

Oct. 5, 1971

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3,609,778

RIGID LITTER

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3 Sheets-Sheet 2

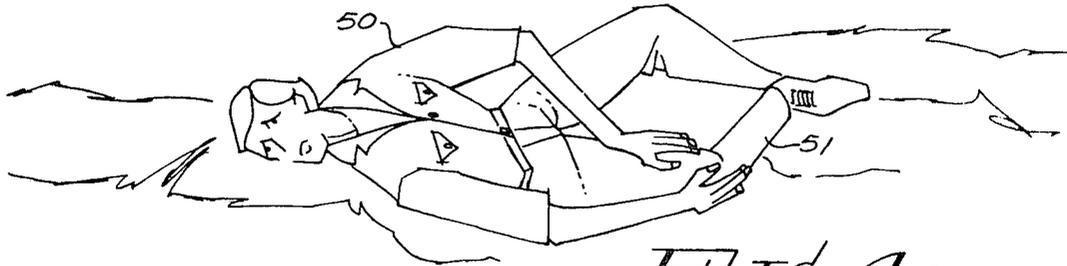


FIG. 4a

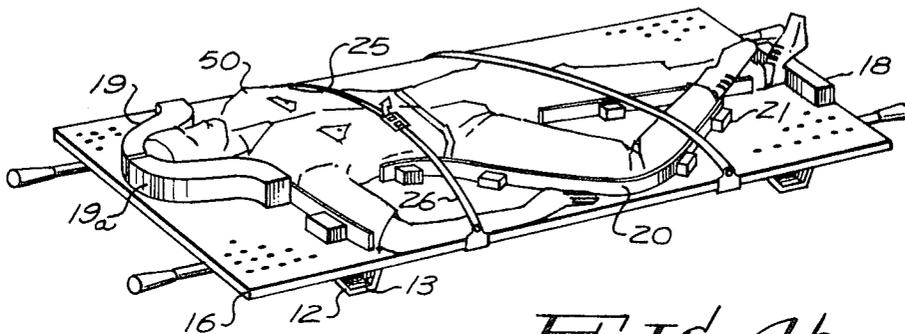


FIG. 4b

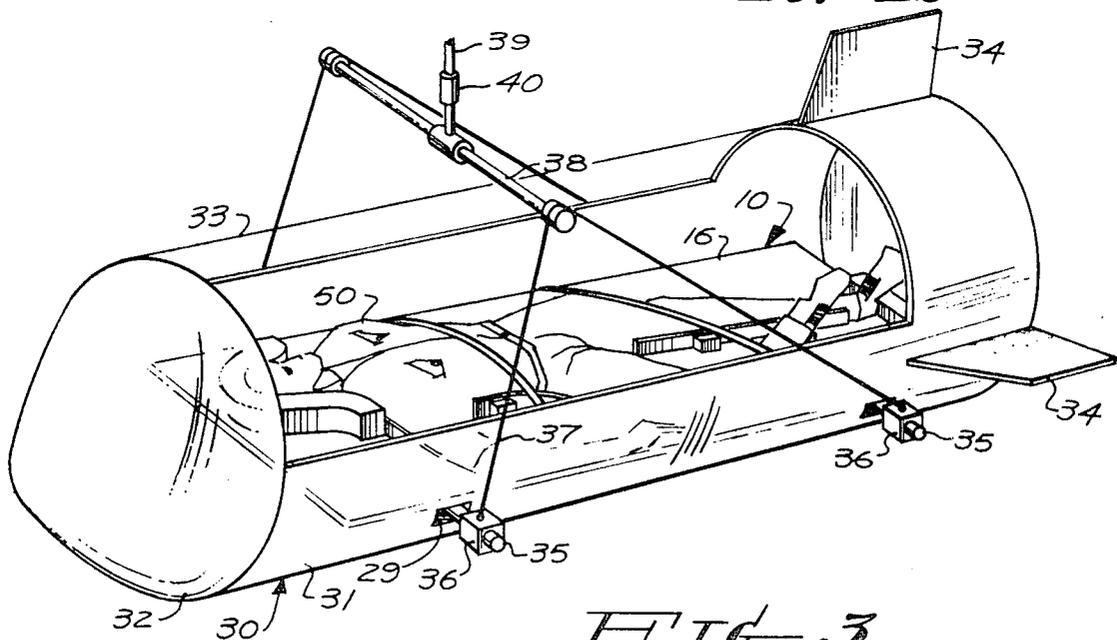


FIG. 3

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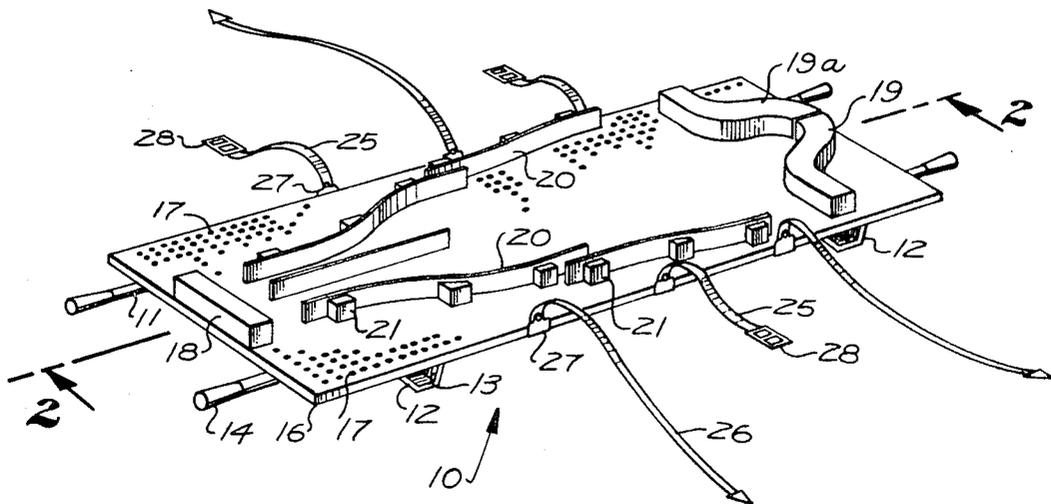


