 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 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.

If it is 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 draws them 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 and valise are 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 and pin-bag.

40. Hospital Marquee Pitching Exercise.

Description of marquee

A hospital marquee, inside dimensions 29 feet long and 14 feet wide, weighing 512 lbs. complete, consists of—

1 inside linen roof	Packed in a canvas valise, laced up the centre, and marked on the outside "Hospital Marquee."
1 outside ditto	
8 walls (4 inside and 4 outside)	
82 bracing lines (40 inside and 42 outside), with wood runner and button to each	
2 wooden vases, painted red	
2 weather lines (90 feet long each) with large runners	
180 small tent pegs	Contained in 1 peg bag marked on the outside with contents and marquee to which it belongs.
4 large ditto (for weather lines)	
2 mallets	
1 set of poles, consisting of 8 pieces, viz., 1 ridge in two pieces and 3 standard or upright in two pieces	Lashed together in one bundle by two box cords.

1 waterproof bottom, made of painted canvas, in four pieces, each piece measuring 15 by 8 feet	Rolled in a bundle round a thin pole, and tied by three box cords.

Laying out the Ground for Pitching.—Undo and empty the peg bag (keeping the four large pegs for the weather lines by themselves), fit the handles in the mallets, and fix the two pieces of the ridge pole together. This done, proceed to lay out the ground for pitching the marquee as follows:—Lay the ridge pole on the

Laying out the ground.

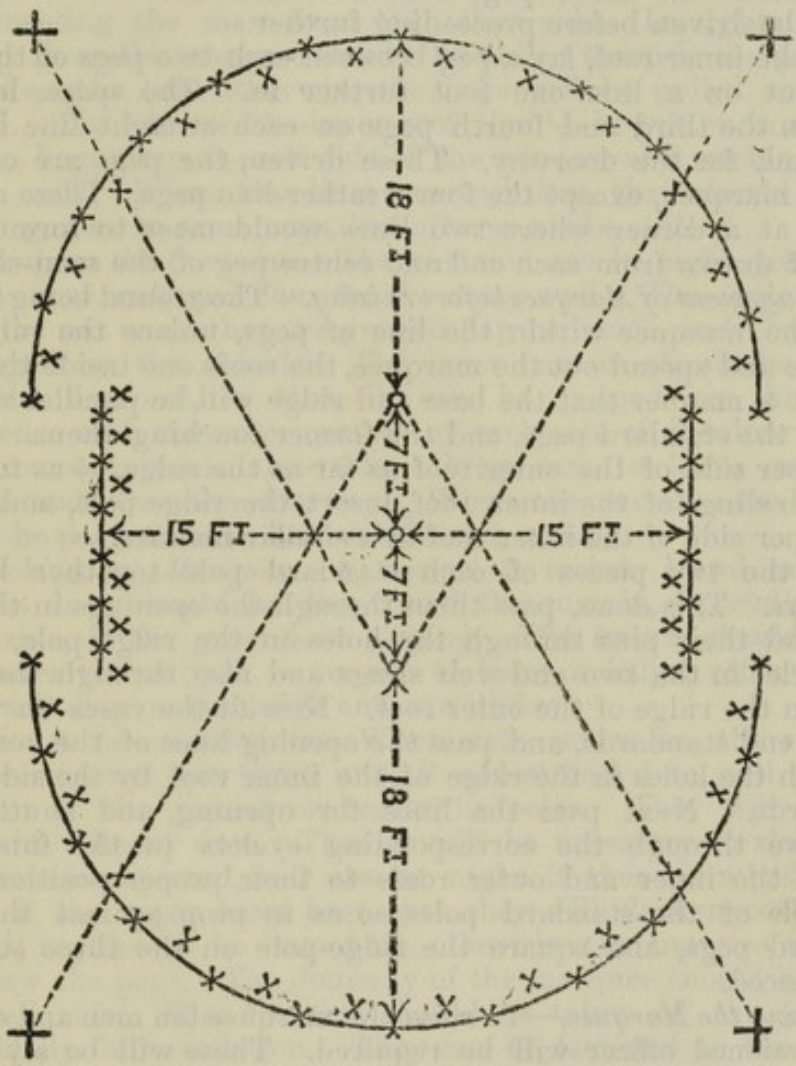


Fig. 78.—Ground Plan of the Pegs of the Marquee.
(Showing direction of weather lines.)

ground selected, and drive in a peg at its centre and at each of its two end holes. These pegs will mark the positions of the standard or upright poles, and will be 7 feet apart. With each end peg as centre, in a semi-circle with a radius of 6 yards, lay thirteen pegs with their points inwards where they are to be driven. This will be easiest done as follows:—Step 6 yards from one of the end pegs, and in a straight line with the three standard pegs lay the centre peg of the semi-circle; next step 6 yards to each side of the end peg, and on a line at right angles to the three standard pegs

lay a peg for each end of the semi-circle; then lay at each side between the centre peg of the semi-circle and the two end pegs, equal distances apart, five pegs, and the semi-circle of thirteen pegs is complete. The other end will be done in the same way.

