March 20, 1951 H. COHAN 2,545,843

HINGED JOINT FOR LEG BRACES

Filed Aug. 30, 1949

FIG. 1.

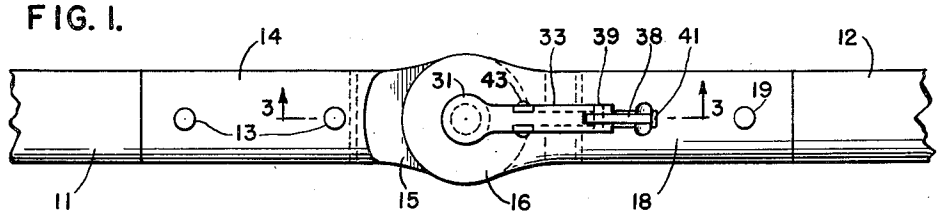


FIG. 2.

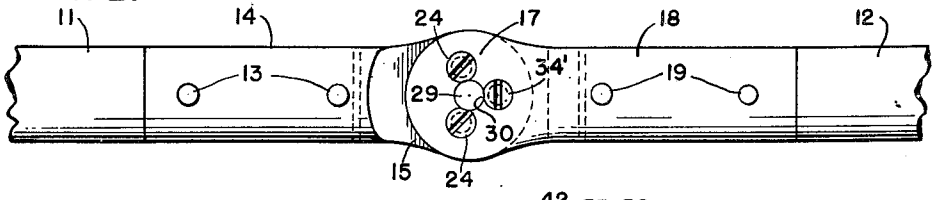


FIG. 3.

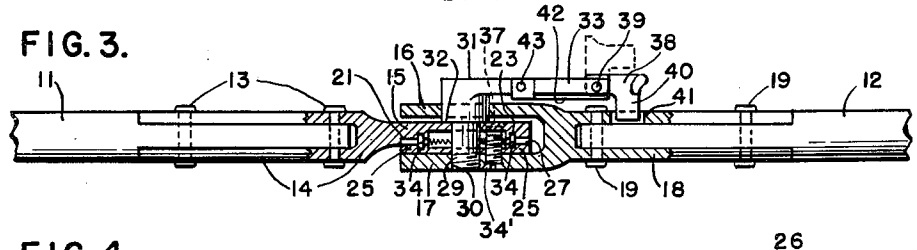


FIG. 4.

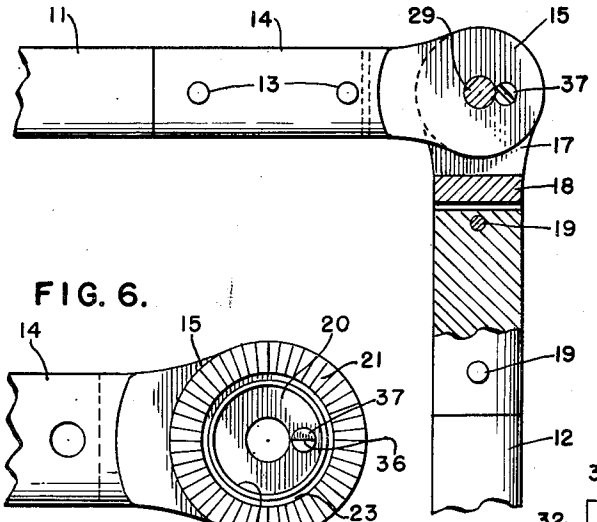


FIG. 5.

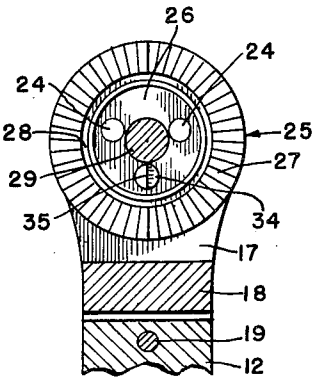
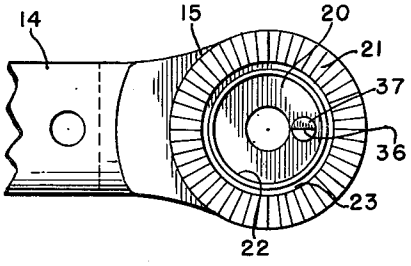


FIG. 6.



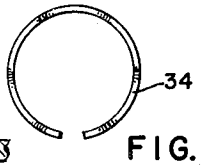


FIG. 7.

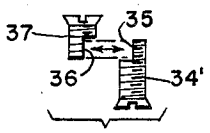


FIG. 10.

