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2,453,370

SURGICAL BRACE

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Fig. 1.

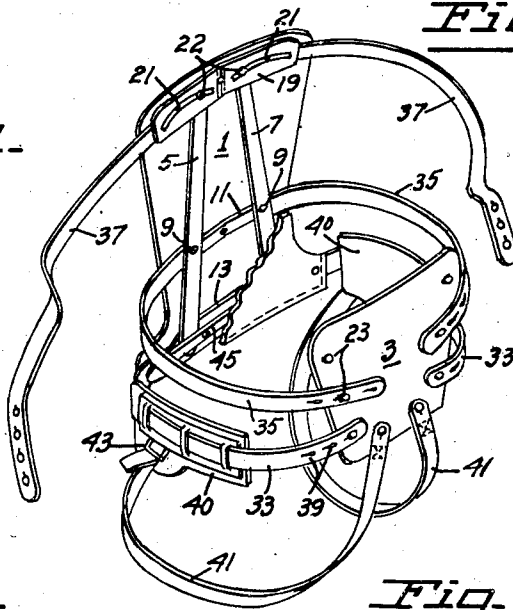


Fig. 6.

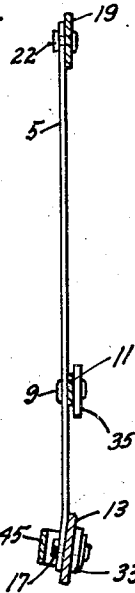


Fig. 2.

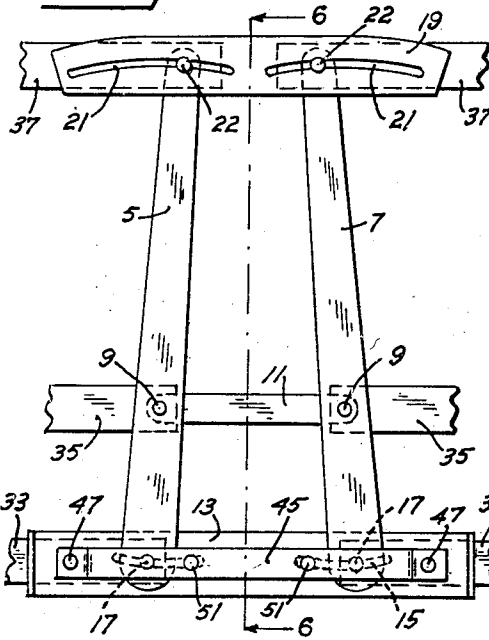


Fig. 4.

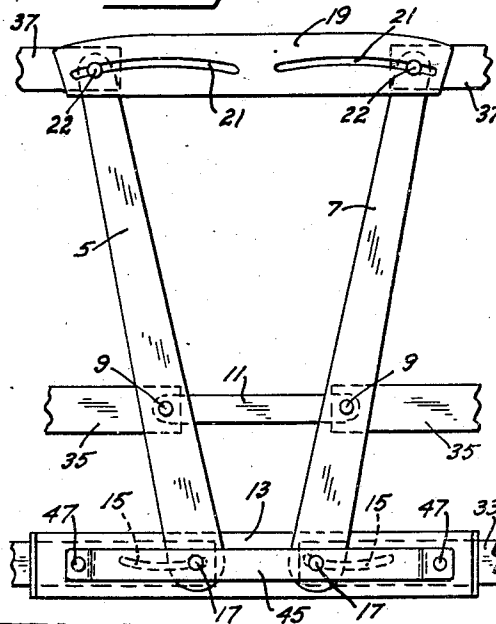


Fig. 3.

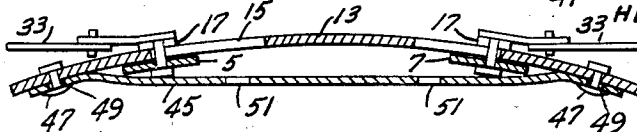
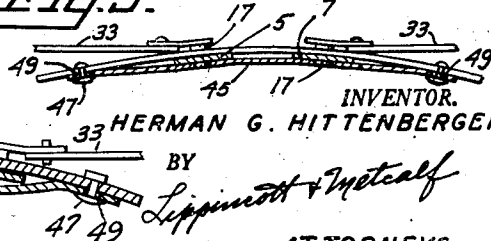


Fig. 5.