FIG. 1

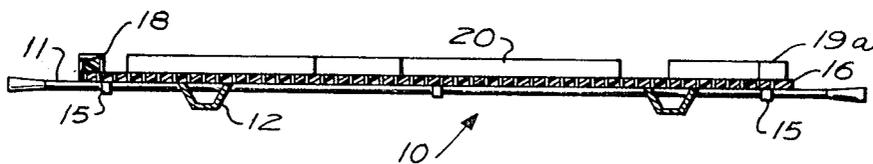


FIG. 2

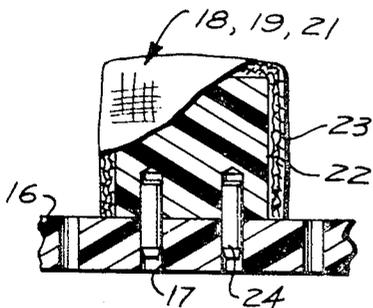


FIG. 5

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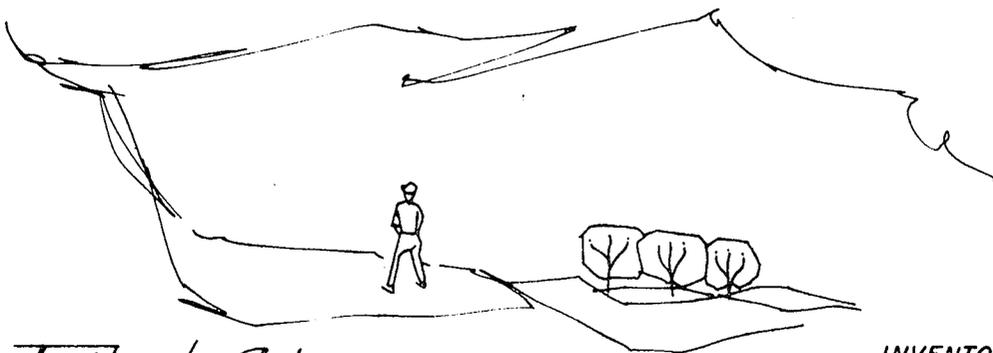
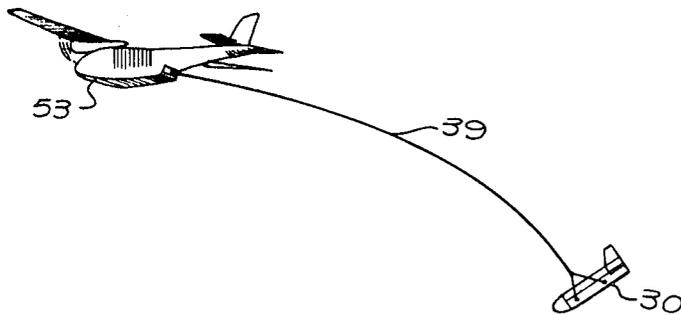
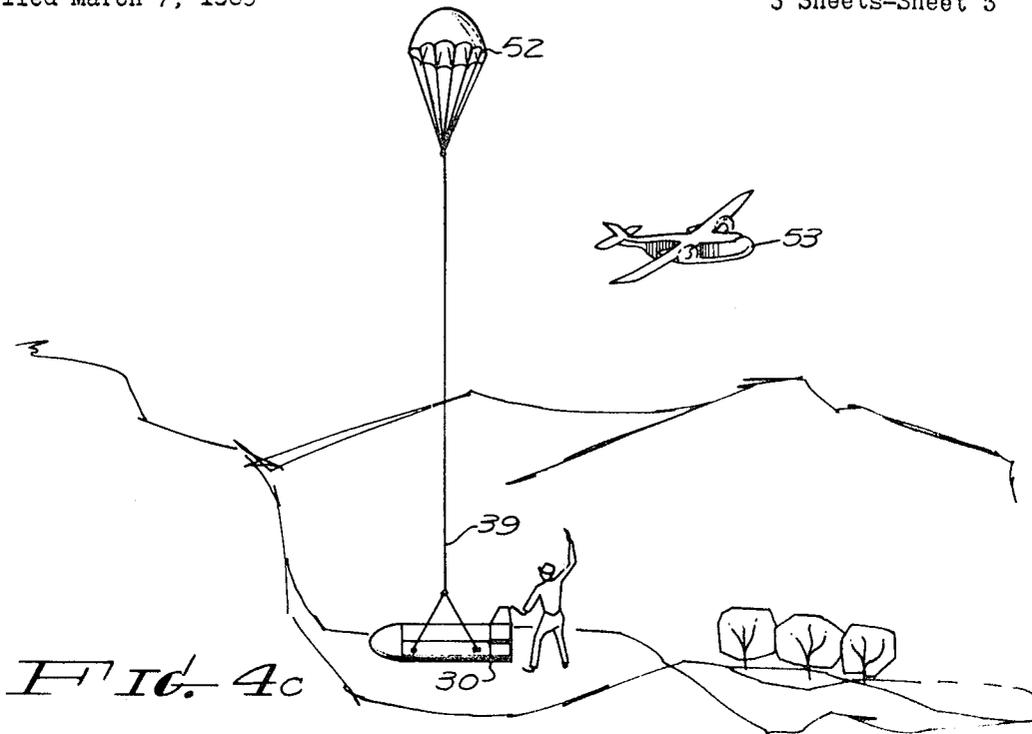
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11 Claims

ABSTRACT OF THE DISCLOSURE

A personnel litter according to the present disclosure comprises a substantially rigid pallet. First rigid restraining means is provided for restraining the length of the torso of the personnel, and second restraining means restrains movement of the torso. Attachment means rigidly attaches the restraining means to the pallet. According to one feature of this disclosure, a canopy is provided for receiving the pallet and snare means is mounted to the canopy so that an aircraft is capable of snaring the snare means to evacuate the litter.

