

LECTURE V.

METHODS OF LIFTING AND CARRYING THE SICK OR INJURED:
AND THE AMBULANCE ARRANGEMENTS NECESSARY IN TIME OF
WAR.

Giving aid by means of one helper; and the best ways of lifting and carrying by oneself, unaided, an insensible man—Giving aid by means of two helpers; and the methods of making two-handed, three-handed, and four-handed seats—The conveyance of patients on stretchers—Furley's Lowmoor Jacket—The Tibshelf Ambulance Tram—Wheeled stretchers or litters—Improvised stretchers—The conveyance of patients in Ambulance Sick-transport Waggon and Carriages, Country Carts and ordinary Vehicles, Sledges, Horse-litters, Mule-litters, and Mule-chairs—The conveyance of Patients by Rail.—Military Ambulance Organisation.

WHEN you have given all the assistance you can on the spot in a case of accident or sudden illness, you have by no means completed your duty. You have to see that the patient is conveyed safely either to his home, the nearest hospital, the residence of his medical attendant, or it may be to a neighbouring shed or cottage—there to await the arrival of the surgeon. In cases of severe injury—as when a leg or thigh is fractured, or the head, chest, or belly badly wounded—the patient should *always* be carried off in the lying-down position, and for this purpose a stretcher or some other means of conveyance is required. The same remark applies to cases of sudden and serious illness, as apoplectic attacks, and severe continued fainting fits; and also to all cases of accident attended by marked shock, faintness, or troublesome bleeding. In less serious cases, when the injuries are—comparatively speaking—slight, and when more especially they affect the arms, head, or upper part of the trunk, the lying-down position is not absolutely requisite, and such patients may frequently be helped or carried along by their comrades or attendants without the aid of a stretcher or any other sort of conveyance—that is, providing they have only to go a moderate distance.

GIVING AID BY MEANS OF ONE OR TWO HELPERS: AND THE
METHODS OF MAKING TWO-HANDED, THREE-HANDED, AND
FOUR-HANDED SEATS.

When there is only One Helper.—If there is only one person to give assistance, there are several ways in which he may act, according to the state of the patient (whether conscious, unconscious, faint, or helpless), the position and severity of the wound, and other circumstances. Thus (*a*) he may put one arm around the patient's loins at the same time that the patient puts an arm around the helper's neck—the patient's hand resting on the helper's opposite shoulder, and grasped firmly by the helper's disengaged hand. If the injury is in the head, neck, upper part of the body, or lower limb, the patient may also assist himself by means of a stick in the hand farthest from the helper; but if the arm is the part that is wounded, it must of course be properly slung. In this way one helper can give considerable assistance: placing his hip behind the near hip of the injured man, he can not only support him to a certain extent, but can even bear him along. In going down hill, the helper must be particular to hold the patient firmly, as there is risk of him falling or slipping forwards from weakness.

(*b*) If the helper is sufficiently strong, he may carry the patient in his arms like a child; or (*c*) he may carry him on his back—if the thighs are uninjured—holding and supporting the patient's thighs with his arms. These two last methods are useful when the patient cannot stand or walk; in both of them the patient must put his arms around the neck of his bearer. In former times, before stretchers were regularly used, wounded soldiers were generally carried off the battlefield on the backs of their helpers; and Surgeon-General Longmore states it was in this way that the great French surgeon, Baron Percy, carried an officer, dangerously wounded, over a bridge which was being destroyed by the fire of twelve Austrian guns. (*d*) If the patient is unconscious, then the task of his helper is much more arduous. A correspondence on this subject has recently appeared in the columns of the *Lancet* in reply to inquiries made by officers in the Soudan, and also in South Africa,

as to the *best way of carrying by oneself, unaided, an insensible man.** One very good plan is that advocated by the chief officer of the Metropolitan Fire Brigade; it is described as follows:—First turn the person face downwards (standing in a line with the patient and facing his head), and take hold close up under each armpit; then raise the body as high as it can be lifted in that position, and allow it to rest on one of the knees; then shift the arms round the waist, and, after interlocking the hands, lift the person in an upright position. After this, take hold of one of the wrists with one hand, and drop into a stooping position; at the same time pass the arm that is free between or around the legs, and the person will then fall across the shoulders; then rise in an upright position, and balance the body on both shoulders.† A somewhat similar method, in which, however, the helper has perfect freedom of one of his arms, is thus described by a correspondent of the *Lancet*.—(e) Turn the individual upon his face, with the arms extended in a line with the body. Raise the trunk until he be in a kneeling position. Place yourself under him, so that his stomach rests on your right shoulder. Pass your right arm between the thighs and behind his right thigh. With your left arm draw his left hand forwards under your left, and grasp the wrist with your right hand; then raise yourself to an erect position. If you can obtain assistance in this operation, so much the better; or if there be a bed or table upon which the subject may be placed, he will be more easily raised, or, rather, you will more easily raise yourself and burden. By this method the weight falls directly on your shoulders. The person carried cannot slip forwards, as you have his hand grasped from behind; nor can he slip backwards or off the shoulder, as your arm is over the thigh. The left arm is disengaged. Or, by reversing the operation, he may be carried on the left shoulder, in which case the left arm is passed behind his left thigh and his right hand grasped from behind. Your right arm is then free. This is very advantageous; as, for example, going down a ladder from an upper storey of a burning building where the rescued one is overcome by smoke, or where the operator wishes to carry weapons, etc., off the field of battle.‡

* *Lancet*, March 14, 21, and 28, 1885.

† *Fire Protection*, Captain Eyre M. Shaw.

‡ "How to carry, unaided, an insensible man," Beaver, *Lancet*, March 28, 1885.

If straps, bands, scarfs, or other materials suitable for slinging or tying, are available, other methods may be adopted. Thus the correspondent alluded to above, writes—(f) Seat the subject with the legs bent on the thighs, and these bent on the trunk; the head will then rest on the knees. Pass a broad continuous strap (a soldier's belt for example) behind the thighs at the popliteal spaces (that is, behind the back of the knees) and under his arms. Crouch down behind him, back to back, pass the strap over your forehead, and raise yourself. The strap should be short enough to allow the weight to fall upon the shoulders and upper part of your back while you are bent slightly forwards. The head may drop backwards: but if so, it falls on the top of yours. The strap, being under his arms, prevents him from falling through. Both your arms comparatively free.

When there are Two Helpers.—(a) Two helpers may carry a

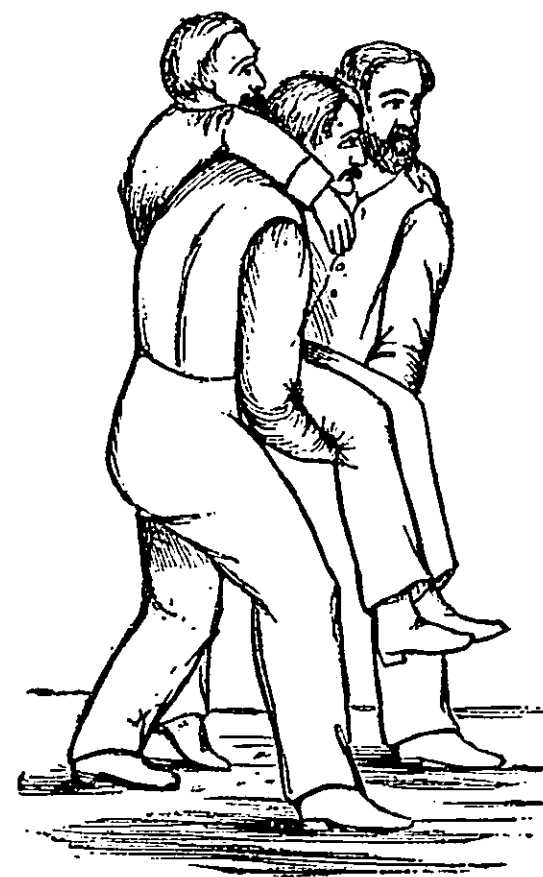


FIG. 36.—Two bearers carrying a patient, in a sitting-up position, on a two-handed seat.

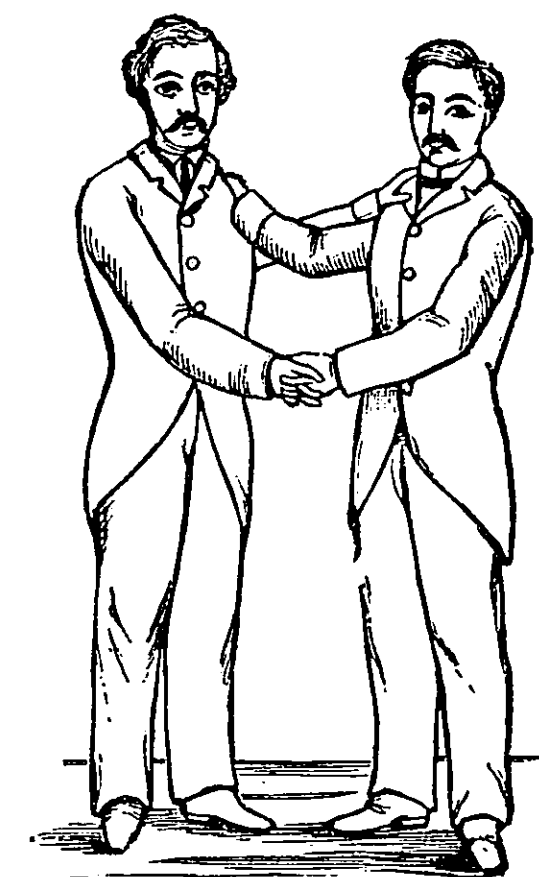


FIG. 37.—Plan by which two bearers may carry a patient, in a lying-jack position, on a two-handed seat.

patient by joining two of their hands under his thighs, and clasping him around the loins with their disengaged arms. The patient is thus carried in a sitting position (Fig. 36), and

may further support himself by putting one or both of his arms around the necks of his helpers—that is, supposing from the nature of his injuries he is able to do so. This method acts well for a short distance; but the helpers cannot long bear the severe strain thrown on the arms and joined hands which support the thighs and sustain the entire weight of the patient.

(b) A patient may be carried in a lying-back position by the helpers joining two of their hands tightly under his thighs, and placing their other hands on—and grasping firmly—each other's shoulders (Fig. 37). This is an excellent method for carrying patients who are very weak, absolutely helpless, or injured in both arms; and in this way,

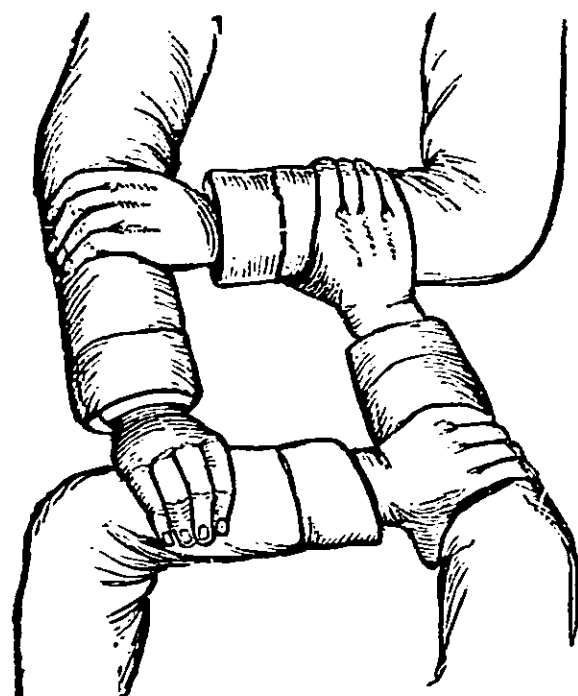


FIG. 38.—Four-handed seat, made with the arms uncrossed; sometimes called the sedan-chair or dandy-chair.

as the weight of the body does not fall entirely on one pair of arms (as in the former method), but is pretty equally distributed on all the arms, and to some extent on the chests and shoulders, of the helpers, a wounded man can be conveyed for a considerable distance without extra fatigue to his bearers.

(c) The helpers, by crossing their arms and then taking hold of each other's hands, can form a four-handed seat on which to carry a patient—that is, if he is in a fit state to be conveyed in the sitting-up position, and also able to support himself by putting his arms around the necks of his

bearers. A good seat can certainly be made in this way; but a great disadvantage is that the weight of the patient quickly tells upon the bearers' arms at the points where they cross each other, and so rapidly causes severe pain.

(d) When it is decided to use a four-handed seat for any particular case, it is better, therefore, to make one with *uncrossed* arms. This form of seat is that known as the "sedan-chair" or the "dandy-chair," and, though it looks a little complicated (Fig. 38), can easily be made as follows:—Let the two bearers stand face to face, each grasping the middle of his right fore-arm with his left hand, the backs of the hands upward; then let each bearer grasp the middle of the other's left fore-arm with his right hand, the *backs* of the

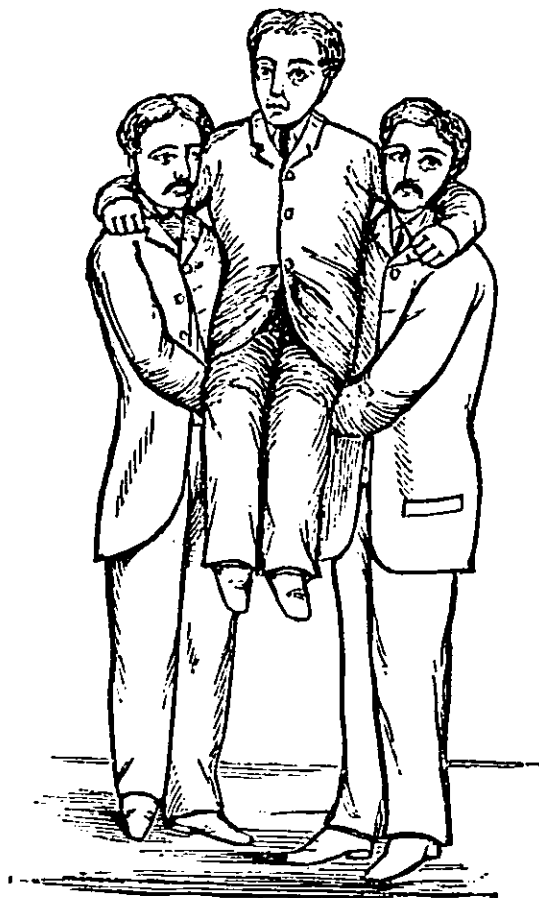


FIG. 39.—Two bearers carrying a patient on a four-handed seat.