For the sides of the marquee on a straight line parallel to the three standard pegs, and 5 yards distant, lay six pegs, the first and last of which will be 18 inches distant from the lines formed by each end standard peg and the two end pegs of each semi-circle. Now the pegs for the outer roof are all laid, and should be driven before proceeding further.

For the inner roof, lay a peg between each two pegs of the outer roof, but on a line one foot further in. The space, however, between the third and fourth pegs on each straight line is to be left blank for the doorway. These driven, the pegs are complete for the marquee, except the four weather-line pegs. These are each driven at a corner where two lines would meet to form a right angle if drawn from each end and centre peg of the semi-circle.

Arrangement of marquee.

Arrangement of Marquee before raising.—The ground being laid out, carry the marquee within the line of pegs, unlace the valise, and arrange and spread out the marquee, the roofs one inside the other, in such a manner that the base and ridge will be parallel with the line of the standard pegs, and the former touching them. Roll up the upper side of the outer roof as far as the ridge, so as to expose the web slings of the inner roof, insert the ridge pole, and roll up the upper side of the inner roof in a similar manner.

Fix the two pieces of each standard pole together by their numbers. This done, pass them through the openings in the inner roof, and their pins through the holes in the ridge pole, through the eyelet in the two end web slings and also through the eyelet-holes in the ridge of the outer roof. Now fit the vases on the pins of the end standards, and pass the opening lines of the ventilators through the holes in the ridge of the inner roof by the side of the standards. Next pass the lines for opening and shutting the windows through the corresponding eyelets in the inner roof. Unroll the inner and outer roofs to their proper position, bring the ends of the standard poles so as to prop against the three standard pegs, and square the ridge-pole on the three standards thus placed.

Raising marquee.

Raising the Marquee.—To raise the marquee ten men and one non-commissioned officer will be required. These will be styled four weather-line men, six standard men, and one director. One weather-line man will take up a position at each large peg, holding in his right hand the runner, and in his left the line, with a loop ready at any moment to slip on the peg. Two standard men will take up a position at each pole, one at the foot, the other at the top, facing each other. When the instructor sees all are ready he will give the word to raise, when all, working together, should steadily erect the standards, taking care not to raise one before the other. The instructor should now go to the side and dress the standard poles, tightening and slackening the weather-lines as required until the poles are perpendicular. He should next go to the end and dress the poles in a similar manner in that direction.

Putting on the Bracing Lines.—The weather-line men should not leave their posts until the bracing lines are on. Four of the standard men should put on the bracing lines, while two of them should take mallets to drive any loose pegs there may be. To put on the bracing lines, two men should go to each side of the marquee, commencing with the outer roof; one should take the line at one side of the window, and the other the line at the other side, which should be put respectively on the third and fourth pegs of the outer straight line, thus working towards the ends until meeting the men from the other side. In tightening the bracing lines the marquee should be pulled towards the pegs so as to slacken the line, otherwise the pegs will be pulled out of the ground. The lines of the inner roof should be put on in a similar manner, beginning at each side of the window and working round to the ends. When two lines are together, they should for the present go on the same pegs, but afterwards be shifted. Bracing lines.

Putting on the Curtains.—The curtains are in eight pieces, four for the inner wall and four for the outer wall. The outer curtain should be put on so that the ground flap be inside, and that it can be pegged on the outside. The inner curtain should be put on with the flap out, so that it can be pegged on the inside. Commence with the outer curtain at each side of the doorway and work round towards the ends, taking care to leave enough to overlap and close the doorway. When the curtains are on they should be pegged down both inside and outside. Curtains.

Trenching a Marquee.—A trench 9 inches broad and 4 to 6 inches deep should be dug round the curtain, especially on the upper side, if the ground be sloping. The trench should be cut well under the curtain, so as not to leave a ledge, otherwise the water will drip on the ledge and run under. Trenching.

Points to be attended to.—When rain comes on, the ropes, as they become wet, get tight, and, if not attended to, will pull the pegs out of the ground or break the poles. They will also get tight with a heavy dew. Thus it will be necessary to slack them when rain is expected, and also at night if there is a heavy dew. Again, if the ropes have been wet, they will slacken as they dry, and will require to be braced up, otherwise the marquee may flap and draw the pegs. The doorway of the marquee should be on the sheltered side. The curtains should be taken off the pegs and raised daily for ventilation. They can be fastened to the bracing lines by the buttons of the peg loops. Points to attend to.

Striking the Marquee.—Unfasten the curtains at the bottom, and unhook them from the roof, beginning with the inner one. Fold each piece into eight parts. The four weather-line men should now stand by the weather lines, while four men should unfasten and do up into a skein the bracing lines, beginning with the inner roof at each side of the doorways and working round to the ends. The two mallet men should take up the pegs as the lines are taken off them, and put them away in the peg bag. Striking marquee.

