May 7, 1963 D. WADDINGTON 3,088,128

CONVERTIBLE PACK BOARD AND STRETCHER CONSTRUCTION

Filed Jan. 6, 1961 3 Sheets-Sheet 1

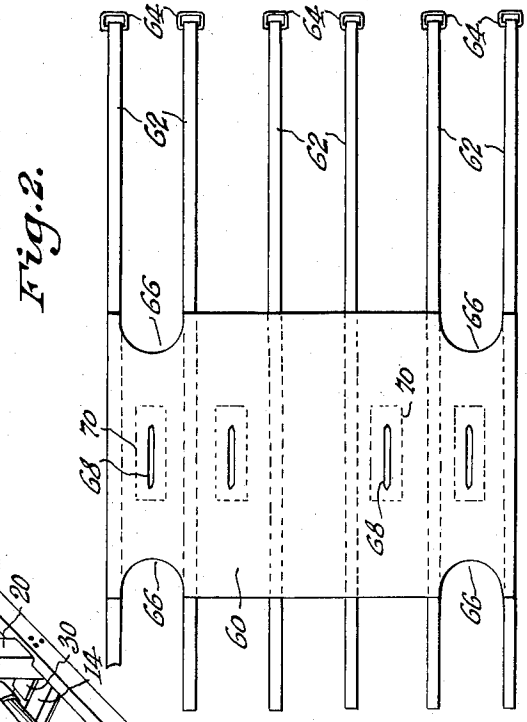


Fig. 2.

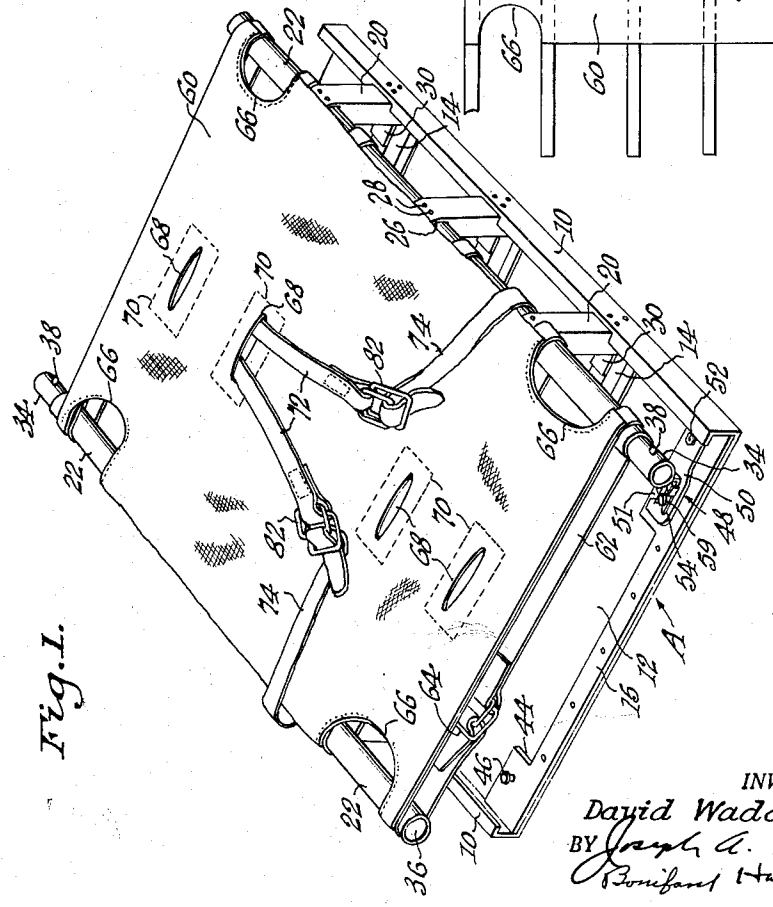


Fig. 1.