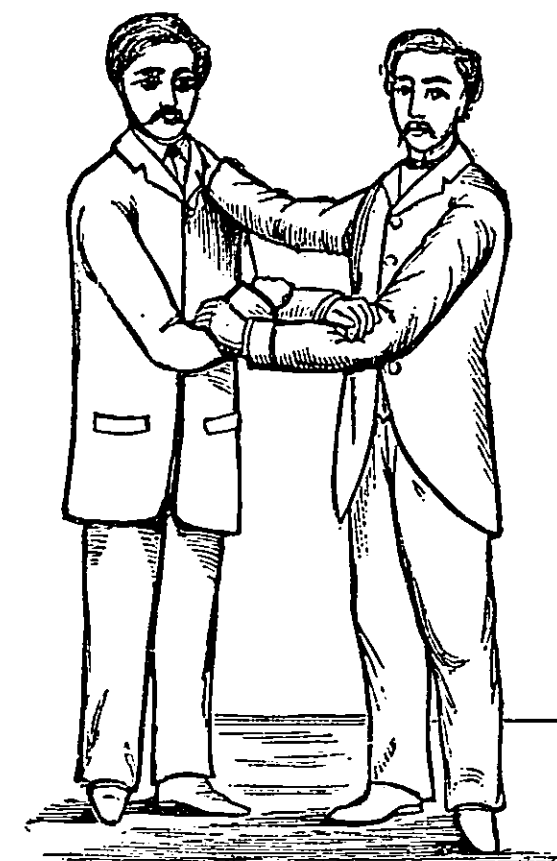


FIG. 40.—Three-handed seat and back support.

hands—I repeat—*upwards*, and the chair is complete. A four-handed seat made in this way is comfortable and also secure, providing that the patient can further support and steady himself by putting his arms around the necks of his helpers (Fig. 39). The weight of the patient, too, by this arrangement of the bearers' arms, can easily be borne.

(e) Perhaps the most useful method of all—because it is the easiest for the bearers as well as the most suitable for the

greater number of injured men, who are generally weak, but not utterly helpless—is that known as the *three-handed seat and back support* (Fig. 40). This method, like the former one, looks rather complicated, but can easily be managed as follows:—Let one bearer grasp his left fore-arm with his right hand, and the other bearer's left fore-arm with his left hand at the same time that the other bearer grasps his right fore-arm with his (the other bearer's) left hand, and places his (the other bearer's) right hand on his left shoulder. By this method the patient is provided with a comfortable, firm, triangular seat, as well as with a cross support behind, which prevents him falling backwards; and the bearers can sustain the weight of the patient with greater ease to themselves, as well as much more comfortably and for a longer distance, because their bodies face rather more to the front.

There may be some difficulty in getting a feeble or badly injured patient on to these different hand-seats; but it can be managed by the bearers placing themselves one on each side of the patient, kneeling on one knee, and then raising the patient on to *their* knees, so that he can support himself by putting his arms around his helper's necks while they quickly join their hands into a seat underneath him. The bearers, having locked their hands securely, can then slowly rise up together, lifting the injured man with them. If one of the lower limbs is badly hurt, for instance broken (*and no stretcher being available*), then a *third helper is absolutely necessary*; splints should be bound on to the injured part; the legs should be tied together, and raised carefully in a horizontal position by the third bearer as the patient is being lifted; and as the party moves off, the third bearer—holding the patient's legs securely and steadily in the horizontal position—walks in front.

(f) An *insensible* patient may be conveyed by two bearers—one walking in front carrying a leg under each arm, the other walking behind supporting the upper part of the body; both bearers being careful to get a secure hold (the hindmost one by passing his arms under the shoulders and around the chest of the patient) before rising steadily together.

Instead of employing any of these methods the bearers may sometimes *improvise a seat* by carrying horizontally between themselves a pole, rifle, a piece of light planking, a bar of a gate, or anything else suitable and handy, around which something soft has been rolled, as a blanket, rug, overcoat, or

tunic. The patient sits on the seat thus formed, and further secures himself, if he is able, by placing his arms on the shoulders of his bearers. If the patient is very helpless, the improvised seat should be placed close to his side or back; and the bearers, after carefully lifting him on to it, should rise up (lifting the seat) slowly together; and if any straps, belts, or accoutrements are available, the bearers can use them as shoulder straps with which to sling the seat, and then their hands are free to lend additional support to the patient.

Patients whose injuries are comparatively slight (more particularly if it is the upper part of the body that is wounded—the arms, head, face, or upper portion of the trunk; or the foot) may be conveniently carried by one or other of the methods described. But when the joints are injured, or the bones fractured, of the lower limbs; or when there are severe wounds of the head, chest, or belly; or serious injury of the shoulder joint; or when there is much shock, faintness, or tendency to bleed; and indeed when the injuries are *severe*, or whenever the case is one of grave and sudden illness, such as apoplexy—then the patient should be carried in the *lying-down position* by means of *stretchers* or other suitable conveyances.

METHODS OF LIFTING AND CARRYING THE SICK OR INJURED ON STRETCHERS.

A *stretcher* may be described as a light and strong frame of an oblong shape (provided with handles), on which a canvas is stretched tightly so as to afford a comfortable and elastic support to anyone lying upon it. I cannot enumerate, far less describe, all the various stretchers that have been constructed, from time to time, by different inventors; it will be sufficient for my purpose to notice two very good ones—the *regulation stretcher* of the British Army; and the *folding stretcher*, “*Furley*” pattern, which is supplied by the Ambulance Association.

The Regulation Stretcher is made of a piece of canvas, 6 feet 6 inches long, 1 foot 11 inches wide, nailed to two side

poles, 7 feet 9½ inches long, with two hinged steel cross-pieces; it is also provided with four foot-pieces, to which small rollers are attached, so that when laid down it is raised by means of its foot-pieces about 6 inches from the surface on which it rests (which prevents the patient being exposed to wet underneath, or to pressure from stones or rough ground); and, moreover, when required, it can be readily pushed along its rollers into a waggon, cart, or other conveyance having a level floor. All the parts of the stretcher are connected one with the other, so that no portion can possibly be lost; and the whole concern, which weighs (Surg.-Major Evatt says) 32 lbs., can be folded up, when not in use, for storage or packing. The stretcher also has shoulder straps in the form of leather slings attached, one at each end, so that it can be borne without the strain on the hands, and—what is more important—without the danger of dropping down from the careless conduct of the bearers.

The "Furley" Stretcher, with which you are supplied, is provided with four foot-pieces and with shoulder straps, and—like the military stretcher—possesses the great advantage of having no independent parts; you can—if you wish it—raise the canvas up at the end of the frame in such a way as to give head support; the joints are so arranged that if the stretcher has to be passed into a carriage or through a doorway rather less than two feet in width, the bearers can diminish the breadth without inconvenience to the patient upon it; it can be procured either with *fixed* or *telescopic* handles, the great advantage of telescopic handles being that—with them—the stretcher can be used more easily in mines where the space is limited, and can also be placed in railway carriages and other vehicles not otherwise sufficiently long to receive it; it can be readily folded up, when not in use, so as to occupy but little room; it weighs only 22 lbs.; and, lastly, it is cheap, costing no more than two guineas with fixed handles, and two pounds, ten shillings, with telescopic handles.

Now, you are possessed of a capital stretcher; but that is not all that is required for the proper and safe removal of a sick or injured man. Everything depends upon your own behaviour and steadiness. You must use the utmost care and gentleness when lifting the patient from the spot where he lies on to the stretcher. When raising and marching with the stretcher, you must not relax any of your caution,

but must move strictly according to the rules which I shall presently explain to you; and lastly, when you reach your destination you must continue to exert the greatest patience, care, and gentleness, in removing the patient from the stretcher to his bed. Any carelessness, rough handling, or want of attention to the proper rules on your part, will cause increase of the patient's sufferings, aggravation of his injuries, and perhaps even danger to his life.

Before beginning your work always see that you have "plenty of help." If possible, never have less than three men to remove a patient, for a third man is absolutely necessary if the patient is perfectly helpless, in cases of fractured thigh or leg, if one of the other bearers gets wearied or "done," or (as may happen in military work) one of the men should be wounded.

The three men chosen should be distinguished from each other by being numbered—No. 1, No. 2, and No. 3. The strongest man of the three should be selected for No. 1, as he will have to bear the greatest weight. In order that the little party may act regularly, steadily, and move easily together, one of them should superintend the work and give the necessary directions by simple words of command. This duty is best performed by No. 3, as, from his position, he can see the other two bearers as well as the patient.

At the word *Place the stretcher*,* then, from No. 3, No. 1 takes the head of the stretcher and No. 2 the foot, and they place it in a line with the patient's body, the foot of the stretcher being next the head of the patient. The stretcher is placed close to the patient so that he need not be moved by hand farther than is absolutely necessary; and it is put in a line with the patient's body, as if placed cross-wise the bearers would have to turn round, and would be liable to stumble when moving him. Again, if the stretcher is placed by the side of the patient, it interferes with the movements of the bearers, and is liable to make them stumble when placing the patient on it.

No. 3 (after satisfying himself that the patient has received all the *immediate* assistance which it is possible to render him on the spot, and after arranging cushions or folded articles of clothing, etc., on the stretcher, so as to give any support to the injured part that may be necessary)

* *Stretcher Exercise*, No. 1, St. John Ambulance Association.

gives the word *Fall in*. At this order No. 1 places himself on the right and No. 2 on the left side of the patient—the two bearers facing each other—and No. 3 places himself on the injured side in a line with the patient's knees, his business being to look after the injured part, to see the dressings, etc., do not get displaced, and also that No. 2 does not interfere with or touch the patient's feet when lifting or carrying the stretcher.

At the word *Ready* Nos. 1 and 2 go down on one knee, grasping each other's hands under the shoulders and upper part of the thighs of the patient, while No. 3 places his hands underneath the lower limbs, always taking care, in case of a fracture, to have one hand on each side of the seat of injury.

At the word *Lift* the bearers rise together, slowly and carefully, keeping the patient in a horizontal position.

At *March* all the bearers take short side paces until the patient's head is over the pillow of the stretcher.

At *Halt* the bearers stand still.

At *Lower* the patient is placed gently on the stretcher, and the bearers then stand up.

Care must now be taken that the patient rests securely on the stretcher in the particular posture which is most suitable to the nature and position of his injury; and that the injured part (and other portions of the body, if necessary) are properly supported by pillows, folded clothes, accoutrements, hay, straw, or other materials. All being arranged properly and comfortably, the word *Fall in* is given and No. 1 places himself at the head of the stretcher with his face towards the patient, No. 2 at the foot with his back to the patient, and No. 3 at the side of the patient.

At *Ready* Nos. 1 and 2 stoop down and grasp the handles of the stretcher, having previously adjusted their shoulder-straps in case they are used.

At *Lift* the stretcher is gently raised to position ready for moving off.

Remember that the bearers must always carry the stretcher with their hands, or by means of their shoulder-straps. On no account must they ever carry it on their shoulders, for under such circumstances the patient might faint, bleed, and even die without being noticed, or he might fall off and have his injuries greatly aggravated thereby. It is stated that the American general, Stonewall Jackson, was being carried on

a stretcher supported on the shoulders of four bearers, when one of the bearers was shot and fell, and the sudden fall of the general from such a height so aggravated his injuries that he died in consequence.* In military work, the plan of carrying stretchers on the shoulders of the bearers is attended by other and peculiar risks. Thus I find it recorded that in the Crimean War a wounded officer on one occasion was being carried on a stretcher which was supported on the shoulders of the bearers—who had their rifles slung across their shoulders, muzzles uppermost—when one of the rifles accidentally “went off,” and the officer was shot dead.† Moreover, when a stretcher is carried on the shoulders, the patient is rendered nervous and uneasy because of the height at which he is placed, and as the bearers are scarcely ever the same size, it is impossible in this way to carry the stretcher in a perfectly horizontal position. It is better, however, if it can be managed, always to have the bearers as nearly alike in size and strength as possible, as they can more easily keep the stretcher level, and can work more evenly and regularly together; and if shoulder-straps are used, their length must be carefully regulated before starting, so that the parts supporting the stretcher may all be at equal distances from the surface of the ground. When the bearers are ready to make a start, No. 3 gives the word *March*.

At this order the bearers move off with the patient, but they must not step off with the same foot; thus, if No. 1 steps off with the left foot, No. 2 leads off with the right, and *vice versa*. The object of walking out of step is to keep the stretcher from rolling first on one side and then on the other. If the bearers moved in step, each time they both advanced their right feet their bodies would also dip together with the stretcher somewhat in the same direction, and when their left feet advanced the dip would be on the left side. By marching out of step—or, as it is sometimes termed, with a “broken step”—the stretcher is kept level, and there is no tendency to roll. Moreover, the bearers must not step out as in ordinary walking or marching, but on the contrary they should take short steps of about twenty inches, and should move steadily and without any spring. The feet, as they

* *Gunshot Injuries*, Surgeon-General Longmore.