Lowering the Marquee.—The men should take up positions as in pitching, one to each weather line and two to each pole. When all are ready, the non-commissioned officer should give the word to lower. The weather-line men should take the lines off the pegs, Lowering.

but keeping a firm hold, and the standard men should have hold of the poles. All together they should steadily lower the poles, the men at the feet of the poles keeping them from slipping, and the other men lowering them by walking backwards towards the ridge, in the same way as men lowering a ladder.

Repacking. *Repacking the Marquee.*—Roll up the four weather-lines and take the vases off the pins, leaving them there attached by the ventilating cords. Spread out the roofs and roll up the upper flap so as to expose the ridge-pole Next pull away the standard poles, and remove the ridge pole from the slings.

Folding. *Folding the Marquee.*—This done, unroll the upper fold of the roof. Bring over each end to the centre, across the middle of the window, and fold the square thus made from side to side into three equal parts. Place the eight pieces of curtain on the roofs lengthwise, overlapping in the centre, and the flaps towards the thick end. Roll up the whole, thus placed, evenly, commencing with the thick end, taking care not to have the roll too wide or too narrow for the valise.

Stowing. *Putting Marquee in Valise.*—Spread out the valise, and shoving one of the side flaps under the marquee, roll it in. Having arranged the flaps, lace them, commencing with the ends.

41. Operating Tent.

Description of operating tent. The tent is rectangular in shape, and has a doorway at each end. It is fitted with six ventilators of the ordinary type, and also with a large ventilator on each side to give extra light and air. The wall is permanently attached to the tent.

The poles used with it consist of two upright poles and one ridge pole, each made in two pieces.

Dimensions, &c.

	ft.	ins.
Length	20	0
Width	14	0
Height	9	4
Height of wall	3	0
	lbs.	
Weight of tent .... (about)	116	
Weight of tent *with poles* and appurtenances complete .... (about)	181	

The duck used in making this tent is of the same quality as for Mark V circular tents (§ 7359). For the main part of the tent the duck is of 27 inches width, and $10\frac{1}{4}$ oz. per yard in weight. For the wall, 36-inch duck is used of about $13\frac{3}{4}$ oz. per yard in weight.

The valise and pin bag are the same as for the laboratory tent.

The pins and mallets are of the ordinary Service pattern. The complement is—2 mallets, 1 pin bag, 60 small pins, and 8 large pins; this allows 2 spare small pins.

Note.—On account of the rods in the large ventilators, this tent must be folded and rolled up lengthwise, and the weather lines must not cross the ventilators when the tent is pitched.

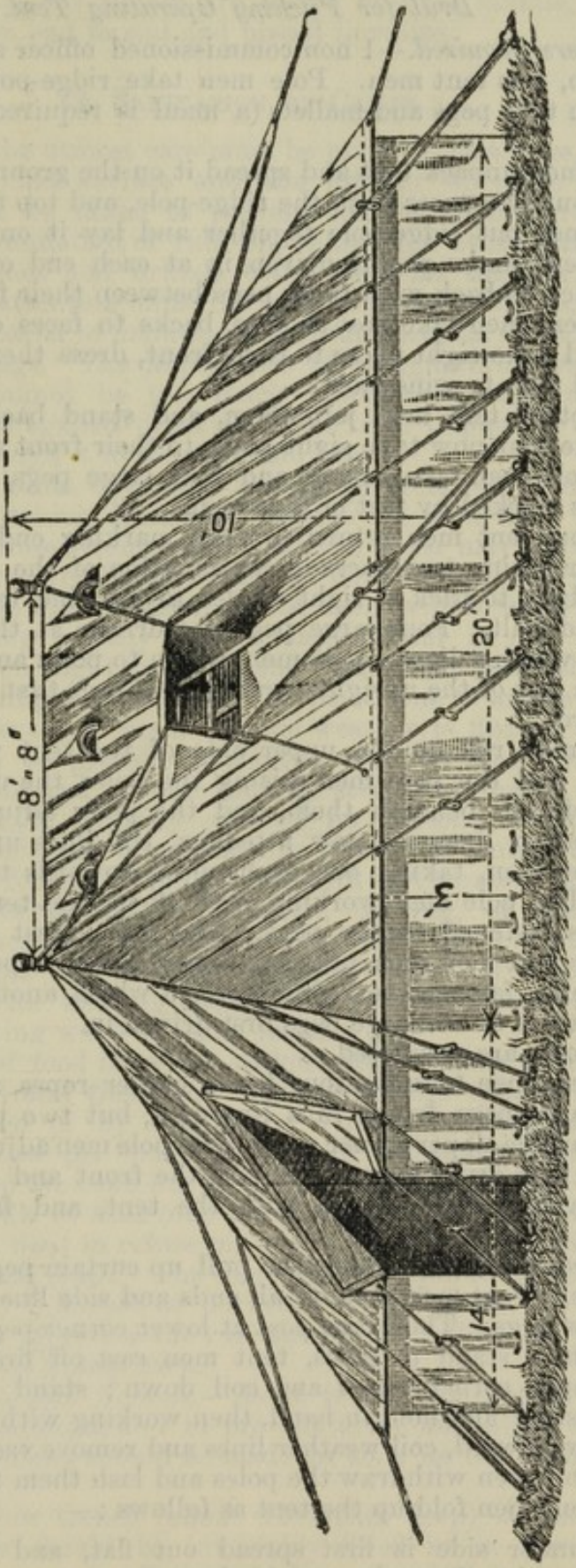


FIG. 79.—OPERATING TENT (MARK I).