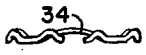


FIG. 8.

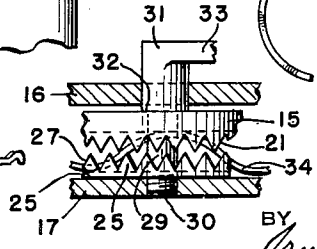


FIG. 9.

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HINGED JOINT FOR LEG BRACES

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2 Claims. (Cl. 128—80)

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This invention relates to improvements in orthopedic appliances and the like and has particular reference to a hinged joint for leg-braces.

Leg braces are, in general, made up of inner and outer upper and lower leg-bars for each leg; the upper leg-bars being connected, in juxtaposition to the knee joint, to the lower leg-bars by a hinged joint which permits adjustment of the angle of the upper leg-bars with respect to the lower leg-bars. The angular movement of the lower leg bars with respect to the upper leg bars is limited to angles from approximately 180° to approximately 90° on one side only.

When a leg-brace is in use, while a wearer is standing or walking, the upper and lower sections are set to assure a 180° angle and must be securely locked in such adjustment. When, however, the wearer assumes a sitting position the lower leg-bar of the leg-brace may be swung inwardly around its hinged connection with the upper leg-bar, to assume a position approximating an angle of 90° between the two sections.

It is an object of this invention to provide a hinged joint having simple means which will allow the wearer to readily unlock the hinged joint, adjust the upper and lower leg-bars to any angle, between 180° and 90°, desired and securely relock the hinged joint to prevent accidental swinging movement.

Another object of this invention is the provision of a simple means therein, for counterlocking the locking unit to prevent accidental release of same.

A further object of this invention is the provision therein of a spring means to urge the locking elements apart when the locking unit is opened.

As already stated generally each leg-brace comprises two sets of upper and lower leg-bars. A single bar, however, has been selected for descriptive purposes. The two sets of leg-bars embrace a leg of the wearer on either side of the leg and are similar in construction to that hereinafter described for a single hinge, with the one exception. That is, in the connecting hinge one set of leg-bars upon one side of a leg has a right hand threaded locking key, while that upon the opposite side of the same leg is provided with a left hand threaded locking key.

A still further object of this invention is the provision of an organization in which the constituent elements are so arranged structurally and functionally as to assure improved results with materials and members which may be manufactured at reasonable cost, may be easily assembled and which will be efficient in operation with minimum wear to the parts.

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The best embodiment of the invention has been chosen for illustrative purposes, but this embodiment should be viewed as being illustrative only and not as limiting because obviously the invention is capable of other embodiments having revised details of construction, so long as they fall within the ambit of the appended claims.

The invention itself, however, both as to its organization and its method of operation, will best be understood from the following description of a specific embodiment when read in connection with the accompanying drawings, in which:

Figure 1 is a side view of a locking unit upon a hinged joint attached between the upper and lower leg-bars of a leg-brace.

Figure 2 is a similar view of the reverse side of the hinged joint.

Figure 3 is a view, partly in section, and looking toward the narrow edge of same. The sectional portion being taken along the line 3—3 of Figure 1 and looking in the direction indicated by the arrows.

Figure 4 is a side view similar to Figure 1 but showing the joined portions of a leg-brace set at a right angle to each other and has a portion of the lower hinge member broken away.

Figure 5 is an enlarged, fragmentary detail, partly in section, of a portion of the lower hinge member, the upper hinge member being removed.

Figure 6 is an enlarged, fragmentary detail showing the reverse side of the upper hinge member.

Figure 7 is a plan view of a split circular spring employed in this invention.

Figure 8 is a side elevational view of same.

Figure 9 is a fragmentary detail, in elevation, showing the spring of Figures 7 and 8 in position, and

Figure 10 is a schematic view, in elevation, of a stop means employed in this invention.

Referring to the parts in detail, 11 designates the end portion of the upper or thigh-bar of a leg-brace and 12 the end portion of a lower leg-bar of a leg-brace. To the lower end of the thigh-bar 11 there is attached, by rivets 13, an upper hinge element 14 formed with a disklike tongue 15 engageable between disklike forks 16 and 17 formed upon a lower hinge element 18 which is attached, by rivets 19, to the upper end of the lower leg-bar 12. See Figure 3, which shows the upper and lower leg-bars 11 and 12 respectively and in which view the disklike fork

16 will be considered the upper fork while the disklike fork 17 will be referred to as the lower fork.