† *Ambulance Handbook*, J. Ardron Raye.

are advanced, should not be raised farther off the ground than is necessary to clear stones, inequalities of the surface, or other obstacles, and should be planted firmly down without any jerking motion. The hips should be moved as little as possible, and the knees should be rather bent. In fact, the bearers when marching should imitate as closely as possible the walk of those persons who, in pursuit of their business, have to carry fragile articles and liquids—as eggs, crockery, plaster of Paris images, milk, water, etc.—on their heads. Their object is, of course, to cause as little movement of the body as possible, and so lessen the up and down motion of the stretcher during its carriage. Another advantage of taking short steps is that the bearers thereby avoid knocking one or other of their thighs against the transverses or crossbars of the stretcher. They are apt to constantly do this if they take long paces, hurting themselves, and, what is worse, jolting the stretcher. The bearers should also endeavour to take their steps equal in length one with the other, as, if one bearer is continually over-stepping the other, jolting of the stretcher is the inevitable result. However irregular the ground is, the bearers should endeavour to keep the stretcher as level as possible. When the ground is moderately level the patient should be carried so that he faces the direction in which he is being moved. If the patient is being carried uphill his head should be in front, if downhill his head should be behind—except in cases of fracture of the thigh and leg, when, in going uphill, the head should be behind, and in going downhill before, so that the weight of the body may not tend to displace the fracture. Never attempt to carry a stretcher over fences, hedges, or walls, but either forcibly break down the hedge or wall so as to make an opening for the stretcher, or carry the patient to where there is a gate or gap through which the stretcher may be got. If a broad ditch or hollow has to be crossed the stretcher should be laid down near the edge; the foremost bearer should then get into the ditch and support the front of the stretcher (pushed forward by the other bearer), the hinder end of the stretcher resting on the edge; the second bearer should next get into the ditch, and the stretcher after being carried across should have its fore part put to rest on the farther edge, while its hinder end is supported by the second bearer. The first bearer then gets out of the ditch, and the stretcher being pushed or lifted on

to the level ground, remains there until the second bearer gets up. The bearers then raise the stretcher and move on. When the patient has been conveyed to his destination No. 3 gives the word *Halt*, and the bearers thereupon stop—but not too abruptly, so as to avoid jerking the patient—and stand still.

At *Lower* the bearers gently place the stretcher on the ground and then stand up.

At *Unload Stretcher—Ready*, Nos. 1 and 2 sink down on one knee and grasp each others hands under the shoulders and upper part of the thighs of the patient, and No. 3 places his hands underneath the lower limbs, taking care, in case of a fracture, to have one hand on each side of the seat of injury.

At *Lift* the bearers carefully raise the patient up.

At *Lower* they lay him gently on the bed, couch, or wherever it has been arranged to place him.

Such is the way in which you would usually transport a sick or injured patient on a stretcher. It may happen, however, that a man is hurt or taken suddenly ill in a spot where there is very little room, and where there is not space sufficient to allow of the stretcher being placed in a line with the patient's body. In such an emergency you would have to place the stretcher at the side of the patient, and you would proceed somewhat as follows—*supposing there were four bearers available*. The bearers should number off, 1, 2, 3, 4; and No. 4 gives the word of command.

At the order *Fall in** No. 1 places himself by the patient's shoulders, No. 2 by the middle of his body, and No. 3 by his feet, all three standing on one side of the patient—*on the injured side*.† At the same time No. 4 places the stretcher on the ground by the other side of the patient, and remains standing near its centre facing the other bearers.

At *Ready*, Nos. 1, 2, and 3 stoop down and kneel on the left knee if they are on the left side of the patient, on the right knee if they are on the right side of the patient. They then proceed to take hold of the patient; No. 1 passing one of his arms beneath the patient's neck and the other under his shoulder-blades; No. 2 passing both arms round the middle of the body, one above, the other below the buttocks; and No. 3 passing both arms under the lower

* *Stretcher Exercise*, No. 2, St. John Ambulance Association.

† See Appendix. Rules for "Lifting and Carrying on Stretchers."

extremities, excepting in case of fracture, when he must place one hand on each side of the broken bone, so as to steady it. At the same time No. 4 grasps the nearest pole of the stretcher with his left hand, and the pole farthest from him with his right hand, near the centre.

At *Lift* Nos. 1, 2, and 3 gently raise the patient up, each at the same time placing on the knee which is not touching the ground his elbow of the same side. While the patient is thus being raised No. 4 moves the stretcher into proper position under him, and kneels down on one knee by its side.

At *Lower* Nos. 1, 2, and 3 carefully lower the patient down to the stretcher, while No. 4 at the same time assists in supporting and placing him on it.

At *Stand to stretcher* No. 1 goes to the head of the stretcher with his face towards the patient, No. 2 to the foot with his back to the patient, and Nos. 3 and 4 remain in position on each side of the stretcher. The bearers proceed then, in the same way as described previously, to lift the stretcher and move off, acting by similar words of command—*Ready, Lift, March, etc.*

It may happen that the space is insufficient for the stretcher to be placed in a line with the patient, and also that *only three bearers are available*. In such a case the bearers are numbered No. 1, No. 2, No. 3; and No. 3 takes charge of the party.

At the word *Place stretcher** No. 1 places the stretcher on the ground close to the sound side of the patient.

At *Fall in* the three bearers place themselves on the injured side of the patient in the same positions as described in the last exercise.

At the words *Ready* and *Lift* the bearers act as in the previous exercise.

At *Lower* the bearers lean forward so as to carry the patient over the stretcher, and then carefully lower him down upon it.

At *Stand to stretcher* No. 1 goes to the head of the stretcher, No. 2 to the foot, and No. 3 remains at the side of the stretcher.

Then follow the orders *Ready, Lift, March, etc.*, as previously described. In mines, underground workings of different kinds, narrow passages and cuttings, there may be

* *Stretcher Exercise, No. 3, St. John Ambulance Association.*

only space sufficient for two men to be engaged in giving first aid and managing the removal of a patient on a stretcher.

In such a dilemma the stretcher should be placed by the two men,* No. 1 and No. 2, in a line with the patient's body, the foot of the stretcher being, if possible, close to his head. It is not advisable, however, to be too particular as to the head or foot of a stretcher in a mine, as it would probably be quite impossible to reverse it, and the bearers can always lower the pillow.

No. 1 gives the word *Ready*, when both the bearers get into position as follows:—No. 1 places his feet one on each side of the patient between his body and arms, the toe of each foot as near the armpits as possible, standing over the man. He then stoops down and passes his hands between the sides of the chest and arms underneath the shoulders, and locks the fingers. If the patient's arms be uninjured he may put them round the neck of No. 1, and by this means greatly assist him in lifting. No. 2 at the same time places his right foot between the calves of the injured man's legs, as close to the knees as possible, and his left foot at the injured man's right side, close to the crest of the hip (when the patient's legs are in splints and tied together, the feet of No. 2 must necessarily be placed outside); he then kneels down and passes his arms round the outside of the patient's thighs at the lowest part, and locks his fingers behind just at the bend of the knees.

When both bearers are ready No. 1 gives the word, *Lift and move forward*. The patient is then slowly lifted, just sufficient to allow his body to clear the stretcher, both bearers slowly and gradually moving forward, No. 1 by very short steps, and No. 2 by bending his body forward over his left thigh, by which means he exercises a pushing movement which very greatly assists No. 1. No. 2, when he has bent his body forward as much as he can without moving his feet, advances his right foot to his left, then again advances his left foot and bends his body forward, this movement being repeated until the patient is laid on the stretcher.

The bearers will then act in the ordinary manner as far as the nature of the locality will permit.

The four different methods that I have given you of conveying sick and injured patients on stretchers are those framed

* *Stretcher Exercise, No. 4, St. John Ambulance Association.*

and recommended by the Ambulance Association, and they are drawn up and arranged so that one or other of them may be usefully adopted in almost any circumstances under which an accident or sudden attack of illness may occur. Thus, when you have plenty of space at your disposal, the first exercise is practicable. When there is not space enough for the stretcher to be placed in a line with the patient, as in a small room or a crowded work-shed of some description, the second or third exercise, according to the number of bearers available, will be found suitable; and in the case of narrow cuttings, tunnellings, and narrow ways in crowded manufactories, the fourth exercise will be found the most serviceable.

The stretchers supplied by the Ambulance Association, when required for use in mines, are provided with telescopic handles, so that a patient can be placed on the stretcher down in the workings, and brought up the shaft in a horizontal position without being further disturbed. I understand that this can be done in well-constructed and roomy mines. There are, however, some mine shafts, borings, sewers, and other narrow places, up which it is impossible to bring a patient in the horizontal position, owing to the deficiency of lateral space. Now, to meet such emergencies an apparatus has been designed by Mr. John Furley, by which a patient can be drawn safely up, *in the vertical position*, through a narrow shaft, even with a fractured thigh. It is known as *Furley's Lowmoor Jacket*, as it was originally designed for use in the small pits at Lowmoor, near Bradford. It can be used with any ordinary stretcher, having fixed handles, and is described by Surgeon-Major Evatt* as follows:—"A jacket which encircles the injured person's chest and abdomen, and which has strong back pieces which run up behind the patient's back, and cross over an iron bar, which is slipped by iron rings over the handles of the stretcher. There is also a strong support, passing between the legs and fastening to the jacket. The legs are kept in their place by a strap, and additional support is given by a web-stirrup into which the sound foot can be slipped if desired. The patient can thus be drawn vertically out of the mine or sewer, or lowered into a boat, without injury to the wounded part."

I am not aware that the Lowmoor jacket has ever been

* *Ambulance Organization, Equipment and Transport*, Surgeon-Major Evatt, M.D.

actually used for the particular purpose for which it was designed; viz., the raising of injured men, in a vertical position, safely up a narrow pit-shaft: but, in reply to my enquiries on the subject, Mr. Smyth, the Manager of the Lowmoor Iron Works, very kindly wrote to me, and said that he had every confidence in the jacket, and believed it to be admirably adapted to the purpose for which it was intended, as he had proved it by experiments. Moreover, the Lowmoor jacket, attached to an ordinary stretcher, proves of the greatest service under a variety of circumstances other than those which it was especially designed to meet: thus, Mr. John Furley writes:—"Within the last few days we have had to employ the jacket on a steep and narrow London staircase. The patient had a bullet wound in the thigh and could not be seated. The jacket was designed for use in mines, sewers, etc.; but it has happened more than once that we have been obliged to use it when removing an injured person through the first floor window of a cottage, where other means were impossible." Several other appliances have been designed for raising or lowering of injured men through narrow passages, as sewers, the hatchways of a ship, or the shafts of a mine: but the Lowmoor jacket, attached to an ordinary stretcher, seems adapted to meet the requirements of any case; moreover it is simple, easily applied, and cheap (the price of the jacket, including bar to attach to stretcher, being only one pound, five shillings); and, lastly, the patient is fixedly maintained, no matter in what direction he may be moved, in the flat lying-down position.

I now pass on to refer to a method of *conveying the sick or injured along underground workings* which has not as yet attracted the attention it deserves. I allude to the *Tibshelf Ambulance Tram*, which was arranged by the chairman and members of the Tibshelf Centre of the Ambulance Association, and which I believe only requires to be generally understood throughout the various large mining districts for it to be greatly appreciated and extensively adopted.

Mr. S. C. Wardell, of the Babbington Coal Company, Nottingham, chairman of the Tibshelf Centre, has, with the greatest courtesy, favoured me with very complete information concerning the ambulance tram—indeed, his description is so complete and lucid, that I cannot do better than give it in his own words. It is as follows:—"The tram we have designed is like our ordinary pit-trams in size and shape,

except that it has no end boards, both ends being open. In the case of an accident, when a stretcher is not used, we made arrangements for a head-rest to be fixed up at one end of the tram at an angle of 60 or 70 degrees, so that the patient may sit in the tram, with a comfortable support for his back and head. In this way he may be wheeled along the underground road to the shaft bottom, and be drawn up the shaft in the tram. To be prepared for a more serious accident underground, I caused to be fixed to a Furley stretcher with telescopic handles four legs, seven or eight inches long, each leg having a spiral spring around it. These legs fit into four holes bored in the bottom of the tram, but the spiral springs catch in the bottom of the tram, and, of course, give way at any jolt of the truck. At our Tibshelf Colliery this stretcher may be laid in the bottom of the tram and drawn up the shaft, the position of the patient thus not being altered between the place of the accident in the pit and his home.

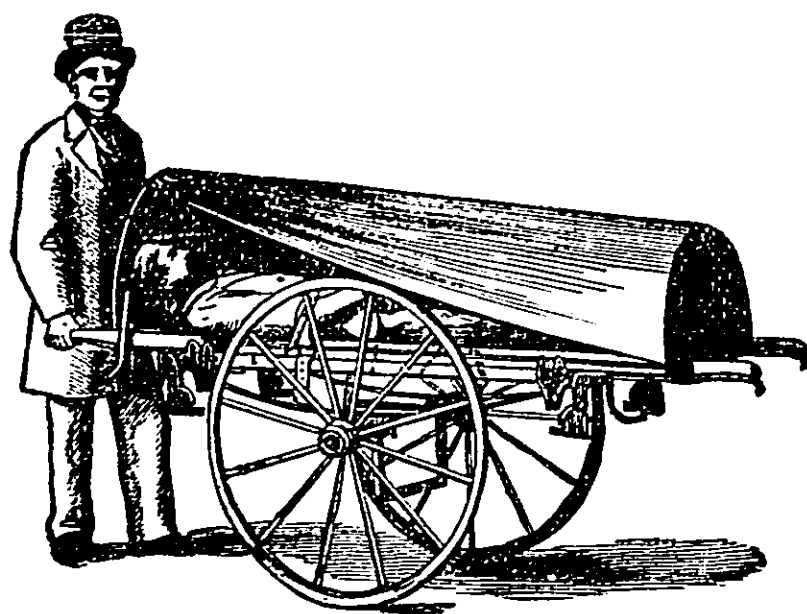


FIG. 41.—The Ashford Litter.

"The tram without the stretcher could be used at any colliery. The use of the stretcher as well would depend on the width of the shaft or length of the 'cage' or 'chair.'

"The tram is four feet long and three feet wide, and will only hold one person.

"It can only be used underground or where tramways are laid on the surface.

"It was designed for the conveyance of injured men underground."

Such is the ambulance tram, of which Mr. Wardell—after considerable experience of its use—remarks:—It is a "complete success, answering its purpose in every way. I do not see that, for conveying injured men underground, it can be improved."