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2,453,370

SURGICAL BRACE

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12 Claims. (Cl. 128—78)

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My invention relates to a surgical brace, and more particularly to an improvement on the brace for immobilizing the pelvic and lower lumbar region of the spine, forming the subject matter of my co-pending application, Serial No. 538,465 which was filed June 2, 1944, now Patent No. 2,434,883, January 20, 1948.

Among the objects of my invention are:

(1) To provide a novel and improved brace for effecting immobility to the lumbar spine, sacroiliac joint and pelvis;

(2) To provide a novel and improved brace for the above purpose, which will offer increased freedom and comfort to the wearer;

(3) To provide a novel and improved brace which is self-locking in an adjusted position.

Additional objects of my invention will be brought out in the following description of a preferred embodiment of the same, taken in conjunction with the accompanying drawings wherein—

Figure 1 is a three-dimensional view of a preferred embodiment of my invention;

Figure 2 is an elevational view illustrating the construction of the posterior pad framework in which the improvement on my former brace has been effected, such framework being illustrated in its non-adjusted condition;

Figure 3 is a lower-edge view of the framework of Figure 2;

Figure 4 is a view corresponding to Figure 2 but with the framework in its adjusted condition;

Figure 5 is a lower-edge view of the framework of Figure 4, partly in section;

Figure 6 is an elevational view in section taken through the framework in the plane 6—6 of Figure 2.

The improvement constituting the present invention has been illustrated as embodied in the surgical appliance or brace forming the subject matter of my aforementioned application, and will be described in its relationship thereto. Accordingly, with reference to the drawings for a more complete and detailed description of the preferred embodiment of my invention as thus illustrated, the brace contemplates the use of a posterior pad 1 and an anterior pad 3 of such construction enabling them to be operatively-interconnected for obtaining desired pressure characteristics.

The posterior pad, adapted for positioning against the lower lumbar region of the spine, includes a framework covered by suitable padding, the framework involving a pair of vertically dis-

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posed stiff resilient tapered strips 5, 7 pivotally connected by rivets 9 to the ends of a cross-member 11 at points below the midpoint of the vertical strips 5, 7 and preferably about two-thirds down from the top thereof, to provide fulcrum points for such strips.

A lower transverse strip or cross-member 13, of flexible material and preferably slightly bowed, is provided with a pair of arcuate slots 15 symmetrically disposed with respect to the midpoint of the transverse strip. Each of such slots serves to slidably receive a shoulder rivet 17 affixed at the lower end of each of the vertical strips.

An upper transverse strip 19 is similarly provided with corresponding arcuate slots 21, each to slidably receive a shoulder rivet 22 applied to the upper end of each of the vertical strips.

The upper slots 21, however, will be somewhat greater in length than those in the lower transverse strip 13 in accordance with the extent of swing of the upper end of the vertical strips as compared to the extent of swing of the lower end of such strips, when the strips are rotated on their respective fulcrum rivets 9.

25 The anterior pad 3, adapted for positioning against the abdomen when the brace is applied to the wearer, is provided for this purpose with a plurality of studs 23 adjacent the side and lower marginal edges of the pad.

30 The aforementioned posterior and anterior pads are interconnectible by a plurality of pairs of straps including pelvic straps 33, intermediate straps 35, and final-pressure adjustment straps 37.

35 The pelvic straps are each connected at one end to one of the shoulder rivets 17 in the lower end of each of the vertical strips 5, 7 and at its free end is provided with buttonholes 39 for adjustable connection to one of the studs on the anterior pad 3.

40 A pad 40 slidably mounted on each of the pelvic straps 33 is adapted to be positioned at such point where pressure will also be applied to the pelvic bones, when such straps are tensioned, such pads further serving to relieve the body from pressure along uncovered portions of the pelvic straps and thus concentrating the pressure against the pelvic bones where it can do the most good in immobilizing the bone structure in such region.