INVENTOR.
David Waddington
BY Joseph A. Hill
Bonifant Hamilton
ATTORNEYS

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Filed Jan. 6, 1961 3 Sheets-Sheet 2

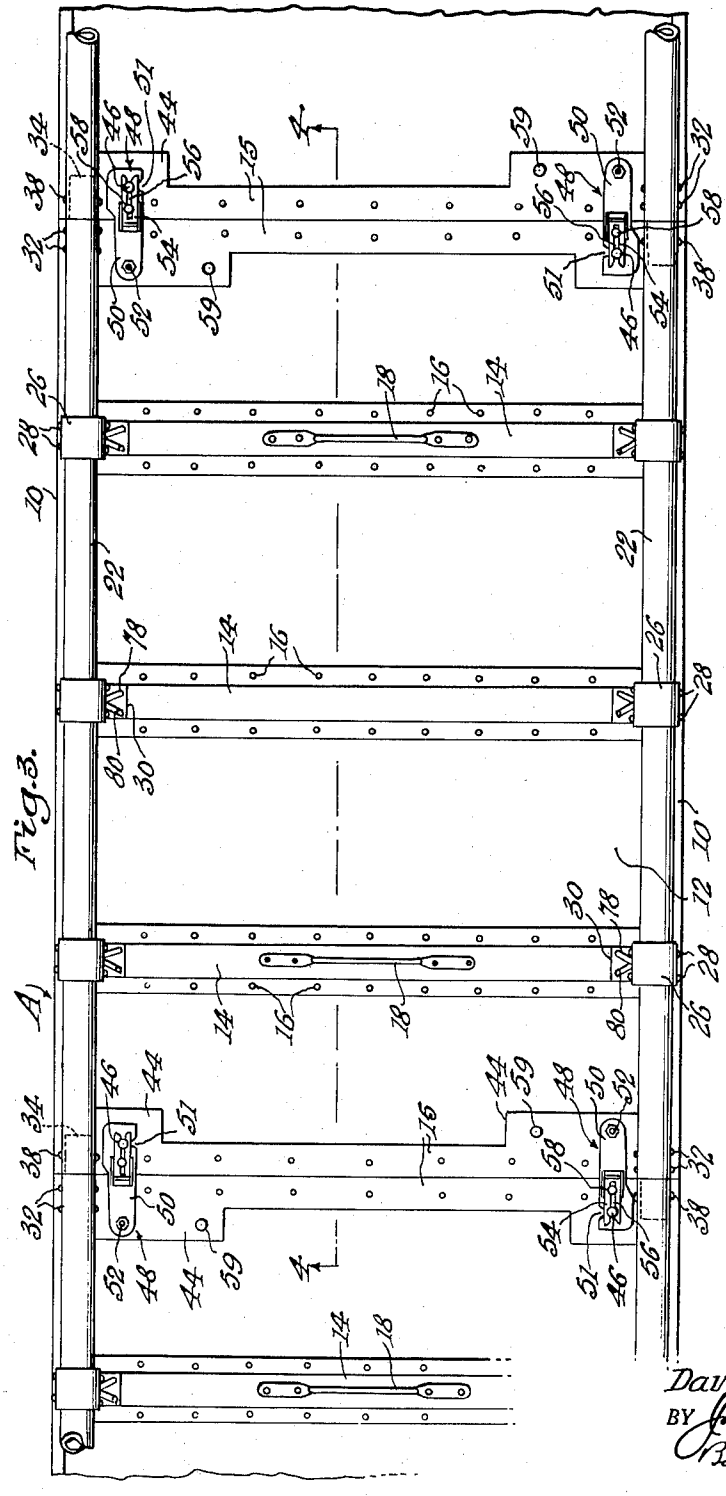


Fig. 3.

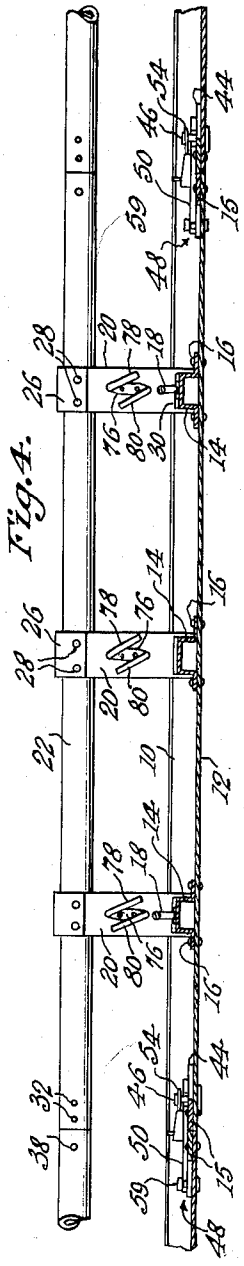


Fig. 4.