Wheeled stretchers or litters (Figs. 41 and 42), in towns and districts where the roads are good and suitable for wheeled conveyances, afford a quicker, less fatiguing, and altogether better means of transporting sick and injured patients, than ordinary hand-stretchers. A wheeled stretcher or litter consists of two distinct parts—a *stretcher*, such as has already been described, and a *wheeled support*. There are many different appliances of this kind in use; but I can only briefly allude here to two varieties. The *military wheeled stretcher* with which our army is provided; and the *Ashford litter*, which is supplied by the Ambulance Association. In the first named, the *stretcher* is the "regulation stretcher," which I have already described; and the *wheeled support* (made of steel and iron throughout) "consists of an axle tree, a pair of wheels (three feet in diameter), a pair of elliptical steel springs, with crutches on their upper surfaces to receive the stretcher poles, and a pair of folding legs. . . . The height of a stretcher when placed on the support is 2 feet 7½ inches. . . . The whole is made to take to pieces and to pack up in a small space for stowage. . . . As bearers must be trained in order to carry patients on hand-stretchers properly, so they have to be instructed in quickly unpacking and putting together the stretcher support, and in using it in connection with the stretcher when a wounded man is to be conveyed by it, or to be transferred from it to an ambulance wagon."*

In the Ashford litter (Figs. 41 and 42) the *stretcher* is that which I have already described as of the "Furley" pattern; the *wheeled support* consists of an under carriage of two wheels, on elliptical springs; and one great advantage of this vehicle is that the bearers can pass with the stretcher *between the wheels and over a crank axle, and thus lifting over the wheels is avoided*. When it is desired to move a patient he is placed in the usual way on the stretcher, which is *detached* from the wheeled support and laid either *on the ground or on a table*; the stretcher with its burden is then fixed on its wheeled

* *Gunshot Injuries*, Surgeon-General Longmore.

support (by the bearers *passing between the wheels*, and not lifting the stretcher over the wheels), and the whole contrivance can, always providing the roads are moderately good, be rapidly drawn or pushed along by a single bearer, *care being taken to keep the litter in a horizontal position, and not to wheel it like a barrow*. On arriving at the patient's home, the hospital, or other destination, the bearers remove the stretcher and patient from the under-carriage, *passing between the wheels of the support*. The stretcher is finally placed on the ground, floor, or a table, and the patient is lifted off in the usual way and laid on his bed: or the stretcher, with the patient on it, is removed from the wheeled support to be properly fixed—it may be—in a specially-built horse ambulance carriage.

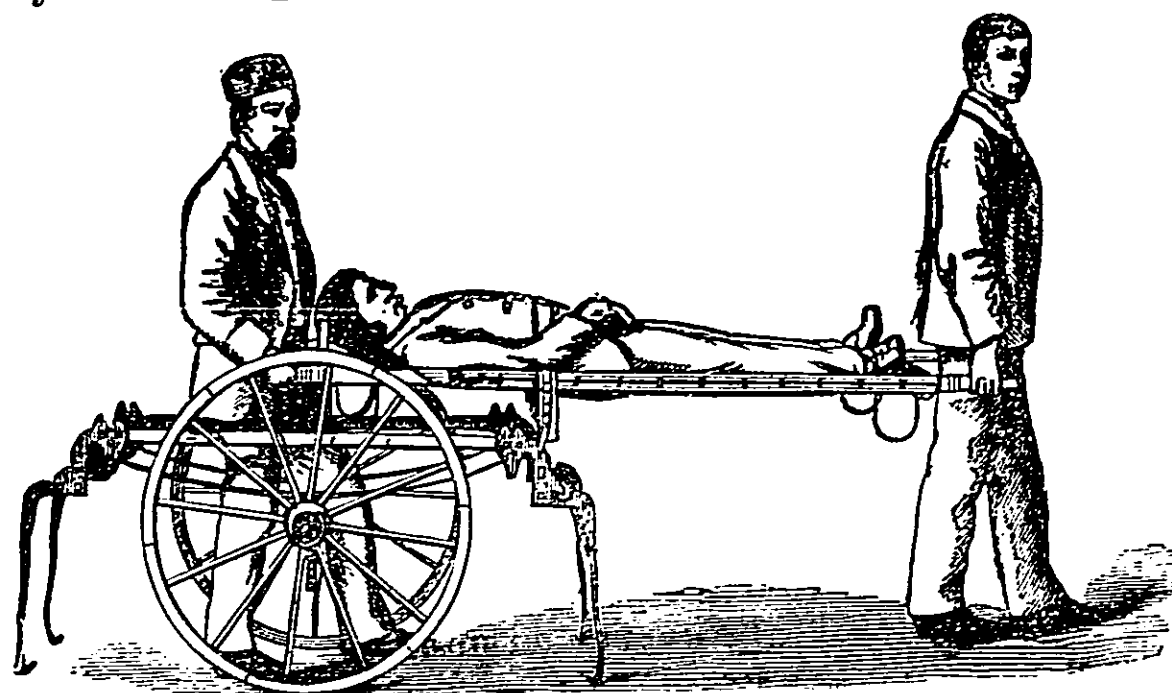


FIG. 42.—The Ashford Litter; with stretcher detached.

The great advantages of these hand-wheel litters are the *rapidity* with which the patient can be conveyed from place to place, the *ease* with which the conveyance can be moved, and the fact that *one man only* is required to push or drag the litter along. It is stated by Surgeon-General Longmore that one man with a wheeled stretcher can do as much work in a given time as four men with ordinary hand stretchers. You may understand, therefore, what a saving of valuable time, fatigue, and labour may be effected by the use of hand-wheel litters in preference to the ordinary stretchers.

Coming to the question of expense, the Ambulance Association supplies the Ashford litter complete for eleven pounds, or, with telescopic handles to the stretcher, for eleven pounds,

ten shillings; and once procured, a wheeled litter only requires a little cleaning and occasional repainting, and if looked after with ordinary attention and kept in a suitable shed, it will last for an indefinite period, and be always ready for immediate use.

Wheeled stretchers were practically tried in the Schleswig-Holstein War of 1864, the German War of 1866, and in the great Franco-German War of 1870-71, and they were found to be of great service in parts where the roads were good, and more adapted therefore for work in connection with stationary hospitals and garrisons. On the battlefield itself, however, and in its immediate neighbourhood, they were found not so suitable on account of the rough and broken character of the ground over which the troops manœuvred. Such conveyances have been found to answer admirably in the streets of our towns and cities, and also in rural districts, in connection with collieries and large manufactories, where the roads are moderately good and suitable for wheeled transport. Consider, for example, the Ambulance Organization established at Brighouse, Yorkshire, the rules and particulars of which have been most kindly afforded me by the late Hon. Secretary, Mr. Henry Y. Barber. Brighouse, Mr. Barber tells me, is a thickly populated manufacturing district, with coal mines and other works in the immediate neighbourhood; consequently there are many serious accidents, and the nearest infirmary is four miles off. A Horse Ambulance Carriage, capable of holding four patients, is used for the purpose of taking the injured to the hospital: but the Ashford Litters, of which there are several, act as feeders, and the patients are brought on them to the larger conveyance where the roads, etc., will not admit of it being brought directly to the scene of the accident. The Ashford Litters are placed in different parts of the district; the stretchers being fitted with telescopic handles so as to admit of their use in Infirmary hoists. When once a patient is placed on a stretcher, he is never removed therefrom until he is conveyed either to his own bed at home, or to one or other of the Infirmaries at Halifax, Huddersfield, or Bradford, the stretchers fitting into the Horse Ambulance carriage.

Now that you have some idea of the different methods of helping along or carrying the sick or injured, you should on no account rest satisfied with mere theoretical knowledge, but should frequently go through the various methods of

transporting patients amongst yourselves. When you meet together for practice you should ask a comrade to represent an injured man, and then see how well you can give him aid by means of one helper and two helpers, and by supporting him on two-handed, three-handed, and four-handed seats. Above all, you should constantly practise lifting him on to the stretcher, carrying the stretcher, and lifting him off the stretcher, carefully going through each of the four stretcher exercises framed and recommended by the Ambulance Association. When you have an opportunity, you should also practise carrying a stretcher—with a friend lying on it—uphill and downhill, over rough and broken ground, across ditches, and other obstacles. It is only by regular and careful practice that you can attain proficiency in transporting patients, and go through the stretcher and other exercises with the care, skill, and gentleness, which are so necessary in removing any one really ill or badly hurt.

For the purposes of practice you have the stretcher sent to you by the Association; and if such stretchers (or, where the roads are suitable, wheeled stretchers) were kept in a convenient spot at all the various collieries and other works in the district, they would prove of the greatest possible service in case of accidents. It may happen, however, that no properly-made stretcher—just at the time when it is most sorely needed—is at hand; or there may be only one stretcher available, and several men badly hurt and urgently requiring removal. During military campaigns the want of stretchers has often been terribly felt in the presence of enormous numbers of severely-wounded troops. In such emergencies you should always be prepared to *improvise stretchers*—that is, to make temporary stretchers out of any materials that chance to be near at hand and suitable for the purpose. Shutters, doors, boards, short ladders, window-frames, bed-frames, or benches, will serve as stretchers at a push; but they should be covered with something soft, as hay, straw, rushes, cushions, blankets, or clothes. Blankets, overcoats, rugs, counterpanes, curtains, or pieces of cloth or canvas—if nothing else is available—may be used, the four corners being held and carried by four bearers. Soldiers wounded in the trenches before Sebastopol were sometimes thus removed on the blankets with which they were supplied. The silk sashes of the officers—as formerly made—were also utilised in the same way. This plan should, however, only be

adopted when no other means of extemporising stretchers are at hand, and it is necessary to remove the patient immediately; it is very fatiguing to the bearers, and the patient falls into a kind of doubled-up position which—especially in cases of fracture—is likely to greatly aggravate his injuries. Sailors' hammocks and cots may be used as stretchers by being suspended from poles: temporary stretchers of this description were used in the Crimea after the battle of Alma, and also in the Ashantee War. When two poles can be procured, or rifles, oars, boat-hooks, broom-sticks, rake-handles, bamboo-poles, or similar articles, temporary stretchers may be made in a variety of ways as follows:—

(a) By fastening loops to the four corners of a blanket, then folding the blanket, and passing one pole through the four loops, and the other within the doubling of the blanket. This arrangement is known as the *looped blanket*. If there is no time to fasten on loops, holes may be made at the four corners of the blanket instead. Counter-panes, rugs, table-cloths, and carpeting may be used in the same way.

(b) By fastening the sides of corn-sacks, flour-sacks, pieces of canvas, fragments of tents, hearth-rugs, over-coats, skins of animals, etc., to the two poles. General Jackson had his wounded carried on the skins of oxen slung between two muskets.

(c) By pushing the poles through the sleeves (turned inside out) of two coats, which are buttoned across; or by pushing the poles through the sleeves of one coat; or by pushing one pole through the two sleeves of a coat which is buttoned across, and rolling the tail of the coat around the other pole. The two last arrangements would only be of sufficient size to support a patient in the sitting-up position, his back resting against the foremost bearer, and his legs hanging in front of the hindmost bearer. The tunics and overcoats of soldiers, and the jerseys and "jumpers" of sailors may be made use of in the same manner.

(d) By stretching and looping across the two poles ropes of hay or straw, telegraph wire, ordinary rope, accoutrements of all kinds, girths, bridles, or stirrup straps. Netting fastened between the two poles would answer very well.

(e) By nailing or tying cross-pieces to the poles; and then making the body of the stretcher either with boards or with some soft material, as blankets, articles of clothing, canvas, etc.

One word of caution in connection with improvised stretchers of any kind:—*Before using one for the conveyance of patients, always test its strength by lifting a good-sized healthy man upon it.*

You should practise making temporary stretchers just as you accustom yourself to making improvised splints, bandages, pads, and tourniquets. It is astonishing how ready some people are in making the most of all their surroundings in case of emergency—improvising tourniquets, manufacturing splints, and contriving the means of transport out of almost anything within reach; while others, again, quite as willing but not so quick-witted, run about making a great fuss, and after all do next to nothing. The ability to display coolness, promptitude of action, and readiness of resource in the presence of some serious catastrophe, is to a certain extent quite a gift, and is not given equally to every one of us; but it is in the power of all, by frequent, careful, and steady practice, so to train themselves into the accurate and rapid performance of their various ambulance duties that, when opportunity occurs, they may render prompt and efficient “first aid” with the happy result of alleviating suffering, and it may be of saving life.

CONVEYANCE OF PATIENTS IN HORSE AMBULANCE SICK-TRANSPORT WAGGONS AND CARRIAGES, COUNTRY CARTS AND OTHER ORDINARY VEHICLES, SLEDGES, HORSE LITTERS, MULE LITTERS, ETC.

Wherever there are moderately good roads, vehicles drawn by horses form by far the quickest, easiest, least laborious, and altogether the best means of carrying the sick and injured: always providing that such vehicles are adapted—either by especial construction or by temporary arrangements—to the comfortable conveyance of patients, without jolting, exposure to the glare of the sun or bad weather, overcrowding, or other annoyances. Of all the skilfully-devised waggons, carts, and carriages (and there are many) which have been constructed for transporting the sick and injured, I have only time to allude to two varieties:—*The English Army Sick-Transport Waggon*; and the *Horse Ambulance Carriages*, designed and built under the direction of Mr. John Furley, which are supplied by the Ambulance Asso-

ciation. Our Military Ambulance Waggon, which is drawn by two or more horses (as occasion requires), is powerfully built and provided with strong springs, as it is designed to travel “with ease and security over any ground, soft, rugged, or broken, and down any declivity, over which the rest of the transport of the army can be taken”;* it is also “made so as to be readily taken to pieces, folded up, and to be put together into a convenient package, for stowage on board ship,” in order that it may “be available for military operations in a foreign country”†; it is “arranged for accommodating two slightly wounded men, together with the driver, sitting in front; two badly wounded lying on stretchers in the body of the waggon; and three slightly wounded, or two with an attendant, seated behind, and resting their feet on the ledge of the tail-board: the diameter of the fore wheels is 3 feet; of the hind wheels 4 feet 8 inches,” so that the waggon can be turned on its own ground: a tank containing 10 gallons of water and a receptacle for forage are fitted beneath the floor of the waggon; and the floor is divided longitudinally down the middle by a wooden partition 14 inches high, on each side of which a Regulation Stretcher—with a badly wounded soldier lying on it—is run in upon its rollers: the sides of the waggon are 1 foot 8 inches high; and the framework forming the upper portion of the vehicle is provided with a water-proof double-canvas roof, from which single canvas sides can be pulled down or rolled up as high as is desired: “places are provided for the valises of the wounded men between the stretcher-handles, before and behind,” and “there are also straps fixed to the floor of the waggon for securing the rifles of the wounded men:” and two spare stretchers are carried rolled up on each side “on the top of the side rail of the waggon.” Several waggons of this description were used by the British National Aid Society in the Franco-German War: the vehicles were sent, made up into packages, by ship from Woolwich to Havre, where they were unpacked, and, the different parts being put together, all the waggons—twenty in number—were in five hours ready for the road: and though “they were subjected to very severe usage during the whole of several months in the trying winter of 1870-71; yet, in the following spring, they returned to England in so serviceable a condition that the

* *Transport of Sick and Wounded Troops*, Surg.-General Longmore.