Drill for Pitching Operating Tent.

Pitching operating tent.

Numbers Required.—1 non-commissioned officer and 6 men—2 as pole men, 4 as tent men. Pole men take ridge-pole and uprights, tent men take pegs and mallets (a maul is required to drive large pegs).

Tent men unpack tent and spread it on the ground flat, the lower edge about two paces from the ridge-pole, and top to windward.

Pole men put ridge-pole together and lay it on the ground on site of tent, and a peg is driven in at each end of it. Pole men stand back to back with these pegs between their feet.

Two tent men take post at pegs, backs to faces of the two pole men, and take eight paces to their front, dress themselves on pole men and turn to windward.

Two other tent men join them, and stand back to back with them, the four now take eight paces to their front and halt.

The pole men take a maul and four large pegs, and drive them at points marked by feet of tent men.

The four tent men return to pegs, marking ends of ridge-pole, and after taking two paces in continuation of the line marked by it, turn back to back at right angles to the line, take six paces to front and halt. Four large pegs are driven at their feet by pole men for weather lines ; pole men return to poles and lay the frame with the feet of the uprights against the pegs first driven, ridge to windward.

Tent men roll up the upper side of the tent until the top is exposed, and the pole men raising the poles, the underside of the tent is drawn beneath them, and the poles adjusted ; the vases with weather lines are now fitted on, the lines uncoiled, and the four tent men, taking one each, move towards the weather-line pegs. The pole men working with them, the tent is raised and the lines fastened to the pegs. The lines must not be crossed. The four tent men each take an upper corner rope (distinguished by its being fastened to a ring through which another line passes) and adjust it to the large pegs first driven in.

The doors are now laced.

The tent men take the four lower corner ropes, and fasten them to the small pegs driven in a line with, but two paces nearer the tent than, the upper corner pegs. The pole men adjust the windows, the tent men drive pegs and adjust the front and side lines of the roof, drawing them square with the tent, and fasten down the curtain.

Striking.

Striking the Tent.—Pole men pull up curtain pegs and let down windows. Tent men cast off all ends and side lines and coil them, and draw pegs. Then take post at lower corner pegs.

Pole men stand to poles, tent men cast off first lower corner, then upper corner ropes and coil down ; stand to weather-line pegs, cast off and hold in hand, then working with pole men lower tent to windward, coil weather lines and remove vases.

The pole men withdraw the poles and lash them together.

The tent men fold up the tent as follows :—

The under side is first spread out flat, and the upper side drawn over it ; the ends are folded over so as to form a square ; the

top and bottom of the square are folded over the middle, and the whole rolled from end to end and placed in valise.

42. Sanitation of Camps.

In all camps the utmost care must be given to cleanness, both as regards the ground surface and the interior of tents. Every precaution must be taken to prevent fouling of the ground by slops, or by accumulation of rubbish, or through other places than the proper latrines and urinals being used for the purposes of nature. Great attention must be paid to camp kitchens, and no effort must be spared to maintain a thorough sanitary condition of their surroundings. The importance of safeguarding water and food supplies cannot be too much emphasised, and men are earnestly warned against drinking water from impure or doubtful sources, even though it looks clean and bright.

To keep the tents dry, they should be trenched as described under "Tent Pitching Exercise" (Section II, para. 39). A drain should connect these trenches, so that the water may not lodge in them, but may run freely off. Half an hour's work on a wet day, when the natural run of water can be seen, will do more towards keeping the camp healthy than a day's labour in dry weather. If more than one night in camp, the flies of the tents should be rolled up first thing next morning. This is done to let the sun and wind dry and air the ground. If the weather is fine all blankets and kits should be placed outside the tents to air. Systematic cleaning of the interior of tents must be strictly enforced. To keep tents dry.

Places should be carefully selected for personal ablution and washing of clothes, and arrangements should be contrived with a view to prevent fouling of the ground with dirty water. It should also be remembered that if ablution, bathing, or washing of clothes takes place near a drinking water well, the foul water may filter through the soil into the drinking water; if a stream be used the place for washing must be fixed well below the point where the drinking water is taken from. Washing.