INVENTOR.
David Waddington
BY Joseph A. Hill
Bonifield Hamilton
ATTORNEYS

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CONVERTIBLE PACK BOARD AND STRETCHER CONSTRUCTION

Filed Jan. 6, 1961 3 Sheets-Sheet 3

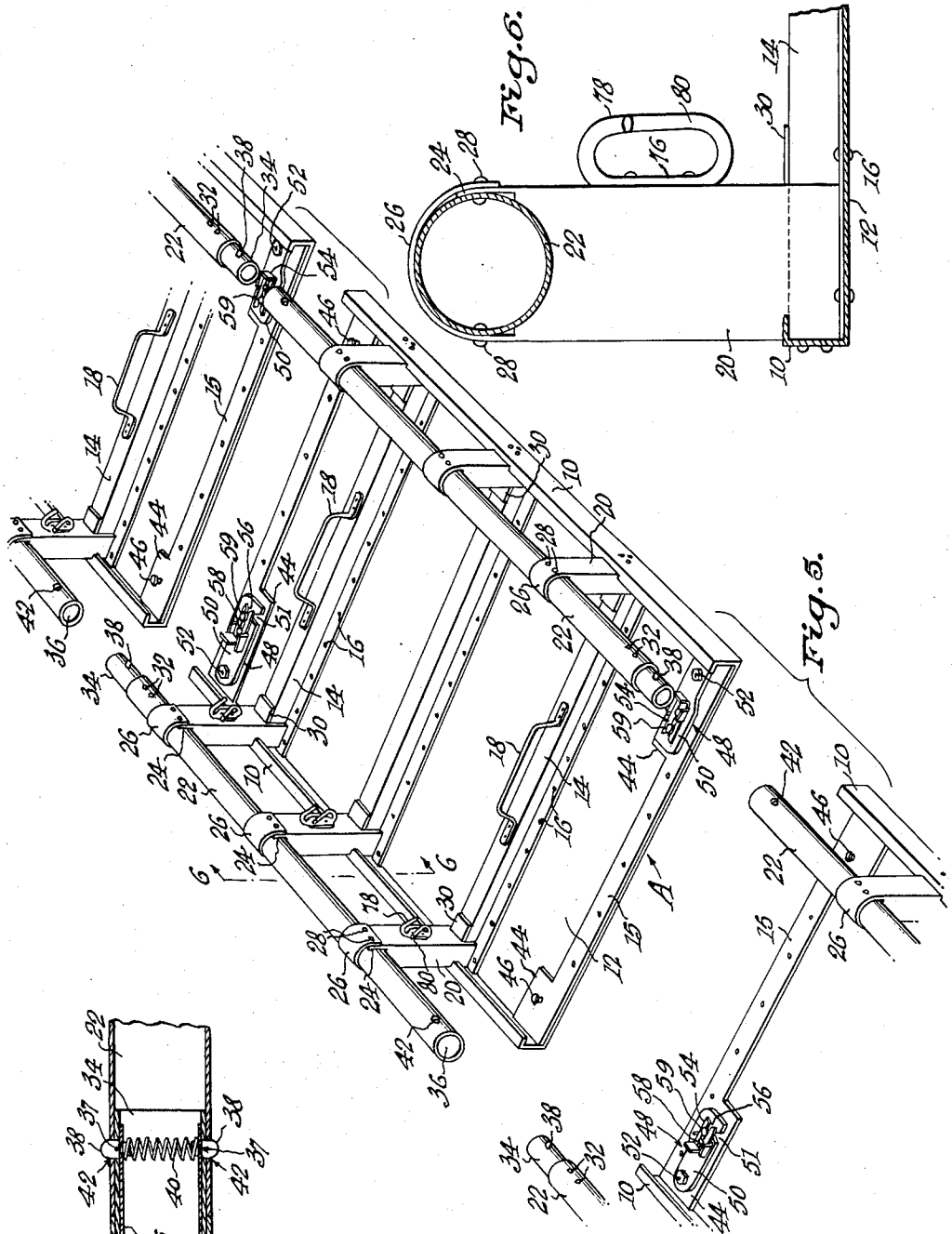


Fig. 6.

Fig. 5.

Fig. 7.