The disklike tongue 15 is formed upon one side (the lower side as viewed in Figure 3) with a recess 20 (Figure 6), annularly bordering which, are radially arranged corrugations or ribs 21 and wall 22 to form a circular groove 23 just inside of the radial ribs 21. To the upper side of the lower fork 17 there is attached, by screws 24, a disk 25 formed with a recess 26 and radially arranged corrugations or ribs 27, which are complementary to and engage the corrugations 21 upon the disk-like end 15 of the upper hinge element 14. A circular groove 28, corresponding to and aligned with the groove 23, is formed upon the disk 25. When the disk-like tongue is in place between the forks 16 and 17, the radial corrugations or ribs 21 thereon face downwardly and interlock with the corrugations 27 upon the disk 25 and are held in close, locking contact thereon by means of a locking pin 29, the lower end of which has a threaded engagement with the lower fork 17 as at 30.

The pin 29 has a broadened upper head 31, forming a shoulder 32 which engages the disk-like tongue 15 to bring the corrugations 21 into close, nesting contact with the corrugations 27 upon the disk 25 thereby holding the connected members 14 and 12 in locked position. The head 31 of the pin 29 has an extending arm or lever 33 by means of which the pin 29 is screwed into or unscrewed from its threaded connection 30 to lock the corrugated portions together or release same to allow them to be moved apart. A split wire spring 34 (Figures 7, 8, and 9), is nested within the grooves 23 and 28 to urge the corrugated portions 21 and 27 apart when the pin 29 is turned and unscrewed by the lever 33.

A stop member, in form of a screw 34', is threaded through the lower fork 17, extends into the recesses 20 and 26 and is partially cut away at its inner end to form a contact surface 35 (Figures 5, 6, and 10) which is adapted to engage a similar or complementary cut-out or contact surface 36 formed upon a screw 37 which is secured upon the disk-like tongue 15 and extends into the recesses 20 and 26 in circular alignment with the stop member 34. The said stop member screws 34 and 37 respectively provide a means to limit the swing or rotation of the lower leg-bars beyond 180° with respect to the line of the upper leg-bars. By changing the depth of the cut out portions of the said screws 34 and 37, the degree of the outward swing may be varied a few degrees above or below the 180° or straight line adjustment by replacing the stop screws shown, with the ones desired.

Assuming that a wearer of the leg brace is standing, the upper and lower leg-bars will be locked in a straight line or at an angle of 180°, as indicated in Figs. 1, 2 and 3. When the wearer assumes a sitting position and desires to bend his leg, he releases the lever 33 from its locked position by disengaging the clip 38 as indicated in Fig. 3, whereupon the said lever 33 may be turned to rotate the pin 29, thereby disengaging the radial corrugations 21 and 27 upon the discs 15 and 17 respectively and permitting the lower leg-bars to rotate about the pin 29 to assume any desired angle with respect to the upper leg-bars.

To prevent the accidental or inadvertent movement of the lever 33 there is provided upon its end an angular clip 38 pivoted to the lever 33 at 39. The free end 40 of the clip 38 engages in a slot 41 formed in lower hinge element 18 and is held in position therein by the urge of a flat spring 42 secured to the lever 33 by a rivet 43.

I claim:

1. A hinged joint for leg-braces and the like, comprising upper and lower leg-bars, the combination of an upper hinge element secured to the lower end of an upper leg-bar and having a tongue formation thereon, a lower hinge element formed with forked ends and secured to the upper end of a lower leg-bar, the tongue end of the upper hinge element engaging between the forks upon the lower hinge element, a broad headed pin pivotally engaging through a fork of the lower hinge element and having a contracted lower shank forming a shoulder which engages against the tongue and the contracted shank portion pivotally extending through the tongue of the upper hinge element, a fork upon the lower hinge element having a threaded bore to receive the threaded end upon the pin, radially arranged ribs upon one side of the tongue portion of the upper hinge element, complementary radially arranged ribs upon the opposing face of the fork of the lower hinge element and adapted to engage and inter-lock with the radial ribs upon the tongue, a lever upon and extending from the head of the pin to provide a means for rotating the pin to lock the radial ribs together or move them apart, and a counter-locking clip pivotally attached to the lever and engaging a slot in the lower hinge element to prevent accidental or inadvertent rotation of the pin.

2. A hinged joint for leg-braces as set forth in claim 1, including stop means upon the tongue portion of the upper hinge element and upon the fork of the lower hinge element, adapted to limit the outward swing of the lower hinge element about its pin connection with the upper hinge element.

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