The remains of food from the various messes must be swept up after each meal, and these and other sweepings collected and, if possible, disposed of by burning. Where burning cannot be carried out a refuse pit should be dug in a suitable position, and every addition to the contents of the pit should be at once covered with earth. Milk of lime (one part quicklime to eight of water) should be freely used in refuse pits and slaughtering places, and on the ground around them. The same care is required in the disposal of animal litter: it should be burned, buried, or removed far from the troops. For all refuse the rule should be, "*Burn all you can, and bury what you cannot burn.*" Disposal of refuse.

Field Latrines and Urinals.—As it is most important to keep camping grounds clean, and to prevent urine and night soil from fouling them, latrines should be made as soon as the troops arrive on the ground. Latrines.

A small shallow trench (about 12 inches deep) will suffice for one night; this should be invariably filled in in the morning before the troops march off, the site being marked by heaping up the earth.

Situation.

Situation of Latrines.—They must be placed as far as possible from the kitchens, and from any source of water supply, and to leeward whenever this is practicable. They must never be placed in any gullies which, when it rains, may discharge into the water supply. Urinals may need to be placed nearer than the latrines to the men's tents in order to prevent the ground being fouled at night; a urinal is always required near to the canteen.

For *standing camps* there are two systems that may be employed; the trench system, and the removal, or pail system.

Trench system.

(1) *The Trench System.*—Latrines may be made with seats, as shown in Fig. 80. The seat being a simple rough pole, the trench should be made as narrow as possible, and from 3 to 4 feet deep. A fatigue party should scatter some earth into the trench twice or thrice a day; the more often this is done the better. Quicklime or chloride of lime in powder may be mixed with the earth, or milk of lime (one part of quicklime to eight of water) may be sprinkled over the trench. The length of the latrine trench must not be greater than that of the poles to be used as the seat and back rests. Latrines should be constructed to seat, if possible 10 per cent. of the troops, 2 feet per man being allowed.

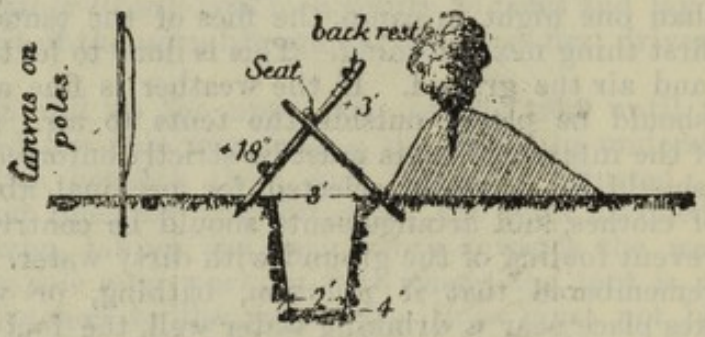


FIG. 80.—LATRINES.

The trench should be 3 feet wide at the top, and 2 feet wide at the bottom, the hinder wall being cut straight down and the front wall sloping backwards. The earth dug out is heaped behind the trench. Six poles about 4 inches thick are required, two of which should be 10 feet long, two 6 feet long, and two 4 feet long, the four latter should be pointed at one end. After the trench has been dug the two 6-feet poles should be driven into the front edge of the trench at the ends sloping backwards. The two 4-feet poles should be driven into the hinder edge of the trench, crossing the 6-feet poles about the centre of the trench. They should be lashed firmly together in this position with rope yarn, about 6 inches of the 4-feet poles projecting in front of the 6-feet poles, so as to form two crutches. Upon these one of the 10-feet poles is laid and then lashed. This forms a seat. About 2 feet above the seat the second 10-feet pole is lashed to the front of the 6-feet pole so as to form a back rest. The latrine is hidden from view by means of a canvas latrine screen, this being so arranged as to leave plenty of space in front of the seat.

Separate pits or trenches must be dug for urinals.

All trenches must be carefully filled in *before leaving* the camping ground, and their position marked by heaping up the earth to a slight extent.

(2) *The Pail System.*—In standing camps likely to be used for any considerable time it is preferable to adopt the pail system of removal, if circumstances admit of its being carried out. Poles may be set up as above described, or rough closet seats may be constructed. The same care is necessary in covering the excreta with dry earth, or earth and lime, at frequent intervals; the pails should be removed and clean ones substituted for them at least once a day, and if possible twice a day. Separate pails of larger size may be used for urinals, in which sawdust, when available, may be placed; it is a good material for soaking up and deodorising urine. Care must be taken to keep the ground round about as dry and clean as possible. Pail system.

43. Water Supply.

As the health of a force largely depends on the purity of the water provided, everything possible must be done to ensure an ample and pure supply; it is through drinking contaminated water that cholera, dysentery, and enteric fever are chiefly spread; men must therefore be careful not to drink any water that is not pure. If no water that can be relied on as fit for drinking is obtainable naturally, the best source that is available will be made use of and measures taken to render it safe, either by filtration or by boiling. Water that has been thus purified must be used carefully and not wasted; men should be trained to economise the contents of their water-bottles, which before marching should be filled with weak tea, coffee, or sterilised water. Self-restraint in quenching one's thirst should be practised in time of peace, especially while on the march and during manœuvres; it is only by such self-restraint, every man husbanding the limited quantity in his water-bottle, that troops can be properly trained for encountering successfully the trials and hardships of active service. Men should make it a point of honour to exercise this self-control, not only in their own interests, but for the sake of the health and efficiency of the army to which they belong. Water supply.