INVENTOR.
David Waddington
BY Joseph A. Hill
Bonifant Hamilton
ATTORNEYS

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CONVERTIBLE PACK BOARD AND STRETCHER CONSTRUCTION

David Waddington, 1809 E. Tufts, Englewood, Colo.

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13 Claims. (Cl. 5—82)
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The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment of any royalty thereon.

The present invention provides improved transportation equipment for facilitating removal of accident casualties from the location of an accident to an aid station, particularly where it is required that such removal be accomplished over rugged and difficultly accessible terrain. The equipment composing sectionalized rescue equipment, each section of which may be carried by an individual of a rescue crew to the site of an accident, where the individual sections of the equipment may be interconnectedly assembled into a complete and rigid litter, a casualty placed thereon and secured thereto against any likelihood of slipping, and transported over rough and rugged terrain by the rescue crew with minimum risk of additional injury to the casualty from impacts against rough and irregular impediments of terrain during the course of transportation of the casualty to an aid station. When the sections of the litter are separated for individual carrying, each individual section may be utilized as a conventional pack board carrier for holding personal gear of an individual member of the rescue crew, as well as such individual's share of necessary rescue equipment.

The structure of the present invention has been devised particularly for the expeditious removal of nonambulatory personnel injured by accidents occurring during basic military training including mountain climbing activities, although it will be apparent from the description which follows that the utility of the equipment is not necessarily so limited; and in rescue operations performed in connection with personnel injured to a nonambulatory extent during such training activities, it may become necessary to send rescue crews to the site of an accident, and such crews frequently have been hampered severely in their rescue operations by a lack of suitable stretcher instrumentalities for handling and transporting the casualty to an aid station; and to fill such need the present invention has been devised in particularity.

The stretcher construction of the present invention comprises separable sections, for example three in number, each of which sections may be carried by an individual member of a rescue team, each section when disassembled, being usable as a pack board structure supporting such individual's personal gear as well as his share of necessary rescue equipment. Upon reaching the site of the casualty, a suitable plurality of such pack board sections, for example three in number, may be joined together to form a completely rigid stretcher, the resulting stretcher being ready-equipped with straps slipping at suitable tie-down points for securing the injured casualty against accidental displacement with respect to the stretcher, the construction of which also provides support for the casualty, combined with full protection on the lower side for preventing any further injury to the casualty by movement over sharp rocks or other rough impediments of terrain which may be encountered during transport of the casualty to an aid station.

Further objects and advantages of the present construction will become apparent as the description proceeds and the features of novelty of the present construction will be defined in particularity in the appended claims.

The structural features of the present invention will become understood more readily by reference to the accompanying drawings which illustrate a typical embodiment of the structural features of the present invention, in which drawings:

FIG. 1 is a perspective view of an individual section of the present invention which may serve as a convenient pack board unit for carrying personal gear of an individual member of a rescue crew, together with such member's share of rescue equipment;

FIG. 2 is a plan view of a yieldable fabric cover employed in the present construction, together with supporting straps therefore;

FIG. 3 is a plan view of a plurality of sections as shown in FIG. 1, the view showing the individual sections rigidly interconnected to form a carrying stretcher for a nonambulatory casualty;

FIG. 4 is a vertical section view of the structure shown in FIG. 3, taken along the line 4—4 of FIG. 3 looking in the direction of the arrows;

FIG. 5 is a perspective view of a plurality of the sections in position for interconnected assembly, the view showing structural details of the sections with the fabric cover removed;

FIG. 6 is an enlarged sectional view taken on the line 6—6 of FIG. 5, looking in the direction of the arrows; and

FIG. 7 is an enlarged longitudinal sectional view through a joint between interconnected top tubular side bars, the view showing means for releasably securing the interconnected ends of the top side bars.

Referring more particularly to the drawings, the equipment of the present invention comprises a plurality of sections of substantially identical structure, which, when assembled, compose a stretcher or litter for the aid and transportation of an accident casualty over rough and rugged terrain, the stretcher being constructed so that the casualty may be secured thereon against displacement and possibly additional injury during transportation of the casualty to an aid station. When not in use as a litter, the individual sections may be separated and employed as a pack rack or pack board adapted to be carried by individual members of a rescue team, which pack board is adapted to carry personal belongings of the rescue crew member who carries the pack board to the scene of the casualty, or rescue equipment, or other items of requisite gear. The individual sections are adapted to be interfitted and releasably interlocked together into a completely rigid assembly as will be defined hereinafter.

