June 12, 1945. R. C. HUGHES 2,377,940

STRETCHER

Filed Dec. 29, 1942

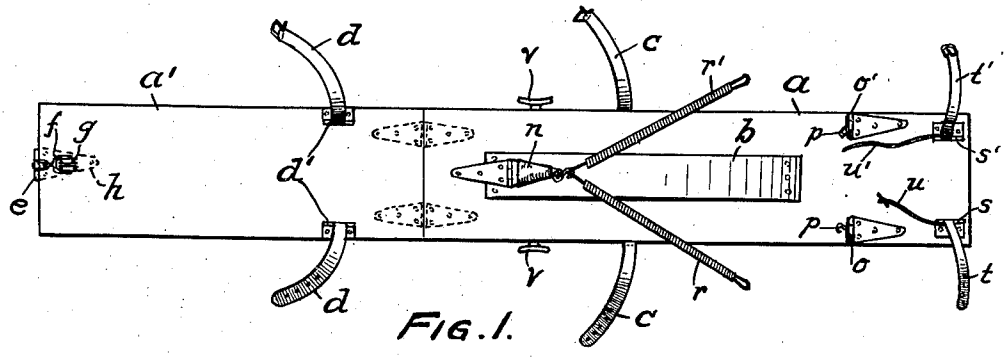


FIG. 1.

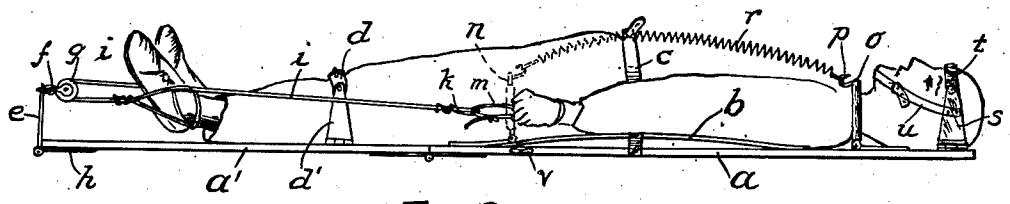


FIG. 2.

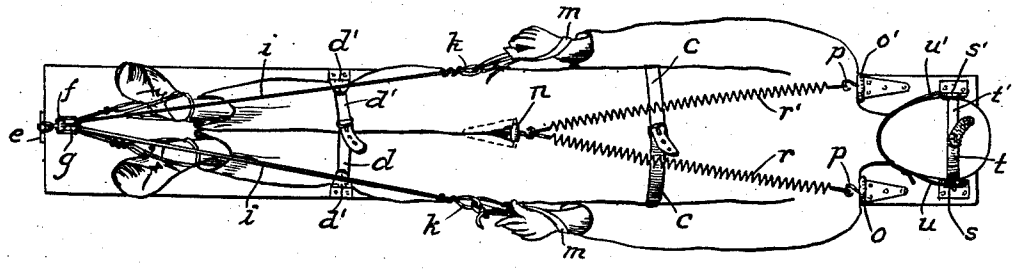


FIG. 3.

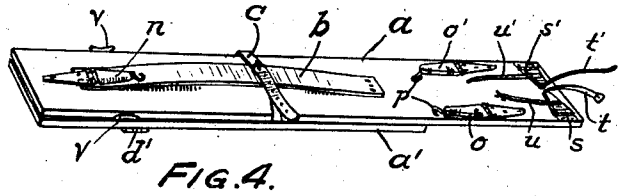


FIG. 4.

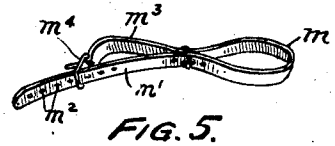


FIG. 5.

