ADAPTATION OF MOTOR OMNIBUS AND SCOTCH HAY-CART FOR CARRIAGE OF WOUNDED MEN.

By LIEUTENANT-COLONEL H. E. R. JAMES.
Royal Army Medical Corps (retired).

In all schemes of medical aid, whether for manœuvre or for war, the adaptation of vehicles not specially constructed for the purpose of carrying wounded must play a considerable part, and in such adaptations it should be an object to avoid making structural alterations, and to use articles which are ready to hand as far as possible. The motor omnibus properly adapted forms a most excellent means of conveyance on good roads, being speedy and comfortable. But without special adaptation it is quite unsuited to the conveyance with any degree of comfort of more than one lying-down patient upon the floor, the seats being too narrow.

By the courtesy of the management of the London General Omnibus Company I have been enabled to measure up one of their newest standard bodies, which may presumably be taken as a type of such omnibus for the next few years and to test the method of loading it.

The internal dimensions that matter are as follows: Length 11 feet 3 inches, width at level of seat 4 feet 6 inches, width halfway between seat and roof 5 feet 6 inches, height (approximate) 5 feet 8 inches, width of door 2 feet, width of seat 1 foot 4 inches.

The accompanying diagram shows the general arrangement.

There is a brass arm halfway along the seat which forms an obstruction; the handrail to the steps leading to the roof is also an inconvenience to the carrying in of stretchers. The seat and back are usually cushioned in two sections on each side. Stretchers are necessary to the adaptation described, both in the motor 'bus and in the hay cart.

The structural alterations required are:

(1) The removal of the brass arm which divides the seats.
(2) Possibly the removal of the handrail to admit the stretchers.

The arm can be removed with a screw-driver. A screw-wrench is necessary for the hand rail. The extraneous apparatus necessary is:

(1) Four battens or bars of ash, or oak: Two of 4 feet 6 inches by 2½ inches by 2 inches; two of 6 feet by 2¼ inches by 2 inches.
Longitudinal view of interior of motor 'bus, adapted to carry four patients lying down on stretchers. Scale, ⅛ inch to 1 foot.

Method of forming suspension loop from stretcher-sling.
Transverse view of same.
Adaptation of Vehicles for Wounded Men

(2) Eight 2-inch by ½-inch iron screws.
(3) Four stretchers with slings.
(4) Twenty yards of ¼-inch circumference cord for lashings.

Tools.—Screw-wrench, a screw-driver, a ⅛-inch gimlet, a jack-knife.

The method of adaptation:

(a) It is intended to suspend two stretchers from transverse supporting battens or bars whose ends pass through the ventilating apertures and rest upon the frames of the apertures. The weight to be carried is two stretchers, each 35 lb. = 70 lb.; two patients say 170 lb. each = 340 lb. (410 lb.). This weight is distributed over four frames, each taking 103 lb. The frames are of 1-inch square ash, and strongly mortised into the uprights. The two end ventilators on each side are opened, the restraining straps being detached. The two longer battens are thrust through the apertures and rest on the frames near the uprights. A screw is screwed (leaving 1 inch projecting) into the underside of each batten at each end half an inch from where it cuts the outer edge of the aperture. The eight slings of the four stretchers are made into closed loops, four round each batten, by the method shown in the diagram, or supplementary loops may be formed from ⅛-inch rope (see diagram).

(b) The two remaining stretchers are to be laid upon two transverse battens whose ends rest upon seat cushions laid across the seats. Screws should be screwed half their length into the upper faces of the batten to stop the stretchers from slipping inwards.

Lashings should be used as necessary.

(1) To steady the upper stretcher the point of purchase should be taken from the strap rails.
(2) To prevent the lower stretchers from slipping lengthways a purchase may be taken from the stanchion that supports the seat. Enough rope is allowed to form suspension loops in case slings should be wanting, four thicknesses are considered sufficient to support each pole.

Method of Loading.—The upper battens are to be placed in position first, and suspension loops formed. Next the lower battens are laid across the seats beneath the upper ones to form a temporary support for the stretcher. The upper tier is first loaded, commencing with the near side stretcher.

Four bearers are necessary to load. When the stretcher has been brought up to the omnibus opposite to the centre of the door, and with its long axis in continuation of that of the omnibus: Nos. 2 and 4 turn inwards, and with No. 3 take the weight of
the stretcher, and No. 1 mounts the platform. Nos. 2, 4, and 3 raise the stretcher, keeping it longitudinal until its foot clears the handrail, if the handrail has not been removed, No. 1 steadying it in this position while No. 3 disengages and mounts the platform. No. 1 now takes both the poles, and assisted by the remainder in supporting the stretcher, backs into the omnibus, and No. 2 mounting the platform, the stretcher is lifted in until the hind end of the poles clears the rail—when No. 1 and 3 bring it completely in and lay the poles upon the lower battens, No. 1 stepping over them as he backs up the omnibus. No. 2 now enters. Nos. 1 and 3 mount the seats, and raise the stretcher till its handles come opposite the prepared loops. No. 2 passes the loops over the handles and a lashing is placed under the runners and over the handles so as to secure the loop from slipping.