As has been pointed out above, each of the sections is substantially identical structurally with that individual section which is identified generally as A in FIG. 1. The identical sections, usually three in number, as being adequate to compose the assembled litter, comprise bottom side frame channel bars **10** which are composed of a light but strong metal such as aluminum or of a strong but lightweight aluminum alloy, such as "duralumin" or "magnalium," by way of illustrative example, the bottom side channel bars **10** being maintained adequately widely spaced for litter purposes by a continuous lightweight sheet of lightweight metallic composition such as is indicated, having sufficient thickness to possess requisite ruggedness to resist without fracture or deformation impacts against rocks, cactus, or any type of rough and rugged terrain over which a casualty must be evacuated to an aid station. Such sheet forms the bottom of the litter assembly, and is indicated at **12** on the drawings. Each bottom sectional sheet **12** may be composed of a sheet of aluminum or of a light metal alloy as defined above, the sheet **12** being secured to the bottom flanges of the side channel bars **10**, and when the litter is demounted into its sections, each sheet **12** forms a protective bottom for each individual pack board which is adapted to seat against the back of an individual crew member

who is carrying such stretcher section to the site of the casualty to be evacuated. As mentioned previously, the sheets 12 form a continuous rigid bottom for the litter when the pack board sections are assembled, and produce a firm, rigid and continuous protective bottom element which minimizes danger of a further injury to a casualty being carried on the litter over rough and rugged terrain. This resulting bottom sheet 12 is reinforced throughout each of its sections by transversely extending, substantially equally spaced rigid channel bars 14, which are secured to the upper surface of each of the bottom sheets 12 by means of suitable fastening means 16, the channel bars 14 being secured in inverted position with respect to the bottom sheets 12 so that lifting brackets 18 may be applied and secured to the upwardly disposed web of alternate reinforcing channels 14.

At each of the transverse reinforcing channels 14 is a vertical, hollow carrier or spacer 20, which is formed of sheet metal of light weight, such as aluminum, each of which spacers is secured to the bottom side channels 10 so that opposite surfaces are directed forwardly and rearwardly of the pack board sections and are recessed at their upper ends for receiving top tubular side bars 22 which, as illustrated, are substantially circular in cross-section, each upright hollow carrier or spacer 20 having its inwardly directed face projected into a projecting flange 24, and its outwardly directed face formed with a flange 26, which flanges 24 and 26 are bent around the top tubular side bars 22 in overlapped relation as shown in FIG. 6, and which are secured in place by rivets or other suitable fasteners 28, which extend through the flange portions 24 and 26 and also through the tubular side bars 22. Also, each of the hollow upright carriers 20 is provided with an inwardly-directed lower flange 30 which seats on the upwardly-directed web of each of the reinforcing channel bars 14. The upright carriers 20 are secured in rigid position, and the top tubular side bars 22 are held rigidly spaced above the bottom channel bars 10 at a height corresponding to the upright carriers 20, all of which are of equal height in all sections of the litter.

In order to connect the individual sections into the litter, diagonally opposite ends of the top tubular bars 22 have fitted therein, and secured thereto, by rivets or the like 32, a tubular insert 34 which extends beyond its tubular bar 22, and which is received telescopically into contiguous open ends 36 of the tubular bars 22 of an adjacent litter section. Each of these connector inserts 34 contain a pair of diametrically opposite spring strips 35, which are secured in place by the aforesaid rivets 32 which are located adjacent to the inner end of the strips 35. The strips 35 receive detents 38, which have an annular recess 37 therein which receives the aforesaid strips 35. These detents 38 are diametrically opposite to each other and normally are urged by a coil spring 40 in opposite outward directions with the head portions of the detents 38 adapted to project through locking holes 42 provided therefor in diagonally opposite open ends 36 of tubular bars 22, so that when the projecting inserts 34 are inserted into contiguous open ends 36 of the tubular bars 22 of an adjacent litter section and when the detents 38 come into registry with the holes 42, the coil spring 40 acts to snap the detents 38 into the locking holes 42, thereby rigidly interlocking the top tubular bars 22 of contiguous sections together.