† *Gunshot Injuries*, Surg.-General Longmore.

Government readily consented to repurchase them from the Society to which they had been sold.* Nevertheless the same waggon can scarcely be expected to suit equally well all the different countries, so varied in geographical character, in which British troops are called upon to act. The old Regulation Ambulance Waggon were considerably lighter than the new ones (which I have just described, and which weigh, when loaded with patients, etc., about 30 cwt. each):

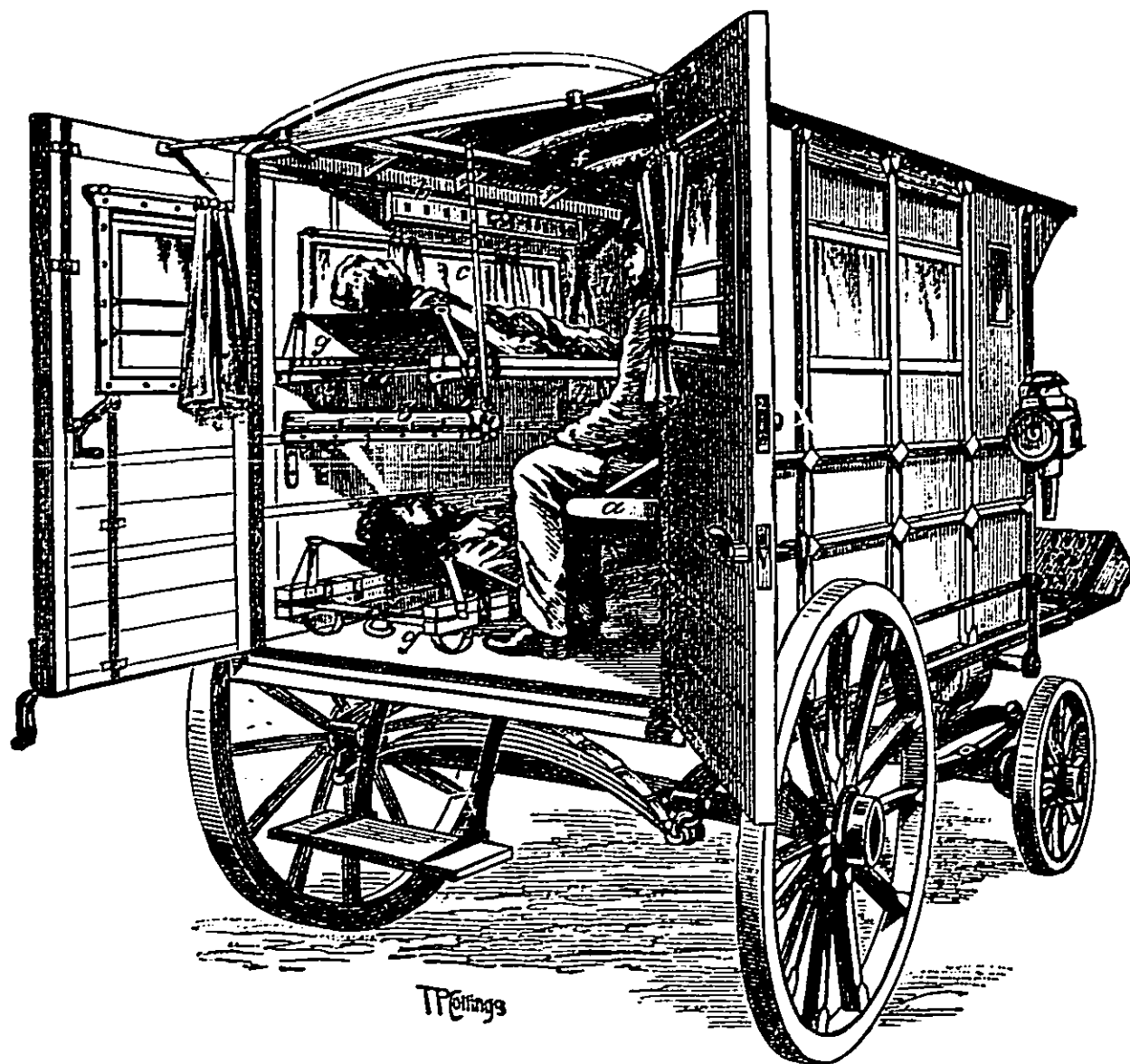


FIG. 43.—One variety of the Furley Horse Ambulance Carriage.

yet in the New Zealand War, their "weight and the absence of roads prevented even attempts from being made to take them into the field with the troops"; whereas, on the other hand, in India, their "very solidity and massiveness appeared to be the cause of parts yielding and breaking under the shocks met with in travelling," and "at the Cape of

* *Gunshot Injuries*, Surg.-General Longmore.

Good Hope, the waggons broke down under the violent concussion they were subjected to in going down the precipitous cart-tracks, and over the rocky drifts which constitute marked features of certain parts of that colony."†

It is impossible for me to describe accurately the *Horse Ambulance Carriages* designed by Mr. Furley, as that gentleman has never built two vehicles exactly alike, and moreover he constructs each carriage with the view of adapting it to meet the requirements of some particular locality. The Brighthouse carriage "will take four patients on stretchers, as well as attendants seated;"‡ and is described by Mr. Barber, the late Hon. Secretary of the Brighthouse Ambulance Institution, as *invaluable*. Another type of the Furley carriage (Fig. 43) is described by Surgeon-Major Evatt as "a one-horse ambulance carriage of varnished wood, with English oak wheels and sliding windows. It carries three patients; two on stretchers on the floor, and a third suspended from roof, and two attendants. The driver's seat is hooded, and there is room for the two attendants on the box. The third stretcher is suspended by a hook from a little trolley with four wheels, which runs along two wooden rails (f) fixed to the roof of the vehicle. The handles of the stretcher are placed in the loops, and the trolley runs down to the far end of the carriage, the rear end of the stretcher resting on a padded bar (b) which juts out from the side of the vehicle, and can, if not needed for use, be detached at pleasure."‡

I have had the advantage of examining the Wrexham carriage, which is a one-horse vehicle, made of varnished wood, with sliding side windows, a small movable window in front (through which the driver can be communicated with), fixed windows in the doors behind, and ventilators (which can be easily regulated) at the top of the doors and sides of the carriage. The carriage is designed to carry (on the left side) two patients on stretchers, these last being provided with telescopic handles and with little foot-rollers, on which the stretchers can be easily run into the carriage along wooden tramways. One stretcher rests on the floor of the carriage: and above it, fixed on vertical metal supports, is a tramway on which the other stretcher rests. The metal supports are

* *Transport of Sick and Wounded Troops*, Surg.-General Longmore.

† *Carriage and Removal of the Sick and Injured*, Furley.

‡ *Ambulance Organization, Equipment, and Transport*, Surg.-Major Evatt.

hinged in such a way that the upper tramway can be temporarily pulled low down, so as to project horizontally through the doors, in order to facilitate the insertion or the removal of the uppermost stretcher. In the front of the carriage, in the right corner, is a seat for an attendant, which—if not needed—can be lowered: and there is ample room for the attendant to move up and down, in the right side of the carriage, if the patients should need his attention. Outside, under the driver's seat, is a box for "first aid" appliances, such as temporary splints, bandages, etc. Since the Wrexham vehicle was built, Mr. Furley has introduced several improvements in the construction of his ambulance carriages: thus he is able now to make a carriage about two feet shorter than the one at Wrexham, yet capable of carrying two full-grown persons on stretchers with a child and an attendant (or one grown-up person, two children, and an attendant), by prolonging the interior of the carriage forward under the driver's seat (thereby making space in front for the patient's feet) and doing away with the box which occupies that position in the Wrexham carriage. Mr. Furley has also succeeded in providing a new patent arrangement for putting in the upper stretcher, on the same level as in Fig. 43, in his carriages; and it is now, by this new method, just as easy to put in the upper stretcher as the lower. The prices of the different Furley Ambulance Carriages are now £40, £65, £80, and £140: I am informed that, for work in London, india-rubber tyres are necessary, and these add greatly to the cost.

I should mention that "Mr. Furley has also devised a system by which any private omnibus or such-like conveyance can be converted *pro tem.* into an ambulance transport-waggon. This is done by the same trolley system running along the roof of the carriage, and with loops suspended from it.

The handles of the stretcher are placed in the loops, and the trolley slides along the tramway, and runs the stretcher home into the carriage; the rear handles are then rested on a padded bar, which can be removed when not needed."*

I am informed that this "convertible omnibus" has proved a great success; and that a new type is being constructed with removable seat and back cushions, in order to allow of

* *Ambulance Organization, Equipment, and Transport*, Surg.-Major Evatt.

the interior of the vehicle being washed as easily as the exterior.

Should no properly built Ambulance carriages be available, nor any Wheeled Stretchers, you may be obliged to resort to *ordinary vehicles as a means of transport, such as drags, vans, waggons, and country carts*; more particularly if many persons are injured at the same time, if considerable distances have to be traversed, or if you are not able to collect a sufficient number of men to form relays of bearers for hand-stretchers. Large furniture vans are very convenient for such a purpose, as they are provided usually with good springs, and are capable of holding half a dozen or more patients in the lying-down position. I should mention here that methods have been devised by Surg.-Major Smith of the Norwegian Army, and also by the Austrians, whereby springless country waggons may "be adapted for the carriage of patients by temporary additions of rough and ready materials so applied as to act as springs."* These plans consist of ingenious arrangements of pieces of timber and poles of springy wood, so as to lessen the jolting of the patients by the movements of the waggon; and may prove of considerable service in future wars, especially in countries "where agricultural hay waggons of a suitable form are in abundance." If no stretcher at all is available, neither any materials from which you can quickly improvise one, the bottom of the cart, van, or whatever vehicle you may be using, should be covered with some soft substance, as hay, straw, leaves, ferns, rushes, mattresses, mats, cushions, or clothes, and the patient should be carefully laid on the soft bed thus formed, being lifted in the way described for placing the sick and injured on stretchers, and one or two men being in the cart to assist. If, on the other hand, the patient is on an ordinary hand-stretcher, then the stretcher with the patient should, if possible, be slung in, and from the sides of the cart, care being taken that the lashings are not too slack, or the stretcher will knock against the sides of the cart, and not too tight, or the patient will be jerked with every slight movement of the cart. In some stretchers, the leather straps at each end have springs connected with them, so that when the stretcher is slung in a cart, jolting of the

* "Report on the Conferences held at Geneva," 1884, by Surg.-General Longmore—*Army Medical Department Reports*, vol. xxv.

patient by the movements of the vehicle is greatly lessened. This is the case in the stretcher manufactured by Peck and Co. of Wigan: and a similar result is obtained by means of the Werber springs as used in France, which have sometimes been employed by Mr. Furley in this country, and which moreover have the advantage of being provided with hooks instead of straps, so that they can be attached to the side of any cart without a moment's loss of time. Should you be unable to manage the lashing of the stretcher to the sides of the cart, it is better to lay it gently on the bottom; and if the stretcher is provided with foot-pieces, these will suffice to keep the canvas—on which the patient is resting—clear of the hard wooden floor of the cart. Should the stretcher, however, not have foot-pieces, then straw, hay, rushes, or other soft material must first be spread over the bottom of the cart. Considerable care is always required in getting a stretcher, with a patient on it, safely into a cart; and indeed into any sort of vehicle, whether a specially-built ambulance carriage or otherwise. When the foremost bearer of the stretcher reaches the cart or carriage, No. 3 must take fast hold of the right-hand pole at the same time that the bearer turns around the left-hand pole which he continues to support. Of course the bearer must be very careful not to let the right hand pole go until No. 3 has firm hold of it. The foremost bearer and No. 3 then raise the poles of the stretcher to the required height—the bearer at the other end taking care to keep the stretcher level, and then (with the aid of the others) pushing it gently into the vehicle. Some stretchers such as that with which the British Army is supplied, being provided with four small foot-rollers, are easily pushed along the floor of a cart or ambulance waggon.

Circumstances sometimes occur under which no wheeled vehicles are obtainable: or, if obtainable, are perfectly useless; on account of the rough, broken, mountainous—or, it may be, the hot, parched, sandy, and stony—character of the country; or from the ground being covered and the roads being rendered impassable by snow. *Sledges* of ordinary construction are plainly the best and easiest conveyances over snow-clad districts. *Two-Horse Litters* have, on some occasions, proved the most efficient means of transporting the wounded; as, for example, during the war between the United States' troops and the Indians. These litters are made of two poles or branches about six yards long, con-

nected by cross-pieces and interlaced cordage, and carried by two horses in tandem fashion, the ends of the poles being supported in loops of the harness of the horses. Such a litter may be said to represent an ordinary stretcher, of which the two bearers are horses. *One-Horse Litters*—consisting of two springy poles, stems, or branches, connected by cross-pieces and interlaced cordage or twigs, and covered with a blanket or canvas sacking, the foremost end being attached to the horse and the hinder extremity trailing on the ground—act extremely well for the conveyance of patients, even over very rugged and irregular ground. One patient, or two patients placed side by side, lie in an inclined position on these litters, their heads being highest and nearest to the horse. It is stated that “not only under the management of the American Indians, but also in the hands of the United States Army Surgeons, the *travée*-litter (or one-horse litter) has frequently proved of great advantage in the transport of wounded men and officers, and that, on the whole, the transport has been effected with comparative comfort, and with no more jolts or concussions than are ordinarily met with in transport by wheeled vehicles. One United States Army Surgeon, from a large experience in the war with the Sioux Indians, has reported that, unless on very good roads, he considered the *travée* (one-horse litter) preferable to ambulance waggons”*. *Mule-litters* and *Mule-cacolets* or *Chairs* prove of great service under some circumstances: “they were found to be very useful in the Crimea for carrying the wounded along the narrow ravines leading up from Sebastopol; and also for conveying them from the camps to the ports of embarkation, before roads suitable for wheeled vehicles existed”; and in Algeria, “had it not been for these contrivances, the French wounded in many of the expeditions in the mountainous parts of that country, could not have been transported from the scene of action to a hospital.”† The *Mule-litters* are contrivances for carrying patients in the lying-down position, and are slung one on each side of a mule: the *mule-cacolets* or *chairs* are for conveying patients in a sitting posture, and are slung in the same manner. Similar contrivances, though called by other names, are used with *camels* for the conveyance of patients.

