

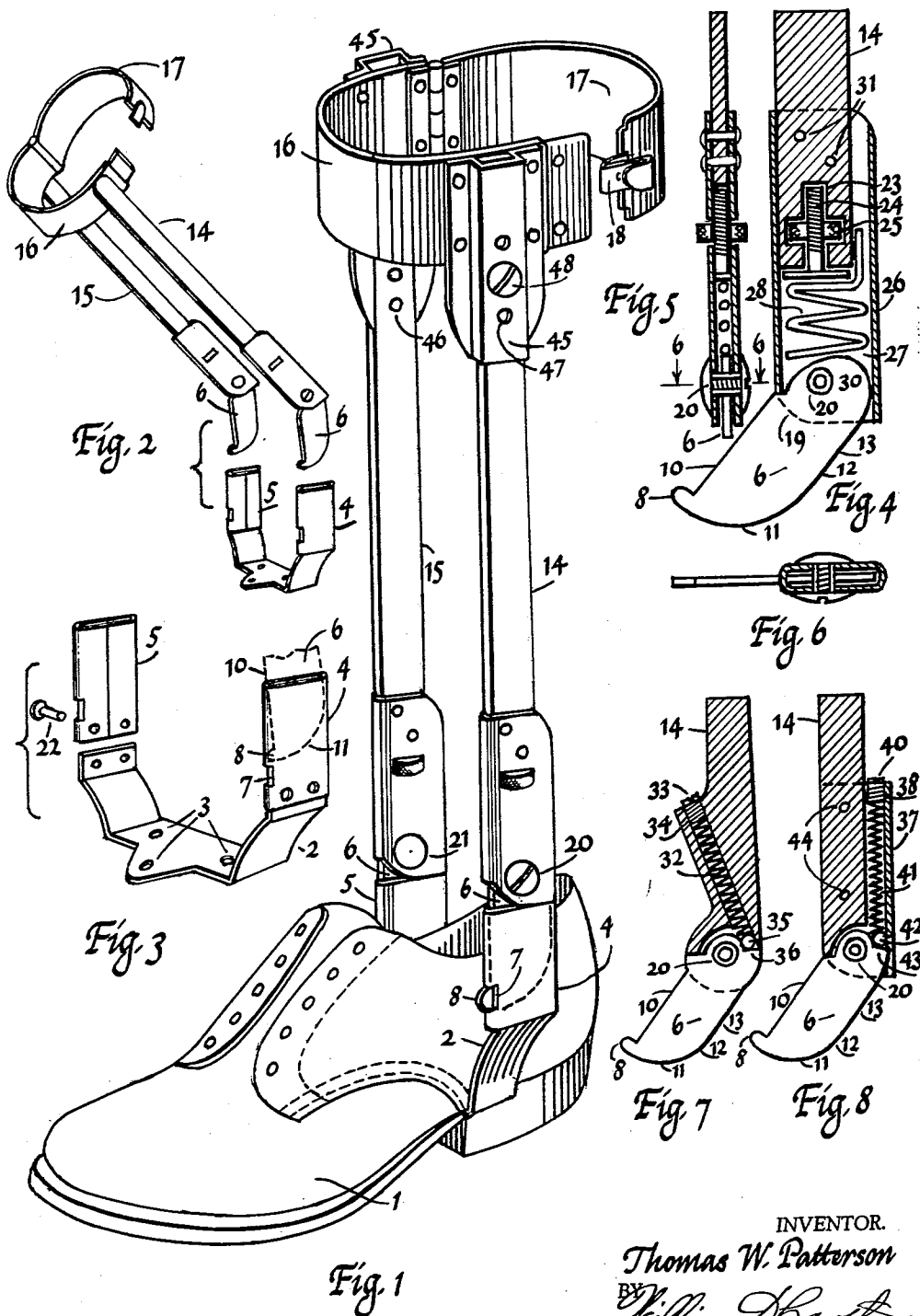
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LOWER LEG BRACE

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LOWER LEG BRACE

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This invention relates generally to orthopedic devices and more particularly to a lower leg brace.