Also, it will be noted that the terminal bottom reinforcing bars 15 of each of the litter sections have substantially wide, flat end portions 44, diagonally opposite end portions being provided with a rigid, upstanding locking stud 46 and an adjacent spaced guide stud 58. The remaining diagonally opposite end portions 44 of terminal reinforcing bars 15 have mounted thereon similar locking devices 48 which are adapted to interlock with its contiguous locking stud 46 of an adjoining litter section when the sections are assembled to form the litter.

The locking devices 48 comprise in each instance, a base member 50, which is mounted turnably on a pivot bolt 52 which, in turn, is mounted rigidly in an enlarged end 44 of a reinforcing plate 15 which extends along each end of each of the individual sections A. Each of the base members 50 of the locking devices 48 has a free end and is sufficiently long to extend over a similar enlarged end of a similar reinforcing plate on an adjacent section, in which enlarged end are mounted rigidly the locking studs 46. Each of the locking devices 48 is provided on its inwardly directed side and adjacent to its free end, with a notch 51 for engaging an adjacent stud 46. On the upper side of each of the base members 50 there is a slide element 54 having a longitudinally extending slot 56 which slidably engages the corresponding guide stud 58, the slide element 54 being extensible and retractable, selectively, along the guide stud 58 into locking and releasing positions relative to the locking studs 46. For releasing the sections A for converting the sections into individual pack boards, the detents 38 are pressed together until they are released from their locking holes 42 in the top tubular bars 22, the slide element 54 having been retracted to disengage locking studs 46, and the base member 50 is turned pivotally on its pivot bolt 52, until its notch 51 is clear of its locking stud 46. The sections A then may be slipped apart, and then the base member 50 is rotated in an opposite direction on the pivot bolt 52 until notch 51 engages with a rigid retaining stud 59 which is mounted at the same radial distance from the pivot bolt 52 as is the locking stud 46, the base member 50 being retained in unobstructing position behind the end of this section when the respective sections are separated to serve as individual pack boards.

The instant structure is completed by securely attaching a stout fabric deck or cover to the top tubular bars 22, which cover may be made of canvas of sufficient strength to carry a casualty out of contact with the bottom plate 12 of the structure. Such a fabric cover or deck is indicated at 60, the dimensions of which in each instance conform substantially to the length and width of an individual litter section, each cover 60 being secured to the top tubular bars of its litter section by a plurality of spaced straps 62, each of which is passed around the tubular bars 22 and the ends of which are tightened and maintained under requisite tautness by the provision of buckles 64, for preventing excessive yielding of the fabric cover or deck 60 under the weight of a casualty being carried thereon. Spaced marginal recesses 66 are provided in the cover 60 for enabling access to be had to the tubular side bars 22 for enabling such bars to be gripped manually for carrying the litter and casualty thereon. For preventing the casualty from slipping with respect to the cover 60, the cover 60 is provided along its length with spaced slots 68, reinforced as is indicated at 70, there being passed through selected slots a pair of body-restraining harness straps 72 which cooperate with a second pair of body-restraining harness straps 74, the straps 72 and 74 being secured to the litter section by suitable hook elements having a base plate 76 secured on the inwardly directed surface of each upright carrier 20, which plate 76 carries a pair of hook members 78 and 80, which are oppositely curved, hook 78 extending downwardly and hook 80 being curved upwardly for facilitating reception of straps 72 and 74. The end of straps 72 and 74 are secured together on the upper side of cover 60 by similar buckles 82, the retaining straps thus provided on each section of the litter enabling a casualty to be secured in position on the cover 60 when the sections are assembled, while enabling the individual sections to be used as a pack board when the sections are disassembled and each carried by an individual member of a rescue team.

While the construction herein described and illustrated by the accompanying drawings is representative of a pre-

ferred illustrative embodiment of the present construction, it will be apparent that structural details may be modified if desired without departing from the scope of the invention, and accordingly it will be understood that it is intended and desired to embrace within the spirit and scope of the invention such modifications and changes as may become necessary or desired to adapt the invention to varying conditions and uses as defined by the appended claims.