45 The intermediate straps 35 are each connected at one end to one of the fulcrum rivets 9 and, like the pelvic straps, each has its free end provided with buttonholes for connection to another of the studs on the anterior pad.

55 The final-pressure adjusting straps 37 each has

one end connected to one of the shoulder rivets 22 at the upper end of one of the vertical strips and, like the previously referred to straps, has its free end provided with button-holes for connection to another of the studs on the anterior pad.

In outlining, in my aforementioned application, the manner in which the brace as thus far described, is applied and functions, it was pointed out that the posterior pad 1 is held against the lower lumbar region of the spine while the intermediate and pelvic straps are adjustably secured to the anterior pad through selection of those button-holes which will assure a fair degree of tightness of the straps. In so adjusting the pelvic straps, the lower ends of the vertical strips will be separated to the maximum distance permitted by the arcuate slots 15.

At this stage in the application of the brace, the final-pressure tightening straps 37 are grasped by the wearer and pulled in opposite directions to draw the upper ends of the vertical strips apart. The resulting spreading of the upper ends of the strips will result in a corresponding drawing-together of the lower ends, thereby greatly increasing the tension and the corresponding tightening effect upon the pelvic straps. When the desired added tension has been applied to the pelvic straps, the final-pressure tightening straps are then drawn around to the front of the wearer and connected to studs on the anterior pad 3.

Maintenance of the brace in its proper position on the body, as described in my previously mentioned application, is assured by the provision of a pair of perineal straps 41. One end of each of such straps is provided with a buttonhole for attachment to a stud at the lower edge of the anterior pad, while the other end of each such straps is adjustably secured in a buckle 43 suspended from each of the pads carried by the pelvic straps.

While the brace of my aforementioned application, as illustrated and described above, fulfills all of the objects of the invention as recited in such application, I have found that by relying upon the final-pressure straps 37 to maintain the final pressure adjustment, the vertical strips 5, 7 are free to respond to movements of the body and that certain movements of the body such as bending, may bring about excessive tensioning of the pelvic straps. While the effectiveness of such brace for its intended purpose is not thereby lessened, a party wearing the same would, under the circumstances, prefer that the tension on the pelvic straps remain substantially constant once they have properly been adjusted to his body.

Toward this end, I provide a slightly inwardly bowed strip 45 of spring material preferably of phosphor-bronze alloy, and anchor the same at each end to the inner surface of the lower cross-piece 13 in a manner permitting limited sliding movement of the spring ends. This is accomplished by a rivet 47 passing through an oversized opening 49 at each end of the spring and only loosely gripping the spring so the same may ride on the rivet to the extent permitted by the oversized opening through which the rivet passes.

The spring is provided with a perforation 51 to either side of the midpoint, each of sufficient diameter to comfortably admit the head of one of the rivets 17. The exact location of each such perforation is in substantial alignment with the inner end of one of the arcuate slots 15 so that when the upper ends of the vertical strips 5 and 7 are spread apart to substantially their maximum

distance, the rivet heads previously referred to, can enter the perforations in the spring, and thereby lock such vertical members against subsequent movement.

In this connection it is noted that while the spring is normally spaced from the cross-piece 13 so that the rivet heads will not in the normal course of events enter the perforations provided in the spring, when the brace is applied to the body, the spring will be pressed under body pressure, toward the cross-member 13 to the extent permitted by the intervening rivets 17. Thus during adjustment, the rivet heads in question will ride along the spring and upon reaching the perforations therein, will snap into place and lock the brace members against further movement.

Buckling of the spring due to such inward pressure by the body is avoided by the over-sized openings which permit limited movement of the spring ends upon their anchoring rivets.

When so locked, the upper straps 37 need no longer be relied upon to maintain proper tension in the pelvic straps 33, and consequently may be adjusted to provide for comfort to the wearer and at the same time permit the wearer to enjoy greater freedom in body bending without fear of altering tension in the pelvic straps.