The off-side upper tier stretcher is next loaded. When this is done the lower battens are placed in their proper positions, as in diagram, on the two cushions laid across the seats—the foremost one being 9 inches from the front end of the interior of the omnibus, and the hindmost one 6 feet in rear of it. The near-side stretcher is first loaded and finally the off-side one. Some nicety of manipulation will be required in introducing the last stretcher. Room is left in the body of the omnibus for one sitting-up patient in addition to the wagon orderly. The kits and rifles can be placed on the floor of the omnibus between the seats. The top will accommodate probably ten sitting-up cases (fifteen in all).

Note.—The loading will be greatly facilitated by the removal of the handrail. This is mounted on stanchions secured to the steps by square-headed screws. These can be unscrewed with a screw-wrench, and the bolts which connect it with the top rail having been unscrewed, the whole comes off in one piece without damage to the vehicle.

The Scotch Haycart.—This vehicle has been taken to illustrate the method of forming extemporised springs, as an opportunity to experiment with it occurred during the spring camp of the Medical Unit, Edinburgh University Officers’ Training Corps. No originality is claimed for the method—which is German—but it has not appeared, as far as I am aware, in our ambulance books. The value of it is that it can be applied to almost any large vehicle, and the requisites for its use can be found in most farmyards. As will be seen from the diagrams, the suspensory apparatus consists of four poles, in two pairs, which are crossed about their
Scotch haycart (lateral view), adapted to the transport of wounded. Two on stretchers suspended; two on sacks of straw on bottom of cart. Scale, $\frac{1}{2}$ inch to 1 foot.
Scotch haycart (end view).
Adaptation of Vehicles for Wounded Men

centres, and rest upon a transom across the top of the cart's body, which takes the downward thrust. The lower ends pass under, and are lashed to the projecting ends of the lower transoms at the ends of the cart which take the upward thrust. Lighter transverse poles are lashed to the upper surfaces of the crossed poles, the distance between them in plan being 6 feet. Looped stretcher strings and rope (see previous examples) are placed round the transverse poles (four on each), and the stretchers are suspended from them. "Square" lashings are used. The loops are secured from slipping by lashings passed above the handles, and below and behind the runners of the stretchers. In this pattern of cart two lying-down wounded men can be laid upon the floor, but without stretchers. There is also some difficulty in getting them in as they must assist themselves.

The apparatus required is:—

(1) For the Suspension Apparatus.—Two stretchers with slings, 20 yards of \( \frac{1}{4} \)-inch cord (to be found in stack yards), four stack props, which are larch poles 10 feet 6 inches by \( 3 \frac{1}{2} \) inches, tapering to \( 2 \frac{1}{4} \) inches, two lighter poles of \( 2 \frac{1}{4} \) inches in diameter, not less than 5 feet 6 inches in length, which should be cut to length after lashing.

(2) For the Floor of the Cart.—Four sacks of about 3 feet 6 inches by 2 feet, 48 pounds of straw. To cover the wounded a tarpaulin of dimensions about 8 feet by 12 feet.

Tools.—A yard measure, a tenon saw or billhook, a jack-knife.

The particular form of cart shown happens to have every requisite for this apparatus, but it can be fitted to a farm wagon wanting in this respect, by the placing of temporary transoms. The amount of spring given is found to be very comfortable, the combination of that from the crossed poles, the transverse poles, and the stretcher handles being quite sufficient to absorb any ordinary shock. The floor accommodation is for two patients less gravely wounded. One of these carts would thus carry four wounded men—two gravely wounded and two less severely.

The Method of Loading.—The wounded on stretchers are first loaded, and four bearers are necessary. As in the case of the motor omnibus, the stretcher has to be raised to a considerable height, the top of the body of the cart, where it is rested and subsequently lifted until the handles can be put into the loops.

In this case two loops are formed from stretcher slings, and two from rope for each stretcher.

No. 1 bearer gets into the cart, while the remainder raise the
stretcher and place its handles upon the upper hinder transom of the body of the cart.

No. 1 takes the handles, and assisted by the remainder eases the stretcher forward until its front handles can be supported by the upper forward transom.

No. 3 now gets into the cart, No. 4 keeping the rear end of the stretcher raised, and Nos. 1 and 3 raise the stretcher to a level with the loops. No. 2 now gets up, and places the loops over the handles.

During the loading it is desirable that the shafts should be propped, and the length of the suspension loops should be so adjusted that the stretcher is horizontal. The two wounded for the floor of the vehicle are helped in in any way that is convenient.