I claim:

1. A stretcher assembly for removing injured personnel from a site of a casualty-producing accident, which comprises, in combination, a plurality of rigidly but demountably interconnected sections, each section when disconnected from contiguous sections being adapted for service as a pack board adapted to be carried by an individual member of a rescue crew for transporting equipment to a site of an accident, and comprising a rigid frame including rigid, parallel, longitudinally extending bottom side rails spaced apart at a distance suitable for service as a stretcher, a continuous and rigid bottom plate fixedly secured to the bottom rails of each section and coextensive in length and width corresponding to corresponding dimensions defined by the bottom rails, means effecting rigid attachment of the bottom plate to the bottom rails, spaced apart rigid upright members rigidly secured to the bottom side rails and being of substantially equal length, spaced apart substantially parallel, longitudinally extending upper side bars carried by the upright members, each of the upper side bars being mounted on the rigid upright members and positioned substantially vertically and parallel above a corresponding bottom side rail at a height corresponding to the length of the rigid upright members, a flexible cover secured to and overlying the upper side bars of each section and substantially continuously interconnecting the upper side bars, adjustable means attaching the flexible cover to the upper side bars of each section at spaced distances and at a selected lateral tautness of the cover for accommodation of a casualty placed on the cover, harness strap members on the cover adjustably positioned with respect to the cover and secured to the upright members for securing the casualty on the cover against slippage during transport, a plurality of opposed latch locking means for interchangeably interconnecting adjacent corners of the bottom plates of adjacent sections, and additional telescoping and spring biased double detent locking means at diagonally opposite intertelescoping and comating ends of the upper side bars of each section, all of the aforesaid locking means cooperating for rigidly but demountably interlocking both bottom and top portions of the section with substantially identical sections for forming a complete stretcher.

2. A stretcher construction as claimed in claim 1, wherein the upper side bars of each section are of a length greater than the lower side rails with diagonally opposite ends extending beyond corresponding ends of the lower side rails for enabling interlocking of contiguous sections into a stretcher.

3. A stretcher construction comprising a plurality of demountably interlocked substantially identical individual sections, each section comprising a continuous bottom means, a frame support including a plurality of upper longitudinal and substantially parallel bottom rails, vertical and lateral members rigidly interconnecting said upper and bottom rails, means for fixedly securing said bottom means to said bottom rails, substantially continuous upper covering means secured to said upper rails and spaced above said bottom rails in substantially parallel relationship to said bottom means, and adjustable means securing said upper covering to said upper longitudinal rails, each section being further adapted to serve as an individual pack board transportable by an individual member of a rescue crew for carrying aid equipment to a site of an accident, said sections being adapted to be rigidly interconnected by a plurality of latch locking means on said lower bottom means and interconnected by a plurality of telescoping lock means on said upper rails and thereby extended into a complete stretcher for receiving a casualty.

4. A stretcher construction as defined by claim 3, wherein each section comprises an upper cover means and a bottom cover means and means intermediate the upper cover member and the bottom cover means for maintaining the said members rigidly in spaced apart parallel relation, the upper cover member being a flexible fabric which is yieldable under weight of a casualty placed thereon, the bottom cover means being a rigid plate for resistance against shocks resulting from impacts against obstacles which may be encountered in transport of the casualty to an aid station, thereby affording protection to the cover member and casualty thereon against such impacts.

5. A stretcher construction defined by claim 4, wherein the flexible upper cover means is provided with a series of spaced parallel strap members for encircling the rigid upper side bars, corresponding ends of the strap members being provided with fastening buckles, opposite ends of the strap members being adjustably interlockable with the fastening buckles, the flexible cover means having recessed corner portions exposing the rigid upper side bars for providing lifting access to the rigid upper side bars.

6. A stretcher construction as claimed in claim 1, wherein the upper side bars of each section are hollow open tubes, diagonally opposite ends of which receive a tubular connector, securing means rigidly securing the connector to the upper side bars, oppositely disposed detent locking members in the tubular connector, resilient retaining members for the detent locking members securing the said members from displacement, and a coil spring compressed between the detent locking members and resilient retaining members therefor, the coil spring normally urging the detent locking members outwardly with respect to opposite openings provided therefor in the tubular connector, there being corresponding opposite openings in a contiguous end of an adjacent upper side bar of a contiguous section adapted to receive the outwardly urged detent members responsively to insertion of the tubular connector until the detent locking members register with the opposite openings in the contiguous end of the said adjacent upper side bar when the compressed spring is enabled to snap the detent members into the openings in the contiguous end of the adjacent upper side bar for releasably but rigidly interlocking contiguous upper side bars.