To remove the brace, it, of course, will be necessary to unbutton the top straps and among other things, to release the rivets from engagement with the perforations in the spring. This latter is readily accomplished by removal of the body pressure therefrom, the resiliency of the spring causing it to spring away under the circumstances and bring about disengagement from the rivets. Under the tension existing at the moment in the pelvic straps, a spreading of the vertical strips at their lower ends will result. During the course of such spreading, it is important to note that the heads of the rivets will engage the spring and force the same outwardly toward its initial position, and thus overcome any tendency on the part of the anchoring rivets 47 to frictionally hold the spring against such restoration.

From the above description of a preferred embodiment of the present invention, it will become apparent that it fulfills all the objects set forth in connection therewith, and while I have disclosed such embodiment in considerable detail, I do not desire to be limited in my protection to such details, except as may be necessitated by the appended claims.

I claim:

1. A brace comprising a posterior pad including a pair of vertically disposed strips, means pivotally connecting said strips at an intermediate location thereon to provide a fulcrum for each of said strips whereby to permit an approach of the lower ends of said strips toward each other in response to separation of the upper ends, means secured to the lower ends of said strips and capable of being fastened about the body of a patient, means for applying separation forces to the upper ends of said vertically disposed strips, and means responsive to the resulting pivotal movement of said vertical strips for locking the same against subsequent movement.

2. A brace comprising a posterior pad including a pair of vertically disposed strips, means pivotally connecting said strips at an intermediate location thereon to provide a fulcrum for each of said strips whereby to permit an ap-

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proach of the lower ends of said strips toward each other in response to separation of the upper ends, means secured to the lower ends of said strips and capable of being fastened about the body of a patient, means for applying separation forces to the upper ends of said vertically disposed strips, and means responsive to the resulting pivotal movement of said vertical strips for locking the same against subsequent movement, said last means including a strip of spring material spanning the lower ends of said vertically disposed strips and supported independently thereof, and means associated with each of said vertically disposed strips and said strip of spring material adapted to interlock during such movement of said vertical strips.

3. A brace comprising a posterior pad including a pair of vertically disposed strips, means pivotally connecting said strips at an intermediate location thereon to provide a fulcrum for each of said strips whereby to permit an approach of the lower ends of said strips toward each other in response to separation of the upper ends, means secured to the lower ends of said strips and capable of being fastened about the body of a patient, means for applying separation forces to the upper ends of said vertically disposed strips, and means responsive to the resulting approach of the lower ends toward each other for locking said vertically disposed strips against subsequent movement, said last means including a strip of spring material spanning the lower ends of said vertically disposed strips and supported independently thereof, and means associated with each of said vertically disposed strips and said strip of spring material adapted to interlock during such approach of the lower ends of said vertical strips toward each other.

4. A brace comprising a posterior pad including a pair of vertically disposed strips, means pivotally connecting said strips at an intermediate location thereon to provide a fulcrum for each of said strips whereby to permit an approach of the lower ends of said strips toward each other in response to separation of the upper ends, means secured to the lower ends of said strips and capable of being fastened about the body of a patient, means for applying separation forces to the upper ends of said vertically disposed strips, and means responsive to the resulting approach of the lower ends toward each other for locking said vertically disposed strips against subsequent movement, said last means including a strip of spring material spanning the lower ends of said vertically disposed strips and supported independently thereof, said spring strip having a pair of spaced perforations therein, and means associated with each of said vertically disposed strips adapted to enter said perforations during such approach of the lower ends of said vertical strips toward each other, whereby to cause said vertical strips to become locked against subsequent movement.

5. In a brace involving a pair of members capable of movement with respect to each other in adjusting said brace to the body of a patient, means automatically locking said members against subsequent movement when the relative movement thereof has brought them to a desired position of adjustment, said means including a pair of interlocking elements, one of said elements being carried by one of said relatively movable members and the other by said other relatively movable member in the path of movement of the other.

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6. In a brace involving a pair of members capable of movement with respect to each other in adjusting said brace to the body of a patient, means for locking said members against subsequent movement when the relative movement thereof has brought them to a desired position of adjustment, said means including a pair of interlocking elements, one of said elements constituting a rivet carried by one of said relatively movable members and the other constituting a strip of spring material carried by said other relatively movable member and having a perforation in the path of relative movement of said rivet.