Purification of Water.—This may be done either by filtration or by boiling.

When filters are used, of the Chamberland or Berkefeld, or similar pattern, the following points must be remembered:—(1) If the water is muddy it requires to be cleared, either by a preliminary straining through cloth or canvas, or by the use of alum (6 grains to the gallon) before passing it through the "candles," otherwise these will very soon get clogged and useless; (2) it is necessary that the "candles" should be sterilised by boiling twice a week; (3) the way these filters purify the water and make it safe for drinking is by preventing the passage through the "candles" of the minute germs of disease: therefore, as the water can only pass through these filters very slowly (about 18 gallons per hour in the service pattern Berkefeld filter) some patience is required to work them; (4) the surface of the "candles" must be frequently brushed to get rid of the deposit, otherwise the delivery of the water will be too slow. Filtration.

Boiling.

When the water is ordered to be boiled, unless any particular instructions are given, it should be *kept boiling* for a quarter of an hour; while cooling down, and while stored before being used, it must be carefully covered up from dust, &c. Different forms of apparatus are in use for cooling the water rapidly after boiling; but in any case, unless the water is to be drunk immediately, it needs to be carefully protected from contamination after it has been boiled.

One gallon of water per head per day is a good allowance for drinking and cooking purposes in camp, half of this quantity being provided as water for drinking.

When no special means of boiling or filtering are available, the water should not be drunk "raw," but should be made into tea, to be drunk either hot or cold. If muddy it may be cleared by adding a little alum (6 grains to the gallon) and stirring it round; this causes the suspended matter to fall to the bottom. Or rough filtration may be carried out by taking two casks and placing one inside the other, the outer pierced with holes at the bottom, and the inner near the top; the space between is filled with sand or gravel or wood charcoal: when these are placed in a stream the water rises through the gravel between the barrels, and flows into the inner one. Or a sheet may be tacked on to a wooden frame so as to form a bag or basin; put a couple of handfuls of wood ashes in the bottom, and then pour on the water, allowing it to percolate through into a receptacle beneath. Some simple means such as the above should always be tried if no regular purifying methods are at hand.

XII.—CEREMONIAL.

44. Inspection or Review.

1. *Formation.*—The Royal Army Medical Corps for inspection will be drawn up as detailed in Infantry Training. Swords will be at the *slope*.

Receiving an Inspecting Officer.

General salute—Carry swords. { When the inspecting officer arrives in front of the centre, at a distance of about 60 paces, he will be received with a salute, the men carrying swords, the officers saluting with the right hand, taking the time from the commanding officer, and the bugler sounding the general salute.

Inspection in Line.—The commanding officer, who will ride on the side furthest from the troops, accompanies the inspecting officer as he passes down the front of the line from right to left, returning along the rear, the other officers remaining steady, and the men standing with swords at the carry. The commanding officer then takes the orders of the inspecting officer as to the movements to be performed.

Return swords. { Swords will be returned and the ranks closed.

Inspection in Column.—When companies are reviewed in column the captain of each company will receive the inspecting officer with a salute, and follow him during the inspection of his company.