WITNESS:

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Patented June 12, 1945 2,377,940

UNITED STATES PATENT OFFICE

2,377,940

STRETCHER

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Application December 29, 1942, Serial No. 470,429

11 Claims. (Cl. 5—82)

In case of accident to the human body, and particularly any accident characterized by broken bones, it is always important, and often of vital importance, to prevent any additional injury to the body in the course of transportation from the locus of the accident to a hospital or hospital base. In the case of broken bones, any serious displacement, before hospital treatment, beyond that produced by the accident itself, often produces conditions that make the remedial measures of the physician or surgeon more difficult and may, in some cases, prevent completely successful bodily repair. Indeed, in some cases, fatal outcomes arise not from the inherently serious character of the bodily injury, but from secondary injuries incurred during transport of the injured body. This is particularly true, although not altogether limited to, a broken bone in the spinal column.

The best insurance against such secondary injuries is to maintain the injured members in a rigid position relative to the remainder of the body; and the most effective insurance against any disturbance of such rigidity is to maintain the entire body in a rigid condition as a unit. Jolts, jars and other irregular movements of the carrier or stretcher during transport are usually unavoidable; but if the body is maintained rigid as a unit, the danger from such movements during travel from place to place is minimized. The necessity for maintaining rigidity of the body, between the accident and the application of remedial measures, is particularly essential in the case of the breakage of bones in the spinal column without involvement of injury to the spinal cord; any deviation from rigidity following the accident being attended with danger of injury to the spinal cord and consequent paralysis or death.

The object of my invention is to provide a stretcher which includes equipment whereby the entire body, after careful deposit on the carrier or stretcher, may be readily and quickly secured thereto in such a manner as to insure, not only that the body will be maintained in fixed position on the carrier or stretcher, but also that all parts of the body will be maintained in fixed relative positions until the hospital base is reached. Incidentally, my improved stretcher is adapted to maintain a broken leg or arm in fixed position relative to the body trunk, even though the equipment is not so manipulated as to hold the entire body rigid; but a primary advantage of the invention is its adaptability to guard against all secondary injuries where conditions make it difficult or impossible to correctly or completely diagnose the character or extent of the injuries at the locus of the accident.

A preferred embodiment of the invention is shown in the accompanying drawing, in which—

Fig. 1 is a plan view of the carrier or stretcher.

Fig. 2 is a side view of the same with a human body in position thereon and secured in rigid relation thereto.

Fig. 3 is a plan view of Fig. 2.

Fig. 4 is a perspective view of the stretcher when not in use.

Fig. 5 is a perspective view of a detail.

The base comprises a flat board or plate preferably comprising two sections *a* and *a'* hinged together so as to permit the foot section *a'* to be folded under the main section *a*, as shown in Fig. 4, to attain compactness in transportation. The base-board section *a* is provided with a slightly arched plate *b* extending along the longitudinal center of section *a*. This plate may be substantially narrower than the base-board but it is wide relatively to its own thickness. Its deviation from flatness is just sufficient to give it a contour corresponding to the natural concavity of the human back.

The body is strapped to the base-board by means of straps *c*, *c'* and *d*, *d* carried by the respective sections *a* and *a'*. The straps *d*, *d* are secured to arms *d'*, *d'*, each of which is one member of a hinge the other member of which is secured to the face of section *a'* of the base-board. Each member *d'* is adapted to swing, from a position flat against the fixed member, upward into the vertical position shown in the drawing.

To maintain the body under longitudinal tension, the following means are provided to connect the hands and the feet. At the foot of section *a'* is an arm *e* carrying a fork *f* between the prongs of which are carried two pulleys *g*. The arm *e* is preferably formed by securing one member *h* of a hinge to the under face of the section *a*, the other member of the hinge (constituting the arm *e*) being swingable, from a position under and flat against the member *h*, through an arc of 270°, into, but not beyond, the position shown in Fig. 2. Around each pulley *g* extends a rope *i* provided at one end with an extension or hitch which is engageable with the foot and ankle in known manner. The other end of the rope is provided with a loop *k* which is connected with the wrist by means of a strap. This strap is constructed as shown in Fig. 5. Between its ends it is formed into a closed loop *m* through which the hand is slipped. One end *m'* of the strap

is provided with a series of perforations m^2. The other end m^3 of the strap is provided with a buckle m^4 slidable along the end m' and adapted to engage any of the perforations. Before such engagement one end of the strap is slipped through the loop k. Thereby the ropes i may be drawn taut to exert a downward pull on both the arms and legs, the body as a whole being thereby maintained under longitudinal tension.