This invention relates to litters for carrying non-ambulatory patients, and particularly to restraint-type litters capable of being retrieved by aircraft.

When transporting non-ambulatory patients from one location to another, care must be taken to prevent uncontrolled movement of such patient to prevent further injury to the patient. Although in many cases it is possible to evacuate a non-ambulatory patient by means of a simple canvas stretcher, such stretchers are not completely successful where the non-ambulatory patient must be moved for an appreciable distance due to the danger of jarring the patient, thereby injuring him. Also, it is desirable to move, without delay, patients needing immediate medical attention or patients in inherently dangerous environments, or both. In battlefield situations, for example, the general medical facilities are ordinarily located at a position removed from the site of the battle, and it is desirable to move injured personnel from the battlesite to the general medical facilities as quickly as possible.

It is an object of the present invention to provide a litter capable of restraining the patient so that there is a minimum degree of deflection to the patient when the litter is transported.

It is another object of the present invention to provide a restraint litter capable of restraining a non-ambulatory patient in the position in which he was injured.

It is another object of the present invention to provide a litter for transporting non-ambulatory patients, which litter is capable of restraining the patient, and which litter may be evacuated in a minimum period of time.

It is another object of the present invention to provide a restraint litter capable of being evacuated by aircraft snaring techniques.

It is another object of the present invention to provide a restraint litter with an aerodynamic canopy or capsule so that the litter may be snared by an aircraft in full flight and so that the acceleration forces applied to the patient on the litter during the snare operation would be applied in a direction having the least effect on the patient.

In accordance with the present invention, a rigid litter is provided having a plurality of attachable rigid restraining devices. In the use of the litter, the patient is placed on the litter in the same position in which he was found by the medical attendants and the restraining devices are attached to the litter to restrain the patient from movement.

According to an optional and desirable feature of the present invention, the litter supporting the patient is placed in an aerodynamic capsule or canopy, and means attached

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to the capsule enables as aircraft, in full flight, to snare the capsule to evacuate the patient. In accordance with this last recited feature, it is preferred that the aerodynamic characteristics of the capsule or canopy direct the acceleration forces upon the patient from his front to his rear, thereby causing minimum deflection and minimal injury to the patient during the snaring process.

The above and other features of this invention will be more fully understood from the following detailed description, and the accompanying drawing, in which:

FIG. 1 is a perspective view of a litter in accordance with the presently preferred embodiment of the present invention;

FIG. 2 is a section view taken along plane 2-2 in FIG. 1;

FIG. 3 is a perspective view of the litter illustrated in FIG. 1 supporting a patient and positioned in a capsule or canopy in accordance with the present invention;

FIGS. 4a to 4d illustrate the method of aircraft retrieval of the apparatus illustrated in FIG. 3; and

FIG. 5 is a side-view elevation in cutaway cross-section of a restraining device for the litter illustrated in FIGS. 1 and 2.

Referring to the drawings, and particularly to FIGS. 1 and 2, there is illustrated a litter 10 according to the presently preferred embodiment. Litter 10 comprises a frame having longitudinal poles 11 and cross-bars 12 arranged in a substantially rectangular configuration. Cross-bars 12 preferably include a channel 13 extending therethrough. Poles 11 preferably include handles 14 at each end and thereon facilitate movement of the litter, and brackets 15 are provided for attaching poles 11 to pallet 16. Pallet 16, which is preferably constructed of a suitable rigid closed-foam plastic such as a closed-cell polystyrene foam, includes a plurality of peg holes 17.