Those who are required to wear a lower leg brace, whether it is worn alone or used in combination with an upper leg brace, ordinarily require a spring device for raising the toe when the foot is lifted from the ground to permit them to walk. This spring device is applied through a lower stirrup that is fastened to the shoe and which is pivotally connected to the brace at a pivotal joint located in the proximity of the ankle joint. When this lower stirrup which is fastened to the shoe is pivotally connected to the upper portion of the brace it is biased with a spring pressure to force the toe upwardly when the foot is lifted from the floor which permits the wearer to walk with greater ease. The stirrup or the lowermost portion of the orthopedic device is rigidly attached to the shoe preferably by securing the same to the instep of the shoe and to a portion of the heel. This stirrup is then pivoted to the upper brace members there being a pivot on each side of the leg and this pivot coaxial with the ankle joint. This pivotal joint is also intended as a permanent joint rather than a demountable joint which requires the upper section of the brace to be integral with the shoe. Thus the person desiring to change shoes has considerable difficulty in changing the brace from one shoe to the other and the result has been that those wearing devices of this character usually have a brace for every pair of shoes, which is costly and presents a storing problem.

The principal object of this invention is the provision of a lower leg brace or the lower section of a complete leg brace which has a fixed or permanent pivotal joint but is detachable from the stirrup. This enables the wearer to provide a stirrup for different shoes and permits him to employ the upper portion of the leg brace as well as the pivoted ankle joint with every shoe, each having its own stirrup.

Another problem in lower leg braces is that they have been arranged with a strap to pass around the leg above the calf from the back of the leg and secured at the front. This is the natural thing to do owing to the bias of the spring in a permanent pivotal angle joint of a leg brace. However wearers of this character of leg brace frequently have little or no access to the area behind their leg but they do have access to the area in front of their knee. Thus the ordinary leg brace that opens in the front and swings rearwardly cannot be applied or removed by the person of the wearer and thus requires a second person to aid in the application of the brace.

Another important object of this invention is to make the leg brace open at the rear of the leg and move forwardly so that the person of the wearer can readily manipulate the same without the aid of others.

Another object of this invention is the provision of a stabbing joint between the lower leg brace member and the stirrup that provides quick interlocking and permanent securing by the straightening of the brace to its normal position on the leg.

Another object is the provision of a particular interlocking stabbing joint for providing a removable brace and stirrup or similar members that provide a very simple connection and disconnection but permanently lock with each other when in normal operating position.

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Other objects and advantages of this invention appear hereinafter in the following description and claims.

The accompanying drawings show for the purpose of exemplification without limiting this invention or the claims thereto, certain practical embodiments illustrating the principles of this invention; wherein

FIG. 1 is a perspective view of the complete lower leg brace comprising this invention.

FIG. 2 is a view showing the lower leg brace in stabbing position with the stirrup.

FIG. 3 is an enlarged view of a modified form of stirrup.

FIG. 4 is a vertical sectional view of the spring biased ankle joint stabbing member of the structure shown in FIG. 1.

FIG. 5 is a transverse sectional view of the structure shown in FIG. 4.

FIG. 6 is a view taken on the line 6—6 in FIG. 5.

FIG. 7 is a sectional view of a modified form of an ankle joint.

FIG. 8 is a sectional view of another modified form of ankle joint.

Referring to FIG. 1 of the drawings the shoe 1 has secured to its instep the stirrup member 2. As shown in FIG. 3 the stirrup member 2 has three holes 3 which are employed to secure the stirrup to the underside of the shoe 1. The upper portions of the bifurcated ends of the stirrup as shown in FIG. 1 are formed to produce the sockets 4 and 5. The sockets 4 and 5 are made by folding the material back around and securing the ends together so that the opening is sufficiently large to pass the stabbing tongue 6 which telescopes thereto. In order to construct the stirrup in the manner as shown in FIG. 1 it is preferable to make it from stainless steel and of sufficient rigidity that will not flex at the side bows and that will substantially hold its shape when formed into the sockets 4 and 5. Each socket has an opening or indentation 7 in the front thereof to receive the lateral tip 8 as shown in each of the views.