To further maintain body rigidity the base-board is provided with an arm n, secured to about the center of the base-board (that is, near the lower end of section a) and adapted to engage the crotch at the junction of the legs to the body; and with two other arms o and o' located near the upper end of the base-board and adjacent its opposite side edges. Each of these arms is preferably formed by hinges, one member of which is secured to the face of the base-board and the other of which, constituting the arm specified, is adapted to swing into, but not beyond, an upright position. Each of these arms is provided with a hook p and tension springs r and r' are adapted to connect the hook of arm n with the hooks of arms o and o' respectively.

Displacement of the head is prevented by the following means: secured to the base-board near the upper end thereof and adjacent its opposite side edges are two arms s, s', which, also, are preferably formed by hinges one member of each of which is secured to the face of the base-board while the other member, constituting the specified arm, is adapted to swing into, but not beyond, an upright position. Fastened to the arms s, s' are straps t, t, which are adapted to be brought over the forehead and mutually engaged. Two other straps u and u' are fastened to the arms s, s', and are adapted to be brought under the chin and mutually engaged.

In the event that it is unnecessary, or for any reason undesirable (as for instance in the case of a broken leg or legs with uninjured arms) to maintain the arms rigid or under longitudinal tension, the board is provided, at its opposite side edges, with two cleats v, v, in lateral alignment, around which the ends of ropes i, i may be wound, thereby maintaining longitudinal tension upon the legs. It is thus possible to maintain longitudinal tension upon either or both legs, upon either leg and its corresponding arm, or upon both legs and both arms.

Certain of the swingable hinge members, and particularly n, o and s, should be padded to avoid possible harmful pressure upon the part of the body against which it is forcibly confined.

All the described appliances cooperate to hold the entire body in the rigid condition required to prevent displacement of any broken bone, especially of the back or neck. Transfer of the body from the locus of injury to a hospital base may be attended, as hereinbefore described, with unavoidable jolting and jarring movements of the base-board, and other deviations from a desirable, but impossible, horizontal position of rest. Such movements, however, effect corresponding movements of the body only as a unit. The various parts of the body are not subject to relative movement and therefore are not subject to secondary injuries.

As shown in Fig. 4, when the stretcher is not in use, the lower section a may be swung against the upper section b and the various movable hinge members swung down flat against the fixed hinged members, thereby so reducing the overall dimensions of the article that a number of them may be readily carried to the locus of the accident.

What I claim and desire to protect by Letters Patent is:

1. A stretcher comprising a flat rigid base-board and means to hold a human body in rigid relation with the base-board; said means comprising an arm secured to the base-board midway between its side edges and at such longitudinal position that it may engage the body at the crotch of the legs, two arms secured, in lateral alignment, to the base-board adjacent opposite side edges thereof and at such longitudinal position as to overlie the shoulders, and tension springs adapted to connect the first named arm with the other two arms respectively.

2. A stretcher as defined in claim 1 in which said arms each constitute one member of a hinge the other member of which is secured to the face of the base-board, the axes of said hinges extending in a lateral direction relative to the base-board.