* “Report on the Conferences held at Geneva, 1884,” by Surg.-General Longmore, *Army Medical Department Reports*, vol. xxv.

† *Gunshot Injuries*, Surg.-General Longmore.

CONVEYANCE OF PATIENTS BY RAIL.

It may be necessary sometimes to transport patients by rail. Those who are injured in the arms, or slightly in the head, neck, or upper part of the body, can—after being dressed, and duly provided with splints, slings, etc.—easily travel in the sitting-up position. Persons who are hurt in the lower limbs may also travel in the sitting-up position, providing proper support, if necessary, can in one way or another be arranged for their legs. This may often be done by the simple method of cutting one or more planks to a suitable length, and fixing them across the front and back seats of the carriage, thus enabling the patient to travel sitting up with the legs raised. If patients have to be carried in a lying-down position, a difficulty exists in the fact that the doors of the railway carriages are barely large enough to admit of a stretcher being introduced: but in connection with this point, it must be remembered that the “*Furley*” stretcher can be passed through a doorway rather less than two feet in width, the joints of this stretcher being so arranged that the bearers can diminish the breadth to some extent without inconvenience to the patient.

A large second-class compartment is found to answer best; and it is recommended to place two strong wooden cross supports on the opposite seats of the carriage, each about a foot from the door. Room is thus afforded for two stretchers to be placed on the supports, one over each seat. Great care must be taken to move the stretcher gently and evenly into the compartment. No. 3 gets into the carriage first, and grasps one pole of the stretcher, while the foremost bearer turns around the other pole—holding it firmly until No. 3 also seizes *that*; the stretcher is then gradually moved into the carriage until No. 3 lays his end on the farthest cross support, when it is easily placed in its proper position by the three bearers acting together. During the journey an attendant should sit between the stretchers on one of the cross supports. In a first-class carriage, on account of the partitions separating the seats, only one stretcher can be introduced, and that placed over the interval between the seats. On the patient arriving at his destination, Nos. 1 and 2 place the stretcher along the middle of the compartment on the

cross supports; Nos. 1 and 3, descending on the platform, bear one end of the stretcher out of the carriage, the other end being carried by No. 2. On No. 2 reaching the door No. 3 goes to his assistance, and the stretcher is got clear of the carriage. Luggage vans, cattle trucks, and goods waggons are much more roomy, and may be prepared in the same way as country carts for the reception of patients by placing a quantity of straw or hay, mattresses, cushions, etc., so as to make a soft layer for the injured men to rest upon. The greatest importance in the present day is attached to the rapid and safe transport by rail of sick and wounded troops during military campaigns; and, as a consequence, much attention is directed—especially by the larger continental states—to the formation of regular *ambulance trains*; and, where that is inconvenient, to the fitting up of ordinary goods waggons, etc., with some kind of arrangement by which stretchers can be securely suspended or supported. The sick and wounded may be safely and comfortably transported—as they were on some occasions in the American Civil War, and also in the German War of 1866—by placing the stretchers, beds, or straw palliasses (on which the patients rest) on the floors of railway cars and waggons, over which hay or straw has been thickly and evenly laid. In the present day, however, special ambulance trains are constructed for the purpose of conveying the sick and wounded in time of war. The Austrians, more particularly, have reached great perfection in this matter; and have ready for use trains consisting of—besides the engine and guard's van—ten carriages, each arranged to carry ten stretchers; a dining waggon; store waggon, containing the eatables, etc.; a magazine waggon, containing instruments and other requisites; a kitchen or cooking waggon; and a sleeping carriage for the medical men, the carriages communicating one with the other, through their ends, along the whole length of the train. Moreover, the Austrians have another institution which we “*Britishers*” would do well to copy—*An organization for affording relief at railway accidents*. Railway waggons, Baron Mundy says, supplied with surgical appliances, stretchers, and fitted in such a way that good beds can be at once provided, are kept at all the great railway stations, in readiness to be used in case of accident, or to be forwarded to the scene of any great railway catastrophe: “*medical men are registered, and they are called for and sent by special train.*”

They also have authority to go on horseback or in carriages, and the expenses incurred are liberally reimbursed. Every surgeon has his own badge, and the other trained men have their certificates and badges to make themselves known at once. They are provided with *matériel*. Ambulance waggon are only at the central stations, but they may be sent to any place where necessity requires them. Litters, boxes of appliances, lanterns, etc., are sent in great quantities.*

Considering the number of accidents which occur every year, in spite of the most careful management, on our different railways, surely our large Railway Companies might advantageously institute an Ambulance Organization in connection with their lines similar to the Austrian system; and might well insist that all their officials and men should be instructed in the methods of rendering "first aid," and that all stations and also every train should be provided with a suitable stretcher, and such simple appliances as may be useful in an emergency.

MILITARY AMBULANCE ORGANIZATION.

To ensure that all sick and wounded soldiers, of an army engaged on active service, shall receive prompt assistance in the hour of need; and also that they shall be safely removed out of the press of battle or from an advanced post back to chosen spots where rest and skilled treatment can be obtained, and from whence they may, if necessary, be sent comfortably and easily by stages back to their own country and homes, even though hundreds and hundreds of miles—both by land and sea—may have to be traversed;—to ensure all this, I say, it is evident that the ambulance organization of an army must be very complete, carefully planned, and arranged on an exceedingly comprehensive scale. It is plain also that not only must the *matériel*—the stretchers, ambulance waggons, etc.,—be of the best, but the *personnel*—that is, the assistants, helpers, attendants, bearers, nurses—call them what you will—must be not only willing but *trained* to their work;—trained during times of peace so that they can duly perform their duties amidst the exciting and trying

* *The urgent necessity for making Surgical Provision for Railway Accidents*, Baron Mundy.

incidents of war. Ambulance *matériel*, such as waggons, stretchers, and hospital tents, can be put together and stored up until required; but the enormous staff of trained assistants and helpers, both men and women, so necessary during a great war, cannot possibly be maintained during long eras of peace. When the signal for war is given, it is too late to teach people how to help, carry, and nurse seriously injured patients: the army has to be up and doing, yet after the first severe engagement, should there be insufficient ambulance arrangements, bearers, and helpers, the military force—even after a successful battle—will be practically crippled: for either it will be compelled to remain stationary, and so lose the advantages it has gained, in order to collect the numerous wounded, minister to their wants, and send them from the front—with a portion of the force—to positions of security; or, on the other hand, the army will be obliged to advance with its strength greatly reduced, many surgeons and a considerable detachment of troops being necessarily left behind to take charge of the wounded. But apart from such considerations as these, the troops—untrained in ambulance work, and fatigued with other duties—can only assist their injured comrades in a clumsy and inefficient manner: therefore the wounded may lie (as has often happened after great battles) scattered over many miles of country, exposed to the inclemency of the weather, during several days and nights before being collected and having their hurts attended to; and moreover their sufferings will be increased and their injuries aggravated during removal by the unskilful handling of their well-meaning but ignorant helpers. And that is by no means all: for, as may be imagined, immense labour, extreme patience, great skill, and a most carefully planned organization are necessary to ensure proper after-treatment and nursing of such large numbers of wounded men; and their safe conveyance, stage by stage, over hundreds of miles of a foreign—it may be a barren and desert—land, to the sea-coast, and from thence in the hospital ships across the ocean back to their own country. "The operation," writes Surg.-General Longmore, "of collecting, removing, and attending to the first wants of the mass of wounded resulting from a great battle is a vast and serious concern. The manner in which this service is performed is not merely important in respect to preventing aggravation of existing suffering, but the question of life

itself, in numerous instances, is involved in the proceeding, and, in many others, the whole future state of the wounded, whether it shall be one of continued pain and of comparative uselessness, or the reverse of these conditions, will be influenced by it. It is a duty which not only requires the necessary amount of transport power, but also thorough organization, special training, immense energy, and undivided attention, for it to be conducted in an adequate manner. . . . But the removal of the wounded, and a general attention to their first wants, is but a small part of the work which their proper care and treatment demand, when armies are on active service."* The question then naturally arises,—Are the Military Forces of this country—the Regular Army, the Militia, and the Volunteers—provided with a suitable, complete, and workable ambulance organization, which will satisfactorily meet the requirements and endure the strain of a great war? The answer, it must be confessed, is most unsatisfactory,—“To-day,” writes Surgeon-Major Evatt, “it would be absurd to say that our own, or indeed any foreign army, is yet completely organized in an ambulance sense, but much progress has been made in the past thirty years in achieving efficiency, and there is much promise of good results in the immediate future; the one thing needed is an educated public opinion. . . .”

Turning from the regular army to the auxiliary services, we find our large Militia force completely defective in ambulance and medical arrangements, and it is now proposed that a body of militia, some 1200 men, should be trained annually in ambulance drill so as to form a supplementary help for the army in time of war, and this will be highly advantageous to the country.

Our large volunteer army 200,000 strong, is completely unprovided with bearer companies or field hospitals, and has nothing but some regimental help. There are probably not half a dozen ambulance waggons with the whole volunteer force."† And again, “in case of war, a complete breakdown would happen, as there is not a bearer company or a field hospital equipment in the whole force. The volunteer army can shoot, and can march past, but it has no organised medical service, no transport, no commissariat, and is like the English army during the Crimean campaign—ready to

* *Gunshot Injuries*, Surg.-General Longmore.

† *Ambulance Organization, Equipment, and Transport*, Surg.-Major Evatt.

break down in the field for want of definite forethought in peace."*

As I have already pointed out, it is impossible to maintain during peace an army ambulance service large enough to cope with the requirements of a great campaign in a foreign country: and therefore it is of vast importance that a *volunteer* ambulance service should be thoroughly organized, to act with the volunteer army, and also to serve as a reserve ambulance service from which large numbers of trained men may be drawn by the regular army in case of a great war abroad. Moreover, such a volunteer ambulance service may be easily formed; for what other nations can *do* we surely can also perform, and the Swiss army is possessed of an ambulance organization which “is as efficient as any in Europe, and it really amounts to a well-thought-out volunteer system.”† Efforts are now being made to drill and instruct the rising generation of doctors—in other words, the medical students of our different colleges and hospitals—in the details of military ambulance work; so that on going into practice and setting up for themselves, they may be fitted to act as Officers in the volunteer ambulance service, and also may be capable of rendering efficient and valuable assistance in case they volunteer for service with the regular army abroad. It is pointed out that about 1,000 volunteer surgeons, *over and above the existing Volunteer Regimental Surgeons*, are required for a properly constituted volunteer ambulance service, together with about 10,000 men—the whole body to be carefully organized and placed under medical (not regimental) control: and it is suggested that a volunteer ambulance corps should be established, in every county, consisting of about 10 Surgeons, as Medical Officers; 2 Quarter-masters, to take charge of all stores, equipment, etc.; and 100 Non-commissioned Officers and Privates, thoroughly disciplined, trained in all the varied duties of ambulance work, and instructed how to act in connection with Bearer Companies, Field Hospitals, and the other portions of an efficient and comprehensive military ambulance organization.

“The one thing needed,” as Surgeon-Major Evatt remarks, “is an educated public opinion.” When once the people

* “Ambulance Arrangements,” etc., by Surg.-Major Evatt. *Health*, December 11th, 1895.

† *Ibid.*

learn "what ambulance aid means"; understand "the aims, the objects, the responsibilities, and the duties" of military ambulance organization; and perceive the "impossibility of improvising everything when war is actually raging"; then the ambulance arrangements of the regular army will, as far as practicable, be developed and perfected; a volunteer reserve ambulance organization will be formed, officered by

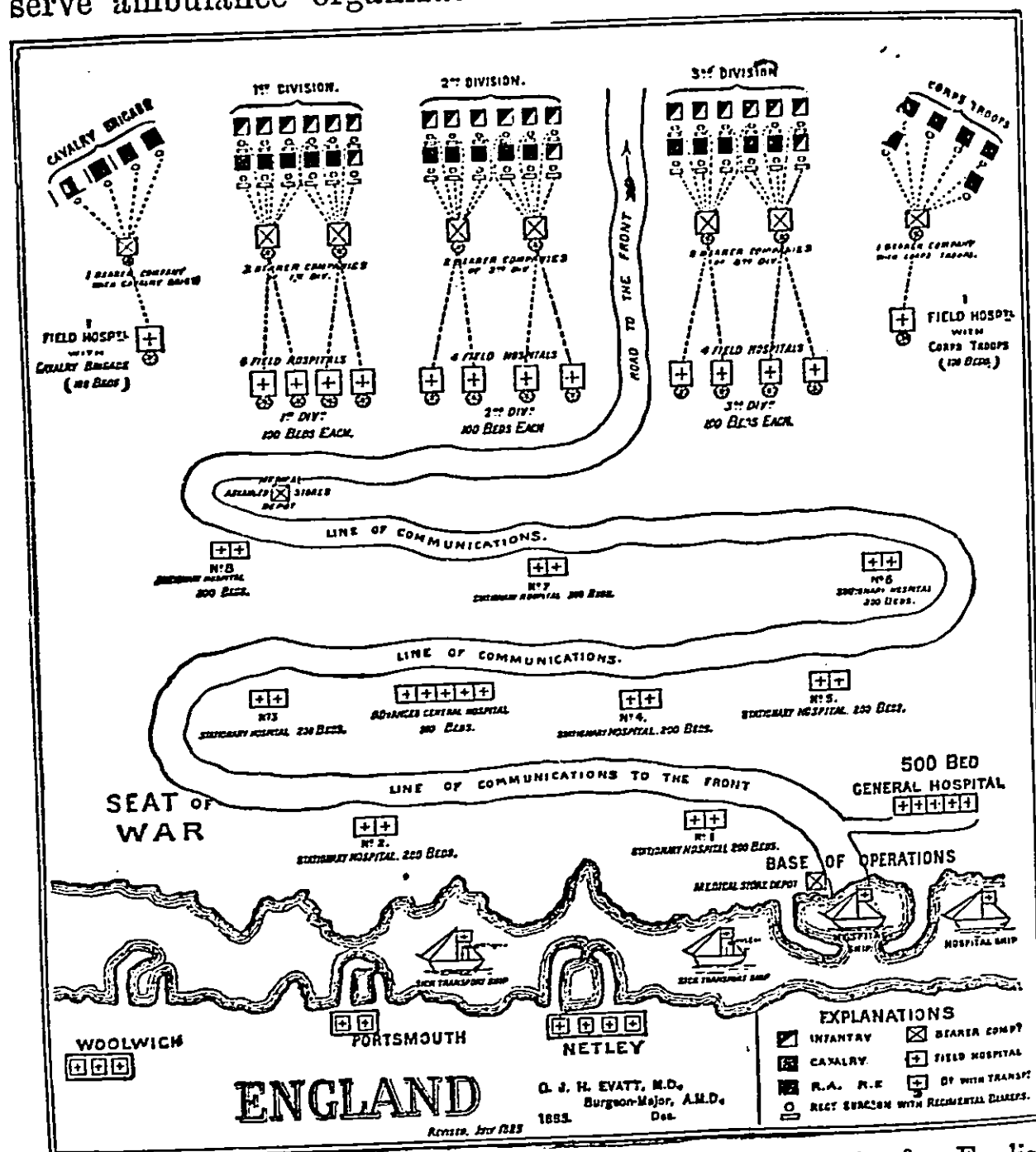


FIG. 44.—Plan of the Medical and Ambulance Arrangements of an English Army Corps of 36,000 Men, 12,900 Horses, 90 Guns, 280 Carts, and 1153 Waggon, with 8 Bearer Companies, 14 Field Hospitals, 8 Stationary Hospitals, and 2 General Hospitals.