A plurality of restraining blocks are mounted to pallet 16. Preferably, the restraining blocks are in two general groups: one group comprising a plurality of large restraining blocks for restraining vertical movement of the torso, and a second group comprising a plurality of smaller restraining blocks for fixing the position of contoured strips. Hence, a large restraining block 18 having a generally rectangular configuration is provided to restrain the feet of the patient and a pair of large contoured blocks 19, 19a are provided to restrain the head of the patient. A plurality of flexible restraining strips 20 are each positioned by several restraining blocks 21.

As is illustrated in greater detail in FIG. 5, each of restraining blocks 18, 19 and 21 comprises a block 22 of closed-cell polystyrene foam plastic having the same general configuration as the restraining block. Plastic block 22 is covered with gauze layer 23 to provide a soft cushion for the patient and is attached to peg holes 17 of pallet 16 by means of pins 24.

Suitable cross straps or belts 25 and 26 are attached to opposite sides of pallet 16 by means of bracket 27. Strap 25 includes a buckle 28 so that strap 26 may be fastened thereto. Straps 25 and 26 are preferably constructed of a suitable flexible material such as leather, or the like, and are preferably in elastic.

In FIG. 3 there is illustrated a canopy or capsule 30 having a substantially cylindrical shell 31 and a nose 32. A transparent window 33 is hinged to shell 31 by means (not shown) to permit access to the interior of the capsule. Window 33 completes the cylindrical contour to shell 31. Aerodynamic fins 34 provide aerodynamic surfaces for the capsule. Litter 10 is positioned within shell 31 and rods 35 are passed through channels 13 of cross bars 12 of the litter and extend through passages 29 of the shell. Fasteners 36 are attached to the rods outside of the shell 31 and support wire 37 is attached to the fasteners. Wire 37 is also attached to bracket 38 which in turn

is connected to cable 39 through fastener 40. Preferably, fastener 40 includes suitable dampening mechanism (not shown) such as a spring to relieve shock to the capsule.

Referring particularly to FIGS. 3 and 4a-4d, the use of the litter according to the present invention may be readily explained. In FIG. 4a there is illustrated an injured patient 50, who, for purposes of explanation, will be assumed to have an injured right knee and is therefore non-ambulatory, and must be removed in a short amount of time. Furthermore, it will be assumed that the right leg 51 of patient 50 is slightly bent as illustrated in FIG. 4a.

First aid medical technicians first place patient 50 onto pallet 16 in the position that the patient was found and position restraining block 18 adjacent to the lowermost portion of his body, which in this case is the heel of his left foot, and places restraining blocks 19 and 19a around his head (see FIG. 4b). Flexible restraining strips 20 are positioned in various locations about the torso with preferential restraint being provided in the vicinity of the injured right leg. Strips 20 are held in position by blocks 21 as heretofore described. Patent 50 is then strapped in position by means of straps 25 and 26 as illustrated in FIG. 4b and the pallet and patient are positioned in capsule 30 as illustrated in FIG. 3 as heretofore described.

It should be noted that the right leg of the patient is maintained in the exact position that it was found with relationship to the rest of the torso, so that additional injury to the injured member will not occur due to moving the patient. The free end of cable 39 attached to canopy 30 is attached to a balloon 52 or other suitable lighter-than-air member so that a snare mechanism (not shown) attached to aircraft 53 can snare cable 39. Hence, as illustrated in FIGS. 4c and 4d aircraft 53 snares cable 39 to pick-up the canopy and patient. Preferably, cable 39 extends between 50 and 200 feet above the canopy to enable aircraft 53 to maneuver.

One feature of the present invention resides in the fact that when the aircraft picks up the canopy, the initial movement of the canopy is substantially upwards so that the canopy will clear any trees or other high objects in the vicinity of the pick-up area. Another feature of the present invention resides in the fact that the litter and the canopy are buoyant. The closed-cell polystyrene foam plastic provides buoyancy to the litter, and the canopy or capsule is sealed so as to be buoyant. However, the litter is capable of supporting the patient in water.