3. A stretcher comprising a flat rigid base-board and means to hold a human body in rigid relation with the base-board; two pulleys, means, secured to the foot of the base-board, adapted to support said pulleys in fixed relation to, and above, the face of the base-board, and ropes extending around said pulleys, one end of one rope being adapted to be hitched about one foot and one end of the other rope being adapted to be hitched about the other foot, loops at the other ends of said ropes, and straps each having a loop adapted to engage the wrist and two ends adapted to engage the loop on the end of the corresponding rope, one of which strap ends is adjustably engageable with the other to thereby impose the desired tension on the rope.

4. A stretcher comprising a flat rigid base-board, a thin slightly arched plate extending longitudinally of the base-board and whose ends lie flat against the base-board and are secured thereto, said plate being adapted to underlie and firmly support the spinal column of a human body recumbent on the base-board, and means to hold the body in rigid relation with the base-board.

5. A stretcher comprising a base-board composed of upper and lower sections, means foldably connecting said sections whereby said sections may be folded with one section beneath the other section into non-use position or may be extended into aligned relationship and maintained rigidly therein for use, the upper section being substantially longer than the lower section, a thin slightly arched plate extending longitudinally of, and substantially shorter than, the upper section of the base-board, the ends of said plate lying flat against said upper section and secured thereto, said arched plate being located substantially nearer the lower end than the upper end of said upper section, and means to hold the body in rigid relation with the base-board when the sections are in aligning relation.

6. A stretcher comprising a flat, rigid base-board and means to hold a human body in rigid relation with the base-board; two pulleys, means, secured to the foot of the base-board, adapted to support said pulleys in fixed relation to, and above, the face of the base-board, ropes extending around said pulleys, the end of each rope having a loop adapted to be hitched about one foot of a patient on the base-board, straps secured to the other ends of the ropes and adapted to be engaged about the wrists of said patient and to impose a tension on said connections between

the feet and arms to thereby exert a downward pull on both arms and legs and thus tend to maintain the body of the patient under longitudinal tension.

7. A stretcher as defined in claim 6 comprising also cleats at approximately opposite edges of the base-board and in lateral alignment and around which said ropes may be wound, to thereby afford an alternative means to exert a downward pull upon the legs if the maintenance of the arms under tension is undesirable or unnecessary.

8. A stretcher comprising a flat rigid base-board and means to hold a human body in rigid relation with the base-board; two pulleys, means, secured to the foot of the base-board, adapted to support said pulleys in fixed relation to, and above, the face of the base-board, ropes extending around said pulleys, one end of one rope being adapted to be hitched about one foot and one end of the other rope being adapted to be hitched about the other foot, and means engageable with the other ends of the ropes to enable the application and maintenance of a pulling tension upon the legs; said pulley-supporting means comprising a hinge one member of which is so secured flat against the lower face of the base-board that the axis of the hinge extends laterally at the extreme lower edge of the base-board and the other member of which carries the pulleys and is adapted to swing from a position flat against the first named member through a wide arc into an upright position above the upper face of the base-board.

9. A stretcher comprising a flat rigid base-board, and means to secure the body of the patient in rigid relation to the base-board, said means including an arm secured to the base-board midway between its side edges and in such longitudinal position that it may engage the body of the patient at the crotch of the legs, arms secured to the base-board at such longitudinal position as to overlie the shoulders, connections between the first named arm and the other two arms adapted to exert a pulling force on both, and means adapted to be connected with the arms and feet of the body of the patient and exert a downward pull on both; whereby the whole body of the patient below the neck, including the trunk, legs and arms, is maintained under longitudinal tension.

10. A stretcher comprising a flat rigid base-board, and means to hold the head of a human body in rigid relation with the base-board; said means comprising arms of rigid material secured, in lateral alignment, to the head end of the base-board on opposite sides thereof and adapted to engage opposite sides of the head of the body, and straps adapted to respectively overlie the forehead, and underlie the chin, of the body and secured at opposite ends to said arms.

11. A stretcher as defined in claim 10 in which said arms each constitutes one member of a hinge the other member of which is secured to the face of the base-board, the axes of said hinges extending in a longitudinal direction relative to the base-board.

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