skilled surgeons, of trained, drilled, steady, healthy men of good character; a female nursing service will also be organized; in fact, all that can be done will be done—by means

of men, money, female nurses, equipment, organization, and transport—to lessen the sufferings of our sick and wounded soldiers, whether during "hard campaigns in Ashanti jungles, in New Zealand fern thickets, in the cholera-haunted defiles of Afghanistan hills, on the burning shores of the Soudan," or on stupendous continental battlefields.

I will now try to explain to you, by means of the diagram (Fig. 44) with which Surgeon-Major Evatt has kindly provided me, the general plan on which our military ambulance arrangements are based. On reference to the diagram, you will see that a complete *Army Corps* is represented, consisting of a Cavalry Brigade, 1st Division, 2nd Division, 3rd Division, and a force called the Corps Troops: each of these large bodies is made up of several smaller, but thoroughly organized, bodies—thus, the *Cavalry Brigade* is composed of three Regiments of Cavalry, and a Battery of Horse Artillery; each *Division* consists of two Brigades of Infantry—of three Battalions each—and a Rifle Battalion (that is, of seven Battalions of Infantry), a Regiment of Cavalry, three Batteries of Field Artillery, and a company of Royal Engineers; and the *Corps Troops* are made up of five batteries of Artillery, with Engineers, etc.

Now, to each of these smaller bodies of troop—that is, to each Regiment of Cavalry, Battalion of Infantry, Battery of Artillery, and company of Engineers—is attached, in time of war, a Medical Officer, whose business it is to give temporary help to the sick and wounded: and, during an engagement, this surgeon is accompanied by trained stretcher-bearers (with stretchers), drawn from the rank and file in the proportion of two per company, and by a soldier carrying a "field medical companion" (containing drugs and dressings), a water bottle, and a "surgical haversack" (containing surgical necessities); and in addition there are a pair of "field medical panniers" (containing medicines, instruments, etc), carried by a mule or pack-horse, which are in charge of a corporal so as to be ready for use during or immediately after the engagement. In the diagram, you will see posted behind each Regiment, Battalion, etc., the Surgeon with his ambulance men, who are properly instructed in ambulance drill and first aid to the wounded, and who form the *Regimental Ambulance Detachment*. These trained stretcher-bearers, when an engagement occurs, leave their rifles and valises in the carts of their corps, take the stretchers, and proceed to render immediate assistance to

the wounded as they drop, helping to apply the first hasty dressings, giving the wounded water and—if necessary—brandy, conveying injured men to the Surgeon, and helping along or carrying the wounded to the rear. The surgeon and the men of the regimental ambulance detachment keep near their corps throughout the fight, doing the best they can under fire to save and assist the wounded, and passing the injured men—after their hurts have been temporarily attended to—back into the care of the “Bearer Companies.”

The *Bearer Companies*, of which—as shown in the diagram—there are eight for the entire Army Corps (that is, two for each Division, one for the Cavalry Brigade, and one for the Corps Troops), form the *First Line of Medical Assistance*. Each Bearer Company is made up of three Medical Officers, and a Quarter-master, of the Medical Staff; and sixty-two Non-commissioned Officers and Privates of the Medical Staff Corps, which is a body consisting of men especially trained in the methods of rendering first aid, nursing, and all the various duties of ambulance work; and there are also Ambulance Waggon, a Surgery Waggon (containing instruments, and medical and surgical appliances), store-carts, water-carts, etc., and the Officer and men in charge of these vehicles. If the country is too mountainous or otherwise unsuitable for wheeled conveyances, then litters, cacolets (or “sling-chairs hung on to a pack-saddle”), field panniers, etc., are carried by mules. I must tell you that five of the Privates of the Medical Staff Corps of a Bearer Company act as Batmen, or servants to the Officers, so that but fifty-seven Non-commissioned Officers and men (as stated in Surgeon-Major Evatt’s description of the diagram) are free to do duty as stretcher-bearers, etc.; nevertheless the Batmen are trained men, like their comrades, and are therefore able to act in cases of emergency. During an engagement, each Bearer Company works as follows:—A *Collecting Station*, marked by a red cross flag, is placed well forward in a suitable spot, usually under shelter, but as near the fighting line as is consistent with safety; and further back, if possible out of fire, a *Dressing Station* is fixed, marked by two red cross flags during day-time and by two red lanterns at night, at which there are the “medical officer in command, one of the surgeons, and the quarter-master, together with the necessary medical and surgical equipment, medical comforts, and water-carts. If no building is available the surgery tent will be pitched, beef

tea and stimulants got ready, and every preparation made to succour the wounded as they come in.” The company cooks, etc., with the baggage, “will be placed a short distance in rear of the Dressing station, and will have food ready prepared for the company at the close of the action.”*

The *Collecting Station* is placed “in charge of the sergeant-major, and with him a non-commissioned officer, having in his care the field companion and water-bottle and a small reserve of bandages and first dressings,”† in case the stretcher-bearers of the company should run short. The ambulance waggons, or other sick carriages, are also assembled at this point, drawn up with the horses’ heads towards the Dressing Station. The stretcher-bearers of the company are sent forward, under one of the Medical Officers, in detachments—each of which consists of four men with a stretcher—to help and collect the wounded. The stretcher detachments, eight in number, with their surgical haversacks and water-bottles, move in front under fire, seeking for the wounded and assisting them by applying first dressings, stopping bleeding, and giving water and—if necessary—stimulants; and they “bring the wounded to the Collecting Station, and place them in the ambulances or other sick carriages, returning at once to the scene of action and taking fresh stretchers with them if necessary.”‡ These stretcher detachments of the Bearer Company are assisted in their work by the Regimental Ambulance Detachments to which I have previously alluded; the latter either handing over their wounded to the men of the Bearer Company, or conveying them direct to the Ambulance Waggon at the Collecting Station.

As the ambulance waggons or other sick carriages are loaded with wounded, they are moved off at once to the Dressing Station, from which—after depositing the wounded—they immediately return to the Collecting Station. The full number of ambulance waggons and sick carriages in this—the *first*—line should always be maintained, and they should never go in rear of the Dressing Station during an engagement. The wounded, on arrival at the *Dressing Station*, are carefully examined, fed, operated upon if necessary, carefully dressed, marked by a ticket or “tally” (attached to the clothes) on which is written the regiment, number, rank, and name of the wounded man, as well as the nature of his injury,

* *Regulations for the Army Medical Department.*

† *Ibid.*

‡ *Ibid.*

treatment, and other particulars; and, lastly, they are put into the ambulances of the *second* line, which are in readiness at the Dressing Station, to be carried still further back to the "Field Hospitals." Wounded men straggling from the battle-field have their hurts attended to at the Dressing Station, and are sent to the rear as quickly as possible: and badly injured men are conveyed, when practicable, without removal from the stretchers to the Dressing Station or even to one of the Field Hospitals.

In this way a battle-field is cleared of the wounded; but it is always very necessary to carefully search rough ground, woods, ditches, ruins, etc., as well as the open plains, so that no wounded men may be left uncared for. The men of the Bearer Company are provided with lanterns for the purpose of searching in the dark; and, as I have said, the Dressing Station is marked at night-time by two red lanterns. Experiments conducted at Vienna, Paris, Aldershot, and Geneva "with a movable electric light waggon, have established the possibility of lighting a large battle-field at night-time sufficiently to enable the wounded to be removed and the dead to be buried after verifying their identity"; and the Conference, held at Geneva in September, 1884, expressed the "wish that the electric light may be turned to practical account in future wars on all occasions when military circumstances will admit of its employment."*

The *Field Hospitals*, of which—as shown in the diagram—there are fourteen for an Army Corps (that is, four for each Division, one for the Cavalry Brigade, and one for the Corps Troops), form the *Second Line of Medical Assistance*. Each Field Hospital consists of four Medical Officers, and a Quartermaster, of the Medical Staff; and forty Non-commissioned Officers and Privates (that is, inclusive of six Privates who act as Batmen) of the Medical Staff Corps; together with Ambulance Waggon, Water-carts, etc., and the Officer and men in charge of these vehicles. If the country is unsuitable for wheeled conveyances, the Hospital necessities and equipment are borne on mules or other animals. These Field Hospitals, each of which is arranged to hold one-hundred patients, and is fully equipped with blankets, tents, instruments, medicines, cooking vessels, etc., are readily moveable from place to place: and—when an engagement is imminent—are

* "Report on the conferences held at Geneva," 1884, by Surgeon-General Longmore, *Army Medical Department Report*, vol. xxv.

established as close as possible to the First Line of Medical Assistance, on practicable roads for the ambulance waggons and other sick carriages from the front, and near a sufficient water supply. Advantage is taken of any available and suitable buildings in towns and villages for the establishment of these Hospitals; but when no buildings are available, the Hospital tents are pitched and the equipment, etc., arranged by the direction of the principal Medical Officer. The wounded are brought into the Field Hospitals—each of which is marked by a red cross flag in the day-time, and by a red lantern at night—from the Dressing Stations by means of the Ambulance Waggon and sick-carriages of this—the *second* line: but all patients are sent as soon as practicable to the other Hospitals in rear, those only being kept under treatment who are likely either to recover quickly or to suffer from removal. The men employed in connection with Field Hospitals are of course trained in Ambulance duties; and act in various capacities, as Nurses, Washer-men, Compounders of Medicines, Clerks, Cooks, etc.

If you refer again to the diagram, you will find represented a long winding road, called the *Line of Communications*, along which the Army Corps advanced; and along which reinforcements, provisions, etc., are forwarded to the army, and along which the sick and wounded returning from the front reach the rear. On this road, or Line of Communications, an *Advanced Depot of Medical Stores* is established (as shown in the diagram) as near to the Field Hospitals as possible. This depot is in charge of a Medical Officer, of the Medical Staff; assisted by a Sergeant compounder of Medicines, a Corporal as clerk, and two Privates as packers and storemen, of the Medical Staff Corps: it is moved forward as the troops advance; and it contains a sufficient supply of medical and surgical material for the Field Hospitals, Bearer Companies, and Corps in front.

Next, there are the "*Stationary Hospitals on the Lines of Communication*," eight in number, each equipped to contain two-hundred patients; which are when possible, established in buildings or wooden huts at any port of embarkation, and in towns, villages, or farmhouses along the Lines of Communication, at regular and convenient intervals (so as to suit the position of the forces and the circumstances of the wounded), and, when practicable, near lines of railway and roads. The various posts, halting places, or stations held by the troops on the Line of Communications, and at which

food, ammunition, etc., are stored, and "Stationary" Hospitals established, are called *étappen* posts. If no buildings, huts, or other shelter are available on the Line of Communications, Hospital Marquees are erected in suitable positions: and though these Hospitals are styled "stationary," and are unprovided with any special waggon transport of their own, they may be readily moved if necessary. A Stationary Hospital consists of nine Medical Officers, and a Quarter-master, of the Medical Staff; and seventy-six Non-commissioned Officers and Privates of the Medical Staff Corps, eleven of which act as Batmen, the remaining sixty-five serving as Ward-masters, Stewards, Compounders of Medicine, Nurses, Washer-men, Cook, etc.; together with instruments, medicines, and equipment of various kinds.

A large *General Hospital*, arranged to hold five-hundred patients, is formed at or near the *Base of Operations* (that is, the port or other place in an enemy's country where the army lands, and where all the stores and reserves of the army are collected); or if it is not desirable to form a General Hospital on the sea-board, its place may be taken by a Hospital Ship. Besides this large Hospital at the Base—called from its situation the *Base Hospital*—a second General Hospital is established, if needful, in a more advanced position; as indicated by the *Advanced General Hospital* marked in the diagram. A General Hospital is worked by twenty Medical Officers, and a Quarter-master, of the Medical Staff; eleven Nursing Sisters; and 148 Non-commissioned Officers and Privates (that is, inclusive of twenty-five Privates who act as Batmen) of the Medical Staff Corps.

A *Depôt of Medical and Surgical Stores* is also established, as figured in the diagram, at the base of operations, for the supply of medicines and surgical appliances to all hospitals connected with the force, and also to hospital, troop, and transport ships.