7. A stretcher assembly as defined in claim 1, wherein the rigid bottom plate of each section is provided with a plurality of transversely extending reinforcing bars rigidly secured to the bottom plate and to the bottom side rails, outermost reinforcing bars having a pair of opposing enlarged opposite end portions, one of the enlarged end portions having a locking stub projecting above the said end portion and rigidly mounted therein, the other enlarged opposite end portion having locking means pivotally secured thereto and comprising a base member, means pivotally securing the base member to the bottom plate and a slide member slidably mounted on the base member and having a locking slot therein, the slide member being movable between extended and retracted positions with respect to the base member for releasably but rigidly interlocking the bottom plate and side rails with the locking studs of adjoining sections, the locking means being mounted adjacent to diagonally opposite corners of the bottom plate to each section.

8. A stretcher assembly as claimed in claim 1, wherein the flexible cover is provided with spaced openings at selected locations, the openings having harness straps extending therethrough for carrying the members as a pack

board and encircling selected portions of a body of a casualty placed on the assembled cover, buckle fastening means releasably interlocking complemental ends of the straps, and means for securing the straps against slippage when positioned about the casualty on the stretcher.

9. A stretcher assembly as defined by claim 8, wherein the means for securing the straps against slippage are brackets mounted on inwardly directed surfaces of the upright members, and oppositely directed hook members extending from the brackets for engaging and securing the straps against slipping.

10. A stretcher assembly as defined by claim 8, wherein the flexible cover is provided with corner recesses disposed above the upper bars for enabling manual gripping thereof for transporting the stretcher assembly.

11. A stretcher assembly comprising a plurality of separable, rigidly interconnected sections, each section being adapted to serve as an individual pack board including a rigid frame having a width suitable for service as a stretcher, a pair of oppositely disposed, vertically spaced panels mounted on the frame, means rigidly interconnecting the panels to the frame, one of the panels being a rigid plate, the other panel being a flexible fabric cover for providing equal pressure loading to back of carrying personnel and receiving an individual to be carried on the assembled stretcher, and releasable locking means at diagonally opposite corners of each section for rigidly connecting the section to additional similar sections for converting the section from an individual pack board into a stretcher.

12. A stretcher construction comprising a plurality of separably interconnected rigid sections, each of which sections includes a rigid frame having a width suitable to serve as a stretcher and having rigidly spaced apart top and bottom panels, one of which panels is a rigid plate, means securing the plate rigidly to bottom members of the frame of its section, another of which panels is a cover resiliently yieldable under weight of an individual being carried on the stretcher, a plurality of upper and lower locking means rigidly but releasably securing the sections together and means operating conjointly with the yieldable cover panel for encircling an individual being transported to prevent slipping thereof with respect to the stretcher, and releasable locking means rigidly interconnecting the sections, each section, when separated, being adapted for service as an individual pack board, each of which is transportable by an individual member of a team for conveying aid accessories to a site of an accident.

13. A stretcher assembly comprising at least three identical pack board sections rigidly interconnected and adapted to be selectively disconnected; each of said pack board sections comprising a continuous bottom plate deck, an upper deck including side rails spaced above said lower deck and adapted by a plurality of adjustable strap means to securely carry a casualty thereon, a longitudinal compound frame structure rigidly interconnecting said upper deck and said lower deck in substantially spaced apart relationship; a latch locking means adapted to selectively interconnect said lower decks of two adjacent and interconnected pack board sections; a spring biased double detent reciprocating locking means adapted to selectively and rigidly interconnect the comating and intertelescoping adjacent ends of the side rails of said upper decks of adjacent and interconnected pack board sections; all of the aforesaid locking means cooperating for rigidly but selectively demountably interlocking both bottom and top decks of said interconnected identical pack board sections to form a complete stretcher assembly adapted to receive and transport safely a casualty over precarious crevasses and projections of objects of mountainous terrain.

References Cited in the file of this patent

UNITED STATES PATENTS

529,301	Ortega	Nov. 13, 1894
2,201,890	Dunn	May 21, 1940
2,675,564	Hughes	Apr. 20, 1954
2,899,693	Stollenwerk	Aug. 18, 1959
2,924,831	Hankins	Feb. 16, 1960

FOREIGN PATENTS

667,922	Great Britain	Mar. 12, 1952