The stabbing tongue 6 shown in each of the views is substantially the same in shape and consists of a straight front edge 10 that terminates in the lateral extending tip 8 and the outer edge of the tip 8 is shaped into an arc 11 that returns substantially half way up the stabbing tongue 6 to the point 12 where the tongue becomes straight at 13 which is substantially parallel with the straight front edge 10. The reason for the particular shape of this stabbing tongue 6 is illustrated in FIG. 3 where the arc 11 allows the straight front edge 10 to just pass into the socket 4 when the lateral tip 8 is bearing against the front edge of the socket just before it enters the opening, indentation or window 7. In other words there is just enough room in the arcuate curve 11 to admit the lateral extending tip 8 to just clear the window or indentation 7 and when it enters the window 7 the stabbing tongue 6 fits within the socket.

As shown in FIG. 2 the upper portion of the brace is indicated by side rails 14 and 15 which are connected at their upper ends by the band 16 which passes around the front of the lower portion of the leg and is closed by the pivoted or hinged rear band portion 17 and joins to and locks with the front portion when encircling the leg by the latch member 18. These bands are of course suitably lined with pads for comfort in wear.

When the leg brace is tilted forward the stabbing tongue 6 may be lined with the sockets 4 and 5 as shown in FIG. 2 and inserted, being slid into place as indicated in FIG. 3. When they are fully inserted and the brace is hinged on the pivot members 20 and 21 which are coaxial with the ankle joint, thus swinging the brace vertical as illustrated in FIG. 1 and enclosing the band 17 about the rear of the upper calf of the wearer, the stabbing tongue 6 be-

comes absolutely locked within the sockets 4 and 5 and allows little or no movement between the tongue and the stirrup. This snug fit may be aided by making the lateral extending tip 8 slightly larger at its base so that it tightly fits in the window or indentation 7. Since the wearer has access and may manipulate things in front of his knee he can take the stabbing joint and fasten the brace to his leg without the aid of others.

As shown in FIG. 3 the sockets 4 and 5 are made independently of the bows and cross plate of the stirrup 2. This permits the bows and cross plate to be made of heavier material, the lighter material being employed for the sockets 4 and 5, thus permitting the lower portion of the sockets to be slipped down over the end of the bows of the stirrup and riveted in place as indicated at 22. The stabbing tongue 6 may then be made the same thickness as the bows and cross plate of the stirrup 2 and since these are both wearing members it is preferable that they be made of stainless steel. However some of the other portions of the brace may be made of aluminum to lighten the structure.

To bias the pivotal joints 20 and 21 so as to raise the toe of the shoe the structures shown in FIGS. 4 to 8 are provided.

Referring to FIGS. 4 to 6 it will be noted that the side rail 14 has the opening 23 formed therein to receive the screw member 24 and the knurled nut 25. An envelope 26 of stainless steel is formed around the lower end of the rail 14 to form the chamber 27 to receive the serrated spring 28, the upper edge of which is engaged by the head of the screw 24 and the lower of which presses against the cam surface 30 of the stabbing tongue 6. Thus by rotating the knurled nut 25 the screw 24 may be forced downwardly to increase the pressure on the cam and thus adjust the spring biased pressure which forces the stabbing tongue 6 in a clockwise direction. This is the character of spring biased member employed in FIGS. 1 and 2. The lower forward edge 19 of the envelope 26 is arcuate and may be generated by a radius from the pivot 20 and may function as a bearing surface for the sockets 4 and 5. The envelope 26 is secured to the strap member by means of the rivets 31.