With the present invention, the torso of the patient is effectively restrained from movement thereby preventing differential displacement of tissue in a region of the injury and minimizing additional injury to the bone structure of the patient during retrieval and evacuation. Furthermore, the restraint on the patient does not interfere with the vital respiratory or cardiac systems of the patient and free breathing of the patient is assured. Also, displacement of tissue in the site of the injury may be prevented by rigidly fastening the patient and the area of the injury of the pallet.

To prevent cardiovascular injury to the patient, head-to-foot acceleration should be substantially eliminated and the acceleration forces should be applied from front to back. With the present invention, all significant acceleration forces are applied from front to back and against the upper surface of the pallet. Hence, when a patient is positioned with his back against the pallet, the aerodynamic surfaces on the canopy assures that significant acceleration forces are applied from his front to his back.

A litter according to the present invention has been constructed having a rigidity factor not exceeding a deflection of 1/2 inch under a force of 3G. The high degree of rigidity of the litter provides a greater reliability of pick up than prior stretchers. Furthermore, there is less likelihood of injury to the patient due to rebound of acceleration forces as in the case of more elastic stretchers.

This invention is not to be limited to the embodiment shown in the drawings and described in description, which

is given by way of example and not of limitation, but only in accordance with the scope of the appended claims.

What is claimed is:

1. A personnel litter comprising: a substantially rigid pallet for supporting the torso of a personnel; first substantially rigid restraining means adapted to restrain the length of the torso; second restraining means, adapted to contain substantial portions of the perimeter of the torso, said perimeter being in a plane substantially parallel to said pallet for restraining movement of the torso; and attachment means for rigidly attaching said first and second restraining means to said pallet.

2. Apparatus according to claim 1 further including a plurality of substantially inelastic flexible straps for holding the torso against said pallet.

3. Apparatus according to claim 4 wherein said pallet includes a plurality of peg holes, and said attachment means includes a plurality of pins in said first and third restraining means adapted to mate with said peg holes.

4. A personnel litter comprising: a substantially rigid pallet for supporting the torso of a personnel; first substantially rigid restraining means adapted to restrain the length of the torso; a plurality of flexible restraining strips; third substantially rigid restraining means for restraining said restraining strips; and attachment means for rigidly attaching said first, second and third restraining means to said pallet.

5. A personnel litter comprising: a substantially rigid pallet for supporting the torso of a personnel, first substantially rigid restraining means adapted to restrain the length of the torso, second restraining means for restraining movement of the torso, attachment means for rigidly attaching said first and second restraining means to said pallet, canopy means defining an enclosed cavity, mounting means for rigidly mounting said pallet in said cavity, and snare means mounted to said canopy and extending above said canopy, whereby an aircraft may snare said snare means to evacuate said litter and the personnel.

6. Apparatus according to claim 5 further including aerodynamic surfaces on said canopy means whereby acceleration forces are applied substantially downwardly onto the upper surface of the pallet.

7. Apparatus according to claim 5 further including a plurality of substantially inelastic flexible straps for holding the torso against the said pallet.

8. Apparatus according to claim 7 wherein said second restraining means comprises a plurality of flexible restraining strips, third substantially rigid restraining means for restraining said restraining strips, and said attachment means includes means for rigidly attaching said third restraining means to said pallet.

9. Apparatus according to claim 8 wherein said pallet includes a plurality of peg holes, and said attachment means includes a plurality of pins in said first and third restraining means adapted to mate with said peg holes.

10. Apparatus according to claim 5 wherein said restraining means comprises a plurality of flexible restraining strips, third substantially rigid restraining means for restraining strips, and said attachment means includes means for rigidly attaching said third restraining means to said pallet.

11. Apparatus according to claim 4 further including a plurality of substantially inelastic flexible straps for holding the torso against said pallet.

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