7. A pad framework for a surgical brace comprising a pair of vertically disposed strips, means pivotally connecting at least one of said strips at an intermediate location thereon to provide a fulcrum for pivotally moving such strip whereby to permit a relative approach of the lower ends of said strips toward each other in response to separation of the upper ends, a cross member having an arcuate slot therein, means including a rivet through the lower end of said vertically disposed movable strip for slidably connecting the lower end thereof in said slot, and means for locking such vertically disposed movable strip in a desired adjusted position during such approach of the lower ends of said strips toward each other, said last means including a strip of spring material spanning the lower end of said vertically disposed movable strip and slidably anchored at at least one of its ends to said cross member, said strip of spring material having a perforation in the line of travel of said rivet to receive the same and lock such vertically disposed movable strip against subsequent movement.

8. A pad framework for a surgical brace comprising a pair of vertically disposed strips, means pivotally connecting said strips at an intermediate location thereon to provide a fulcrum for each of said strips whereby to permit an approach of the lower ends of said strips toward each other in response to separation of the upper ends, a cross member having a pair of spaced arcuate slots therein, means including a rivet through the lower end of each vertically disposed strip for slidably connecting the lower end of each of said strips in one of said slots, and means for locking said vertically disposed strips in a desired adjusted position during such approach of the lower ends of said strips toward each other, said last means including a strip of spring material spanning said lower ends and slidably anchored at each of its ends to said cross member in pressure contact with said rivets to assure an initial starting condition of said spring strip, said strip of spring material having a perforation in the line of travel of each of said rivets during approach of the lower ends of said vertically disposed strips to receive the said rivets and lock such vertically disposed strips against subsequent movement.

9. A pad framework for a surgical brace comprising a pair of vertically disposed strips, means pivotally connecting said strips at an intermediate location thereon to provide a fulcrum for each of said strips whereby to permit an approach of the lower ends of said strips toward each other in response to separation of the upper ends, a cross member having a pair of spaced arcuate slots therein, means including a rivet through the lower end of each vertically disposed strip for slidably connecting the lower end of each of said strips in one of said slots, and means for

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locking said vertically disposed strips in a desired adjusted position during such approach of the lower ends of said strips toward each other, said last means including a strip of spring material spanning said lower ends and slidably anchored at each of its ends to said cross member to permit flexing thereof without buckling, said strip of spring material having a perforation in the line of travel of each of said rivets to receive the same and lock such vertically disposed strip against subsequent movement.

10. A pad framework for a surgical brace comprising a pair of vertically disposed strips, means pivotally connecting said strips at an intermediate location thereon to provide a fulcrum for each of said strips whereby to permit an approach of the lower ends of said strips toward each other in response to separation of the upper ends, a cross member having a pair of spaced arcuate slots therein, means including a rivet through the lower end of each vertically disposed strip for slidably connecting the lower end of each of said strips in one of said slots, means for locking said vertically disposed strips in a desired adjusted position during such approach of the lower ends of said strips toward each other, said last means including a strip of spring material spanning said lower ends and slidably anchored at each of its ends to said cross member, said strip of spring material having a perforation in the line of travel of each of said rivets to receive the same and lock such vertically disposed strips against subsequent movement, and means for restoring said strip of spring material to its initial condition upon disengaging said rivets from said perforations.

11. In a brace involving a pair of members capable of movement with respect to each other in adjusting said brace to the body of a patient, means for locking said members against subsequent movement when the relative movement

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thereof has brought them to a desired position of adjustment, said means including a pair of interlocking elements, one of said elements constituting a rivet carried by one of said relatively movable members and the other constituting a strip of spring material carried by said other relatively movable member and having a perforation in the path of relative movement of said rivet, and means for restoring said strip of spring material to its initial condition upon disengaging said rivet from said perforation.

12. A brace comprising a posterior pad including a pair of vertically disposed strips, means pivotally connecting at least one of said strips at an intermediate location thereon to provide a fulcrum whereby to permit an approach of the lower ends of said strips toward each other in response to separation of the upper ends, means secured to the lower ends of said strips and capable of being fastened about the body of a patient, means for applying separation forces to the upper ends of said vertically disposed strips, and means responsive to the resulting movement between said vertical strips for locking the same against subsequent movement.

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