Next, there are the *Hospital Ships*, provided with special fittings, such as ice-making machines, refrigerating chambers, dispensaries, etc.; and with Medical Officers, Nursing Sisters, Non-commissioned Officers and men of the Medical Staff Corps, and others connected with the management of the sick on board. Thus, there is a *Depôt Hospital Ship*, with steam power, capable of making 200 beds, or 250 on an emergency, for each division of the Army Corps: and there are one or more fast steam vessels, each making up sixty beds, employed

as *Relieving Ships* for the *Depôt Hospital Ships* to take the worst cases to England or elsewhere. There are also *Despatch Vessels*, each fitted out with about thirty canvass cots, to carry less severe cases to any available packet station to meet the mail packets.

And lastly, as indicated in the diagram, there are our own Hospitals of Netley, Portsmouth, and Woolwich, replete with every comfort, to one or other of which the sick and wounded are finally conveyed: and where they have the benefit of complete rest, careful nursing, and the highest professional assistance, until they are cured and able to rejoin their respective depôts or regiments, or, on the other hand, if permanently disabled, they are "invalided with a pension out of the army."

Such is a brief outline of the plan on which our Military Ambulance Organization is based; and in accordance with the provisions of this scheme, each severely-wounded soldier is promptly succoured, transferred from the battle-field to positions of safety, and, stage by stage, brought back eventually to his native land and home, as follows:—

1. He is, first of all, succoured by the *Regimental* (Battalion, or Battery) *Surgeon*; and the *Regimental Bearers* (who constitute the *Regimental Ambulance Detachment*). He has water—and, if necessary, brandy—given to him; his accoutrements and tight clothing are loosened; any dangerous bleeding is checked; and his injuries are hastily and temporarily "dressed."

2. He is next taken in hand by the *Bearer Company*. A "Stretcher Detachment" carries him from the scene of the fighting back to the "Collecting Station;" and from thence he is conveyed in an ambulance waggon or other vehicle to the "Dressing Station." Here he is thoroughly examined; operated upon, if necessary; properly "dressed"; supplied with food (beef-tea, soup, warm drinks, stimulant, etc., as needed), and allowed to rest.

3. He is then conveyed, as circumstances permit, to a *Field Hospital*.

4. As soon as practicable, he is (unless either too ill for removal, or, on the other hand, likely to recover speedily) transferred back to the nearest "*Stationary*" *Hospital*.

5. He is conveyed by "Sick-Convoy"—either in ambulance waggons, or other vehicles, ambulance trains, steamer, boats, or other means of transport—stage by stage, along the line of communications to the *Base Hospital*.

6. He is transferred to one of the *Depôt Hospital Ships*.
7. And, finally, he is conveyed in a Sick-Transport Ship (*Relieving Ship, Despatch Vessel, or Hired Transport*) back to

SKETCH TO INDICATE THE SYSTEM OF SURGICAL HELP ON OCCASION OF ACTION
BY THE HOSPITAL ESTABLISHMENTS WHICH MOVE WITH THE ARMY OPERATING IN THE FIELD.

No. 1.

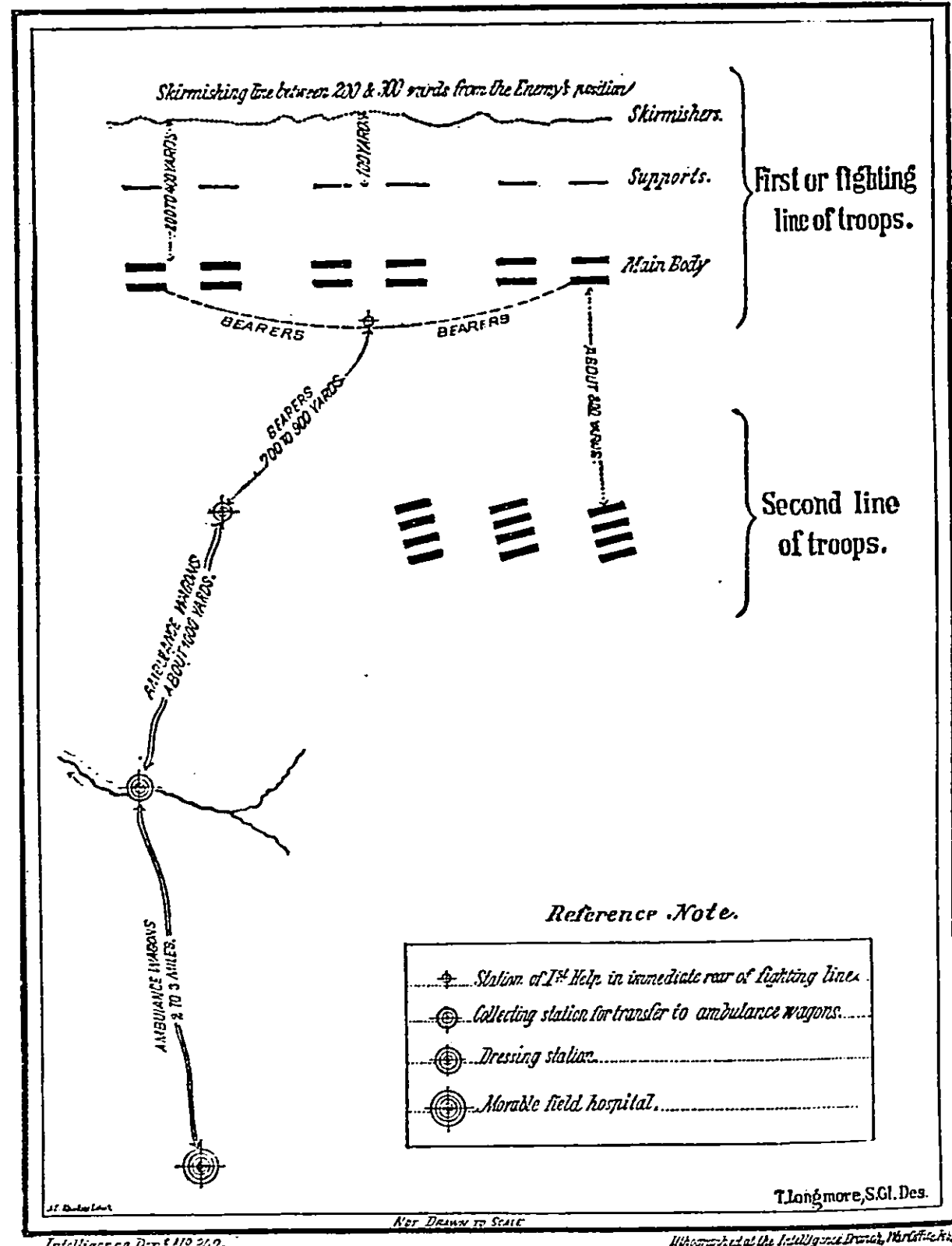


FIG. 45.—Relative positions of Regimental Ambulance Detachments, Collecting Station, Dressing Station, and Movable Field Hospital. Three Battalions are supposed to be attacking.

England, and placed in one of our excellent military Hospitals at home—Netley, Portsmouth, or Woolwich.

In conclusion, it is urged that—with the view of establishing

SKETCH TO INDICATE THE HOSPITAL ARRANGEMENTS IN TIME OF WAR
FOR THE SPACE BETWEEN THE FIELD HOSPITALS & THE HOSPITALS IN THE HOME COUNTRY.

No. 2.

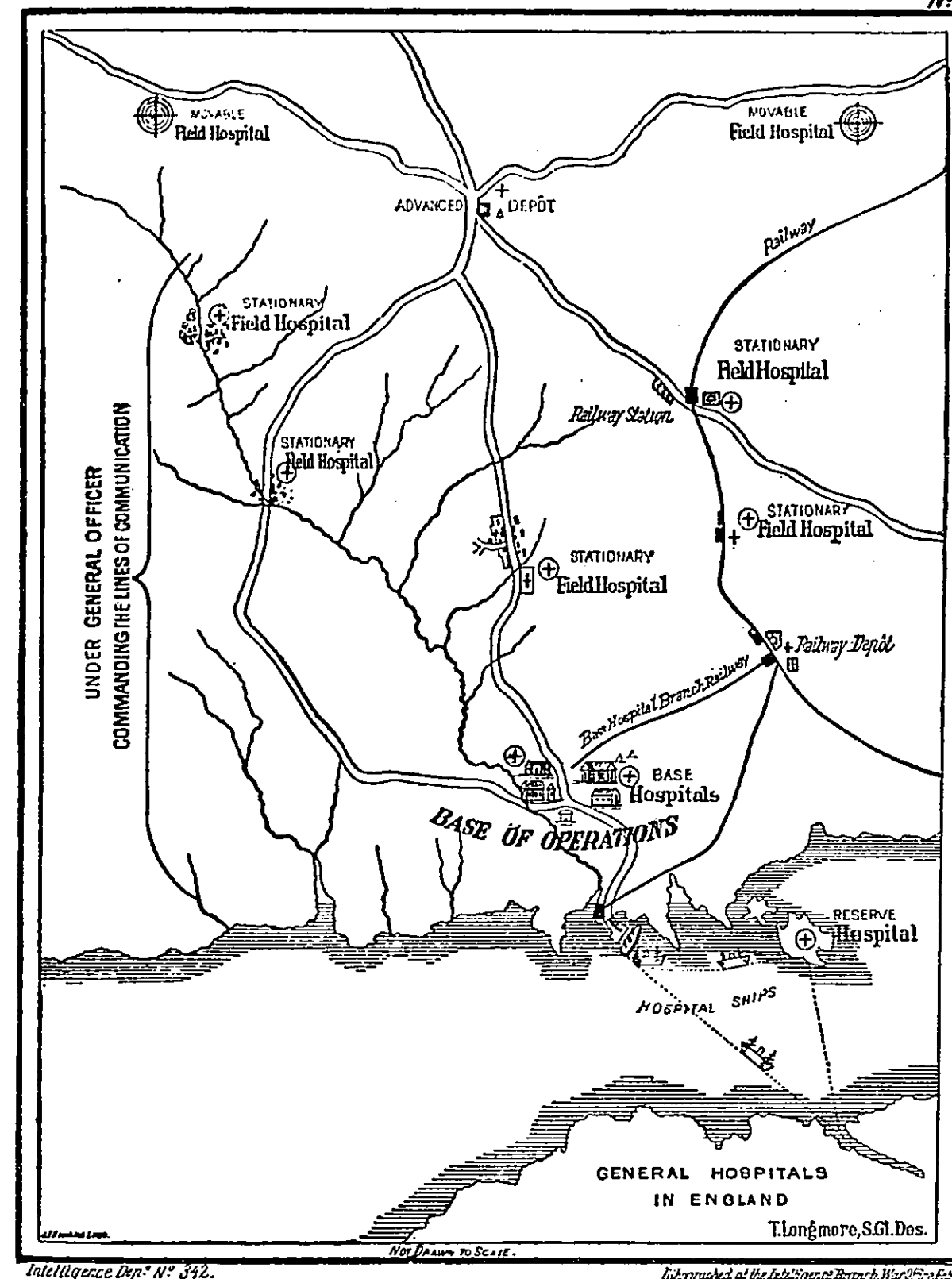


FIG. 46.—Relative positions of Movable and Stationary Field Hospitals, General Hospitals, Depôts, Hospital Ships, etc., in time of war.

an efficient Military Ambulance Organization in connection with the Volunteer Force, which may also constitute a reserve, in case of need, for the regular army—there should be formed (in addition to all existing Volunteer Regimental Surgeons and Regimental Stretcher-Bearers) one Bearer Company and one Field Hospital for each Regimental District, such bodies to be composed of Officers (i.e., Skilled Surgeons) and Men (i.e., men disciplined, and trained in all the varied duties of military ambulance work) of a Volunteer Medical Staff Corps. Such a Corps should be raised, in accordance with this scheme, in connection with every Regimental District, consisting of about ten Surgeons (as Officers), two Quarter-masters (to take charge of stores, etc.), and 100 Non-commissioned Officers and Privates (men of good character, healthy, disciplined, drilled, and trained in ambulance work).

On the publication of the foregoing account of Military Ambulance Organization, Surgeon-General Sir Thomas Longmore very kindly presented me with two plans illustrative of the help-stations in time of war, remarking that, when Surgeon-Major Evatt's diagram (Fig. 44) is added to them, all the Field Medical (and Ambulance) Organization may be readily studied. I have much pleasure in now inserting reduced copies of these plans (Figs. 45 and 46), which, when carefully examined in connection with the diagram (Fig. 44) and letterpress on pages 165-171, show very clearly the Medical and Ambulance arrangements necessary in time of war.

APPENDIX.

Illustrated Triangular Bandages—Precautions necessary in the presence of foul air and poisonous gases—What to do when dress catches fire—Rescue from drowning and ice accidents—Carrying by oneself, unaided, an insensible man—Rules for carrying stretchers—Special appliances for use in mines—Local Ambulance Corps, and Nursing Guilds or Corps—The Invalid Transport Corps—The St. Andrew's Ambulance Association—First Aid: Light, Warmth, and Water—The Signs of Death.

ILLUSTRATED TRIANGULAR BANDAGES.

TRIANGULAR bandages, marked with figures showing the ways of applying them, are of great service to Ambulance pupils, more especially to those who have but little time for study or practice, and their usefulness is still further increased by each bandage being accompanied by a paper or book of printed instructions.

On Esmarch's bandage (Fig. 7), meant chiefly for the use of troops on active service, there is imprinted a sketch of "an ambulance place, behind the line of engagement, where the wounded soldiers are dressing each others wounds with the triangular cloth (or bandage)," the diagram on the bandage being "intended to instruct its owners as to the proper way in which to use it." As the figure of this bandage (Fig. 7) is much reduced in size, it may be usefully examined by means of a hand magnifying glass.

The bandage issued by the St. John Ambulance Association (figured in frontispiece) is illustrated by diagrams clearly showing its application in cases of wounds, in the binding on of splints, in fractures of the lower jaw and (in the central lowest figure) of the collar-bone. This bandage is accompanied by a paper of printed instructions. The bandage of the St. Andrew's Ambulance Association, an illustration of which the authorities have courteously permitted me to produce, has printed upon it no less than fifty designs, and is issued with a little book of instructions as to its application. The figure of this bandage (Fig. 47) will amply repay careful examination with a magnifying glass, on account of the numerous diagrams imprinted on it, showing clearly the varied uses of the triangular bandage, and also illustrating many other