Another type of spring biased joint is illustrated in FIG. 7 wherein the spring member 32 is pressed by the screw member 33 in the threaded hole 34 and bears on the ball member 35 seated on the shoulder 36 at the upper end of the stabbing tongue 6. This adjustable joint needs a screwdriver to make the adjustment but it can be made from the front of the leg.

The rear adjustment is shown in FIG. 8 wherein the rail member 14 is provided with an envelope 37 which has a prethreaded socket 38 to receive the screw 40 and contains the spring 41 that bears against the ball member 42 that rides on the shoulder 43 of the stabbing tongue 6. This envelope is secured to the rail member by means of the rivet members 44. Thus different constructions may be employed to bias the stabbing tongue 6 for the purpose of raising the toe of the shoe and when the stabbing tongue 6 is interlocked in the sockets of the stirrup 2 it will raise the foot and the shoe by means of this spring biased pressure.

Another important point is the use of the spring which biases the movement of the stabbing tongue 6 as the locking agent after the tongues have been stabbed in their respective sockets and the brace has been straightened which applies the proper pressure for the biasing function.

Each of the rails 14 and 15 of the brace member may be adjustably secured to the band 16 by providing the housings 45 on each side of the band for receiving the rails 14 and 15 and by providing the openings 46 in the rails 14 and 15 and corresponding openings in the housing 45 for receiving the set screws 48 which will provide a multiple adjustment of the band 16 on the brace to suit the person of the wearer.

The rear section 17 of the band that is hinged through the front section 16 has the snap lock 18 which will snap and lock into place when shoved home and need only be depressed for releasing the same, which aids in the application of this brace by the person of the wearer.

I claim:

1. An orthopedic device consisting of a stirrup for attachment to the underside of a shoe, an upwardly open socket member on each side of said stirrup, an annular band having a rigid section and a hinged section for detachably embracing the leg to secure the same to the person of the wearer, parallel braces attached to said rigid band section with one for each side of the leg and to depend to the vicinity of said socket members, a tongue member on the lower end of each brace to stab into its respective socket member when said braces are held at a sloping angle relative to the leg of the person of the wearer, and interengaging parts on said tongue and socket members to interlock them together when said braces are straightened to the position for attaching said band to the leg.
2. The orthopedic device of claim 1 characterized in that said rigid band section is in the front and is held forwardly with the braces sloping at an angle to stab said tongue members into said socket members.
3. The orthopedic device of claim 1 characterized in that said interengaging parts on each tongue member is a forward projection, and each socket member includes an indentation to receive said forward projection to lock each tongue member when straightened in its socket member.
4. The orthopedic device of claim 3 characterized in that the bottom of each tongue member from the underside of said forward projection is curved from the front to the back to guide each tongue member to its locking position when stabbed in its socket member.
5. The orthopedic device of claim 1 characterized by a spring lock between said ridged and hinged band sections automatically locks when encircling the leg and releases when depressed.
6. The orthopedic device of claim 1 characterized by a hinged joint adjacent to and on one side of each of said detachable interconnecting socket and tongue members.
7. The orthopedic device of claim 6 characterized in that said hinged joint is above each tongue member.
8. The orthopedic device of claim 6 characterized by a spring means carried on each brace to pressure bias each tongue member to lift the toe of a shoe when attached to the stirrup.
9. The orthopedic device of claim 6 characterized by cooperating shoulders between said tongue members and said braces to limit the relative pivoted movement of said tongue members.
10. The orthopedic device of claim 9 characterized by spring means carried by said braces and effective on said tongue members to engage said cooperating shoulders.
11. The orthopedic device of claim 10 characterized by screw means to change the effective pressure of said spring means on each tongue member to lift a raised foot.
12. The orthopedic device of claim 11 characterized in that said screw means includes a stem threadably received in a nut, and a head on said stem to engage said spring means.
13. The orthopedic device of claim 10 characterized in that said spring means is a flat sinuous ribbon.

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