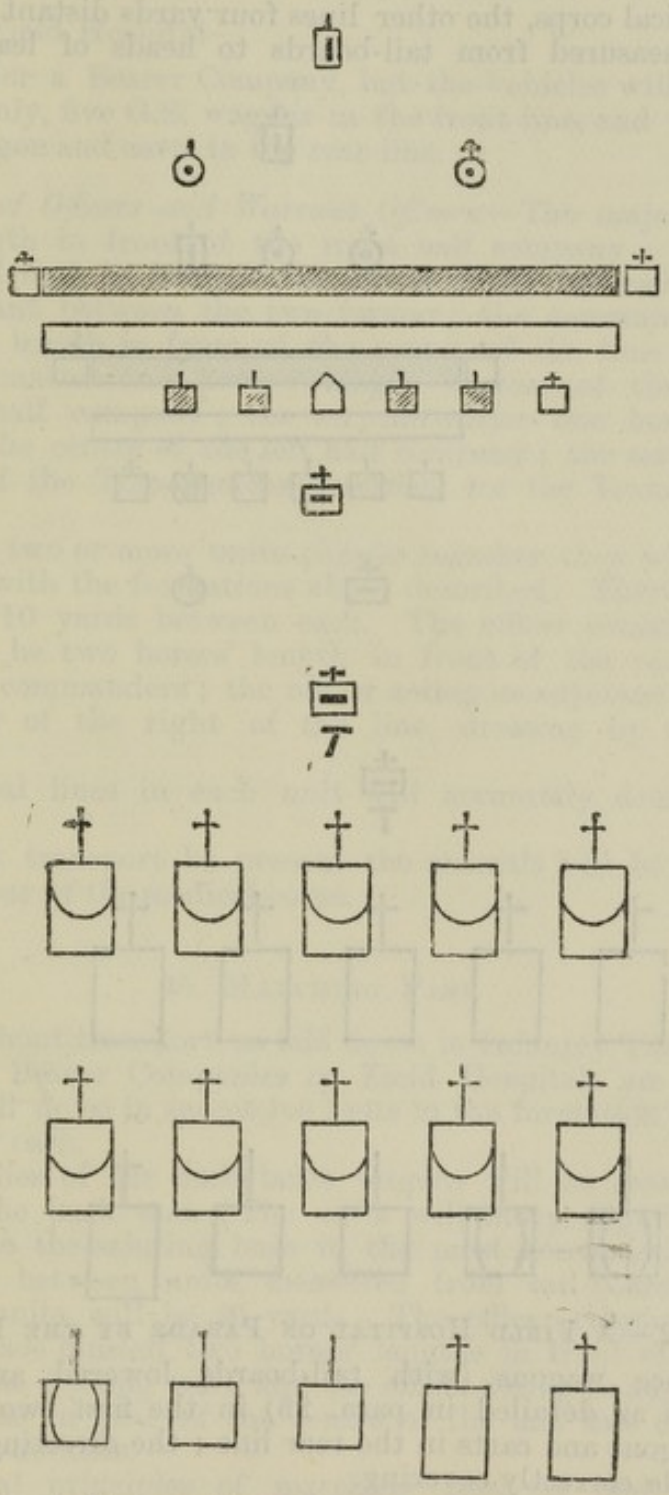


FIG. 81.—A BEARER COMPANY ON PARADE BY THE LEFT.

2. *Inspection of a Bearer Company or Field Hospital.*—When hese units parade for inspection or review they will be formed p as follows :—

(*a*) The Bearer Company—

The medical corps drawn up as in 1 in front; the Transport attached in rear, paraded in three lines at close (or half) interval; the first line 20 yards in rear of the front rank of the medical corps, the other lines four yards distant from each other, measured from tail-boards to heads of leaders; the

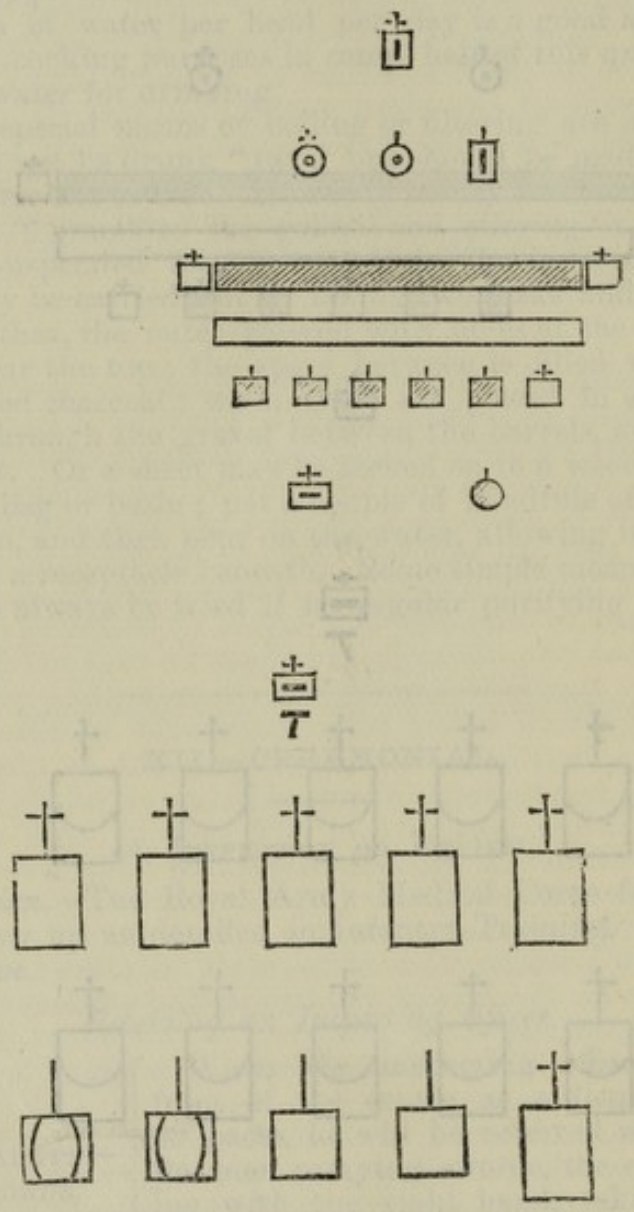


FIG. 82.—A FIELD HOSPITAL ON PARADE BY THE LEFT.

ambulance wagons (with tail-boards lowered and wagon-orderlies as detailed in para. 25) in the first two lines, the G.S. wagons and carts in the rear line; the directing flanks of the whole correctly covering.

Position of Officers and Warrant Officer.—The captain and lieutenant to be one horse's length in front of the centre of the right and left half company respectively; the major one horse's length in front of, and midway between, the two former officers;

the serjeant-major one horse's length in rear of the centre of the supernumerary rank. The Transport warrant officer to be one horse's length in front of the centre of the leaders of the first line.

(*b*) The Field Hospital—

As for a Bearer Company, but the vehicles will be in two lines only, five G.S. wagons in the front line, and the remaining wagon and carts in the rear line.

Position of Officers and Warrant Officers.—The major to be one horse's length in front of the right half company ; the captain one horse's length in front of the centre of the left half company ; the lieutenant between the two former ; the commanding officer one horse's length in front of the centre of the line of officers ; the quartermaster one horse's length in rear of the centre of the right half company ; the serjeant-major one horse's length in rear of the centre of the left half company ; the serjeant-major in charge of the Transport as described for the Transport officer in (*a*).

3. When two or more units parade together they will do so in accordance with the formations above described. There will be an interval of 10 yards between each. The officer commanding the whole will be two horses' length in front of the centre of the line of unit commanders ; the officer acting as adjutant one horse's length clear of the right of the line, dressing by the line of officers.

The several lines in each unit will accurately dress by each other.

4. If pack transport be present the animals will be drawn up in lines in rear of the medical corps.

45. Marching Past.

(*a*) If without transport, as laid down in Infantry Training.

(*b*) When Bearer Companies or Field Hospitals are to march past they will do so in successive units in the formation previously described for each.

The orderlies of the ambulance wagons will be seated on the off-side of the back seat. The units will move round from the parade line to the saluting base in the most convenient manner. The distance between units, measured from tail-boards to commanders of units, will be 20 yards. The officer commanding the whole will place himself two horses' lengths in front of the commander of the leading unit, and the officer acting as adjutant two horses' lengths in rear of the centre of the last line of wagons, carts, or pack animals.

The general principles of marching past, as laid down in Infantry Training and Army Service Corps Training, will be observed by the medical corps and the Transport details respectively.

Under these circumstances stretchers will not be carried in the hand in marching past.

XIII.—LANCASTER SWORD-BAYONET EXERCISE.

46. Drawing, Carrying, Sloping, and Returning Swords.

FOR SWORD EXERCISE FALL IN TWO DEEP.

DRAW SWORDS.—Grasp the hilt with the right hand and the scabbard just below the frog with the left.

Two.—On the word *Two*, draw out smartly to the front, come to the "recover," the sword perpendicular, edge to the left, hilt in line with the chin, elbow close to the body; the left hand resumes the position of attention directly the sword is drawn.

Three.—On the word *Three*, bring the sword smartly down to the position of "carry," hand level with the elbow, blade perpendicular, edge to the front.

SLOPE SWORDS.—Relax the grip of the third and fourth fingers and allow the blade to fall on the right shoulder.

RETURN SWORDS.—From any position. Grasp the scabbard with the left hand, and enter the point about one inch.

Two.—On the word *Two*, return the sword smartly, and drop the hands to the sides.

DRAW SWORDS.—As before.

SLOPE SWORDS.—As before.

STAND AT EASE.—When at the slope.

Except at the SLOPE, when the fingers may be slightly relaxed, the same grip of the sword is to be retained throughout the exercise, the middle knuckles in the line of the edge, the thumb and fingers clasped round the handle.

Staff-serjeants being equipped with the long sword will perform these movements according to the instructions laid down in Infantry Sword and Carbine Sword-Bayonet Exercises.

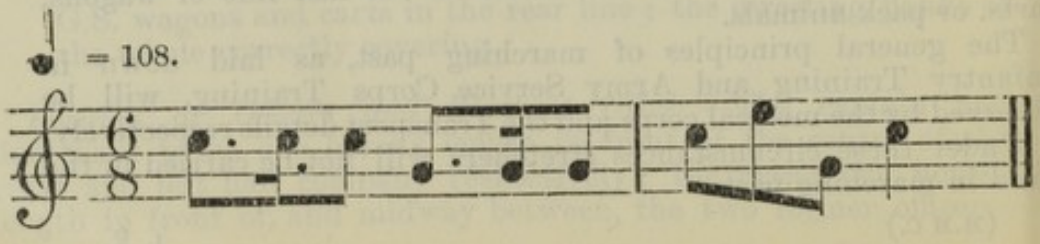
Compliments to Officers, &c.

Non-commissioned officers and men on duty with drawn swords will CARRY SWORDS to all officers and armed parties.

XIV.—ROYAL ARMY MEDICAL CORPS REGIMENTAL CALL.

47. The calls for the Royal Army Medical Corps are given in "The Trumpet and Bugle sounds for the Army."

The following is the Regimental Call :—



INDEX.

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