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ARTIFICIAL LEG

2 SHEETS—SHEET 1

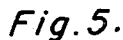


Fig. 4.

Fig. 1.

Inventor

Stanley Mayack

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*Clarence A. O'Brien
and Harvey B. Jacobson*
Attorneys

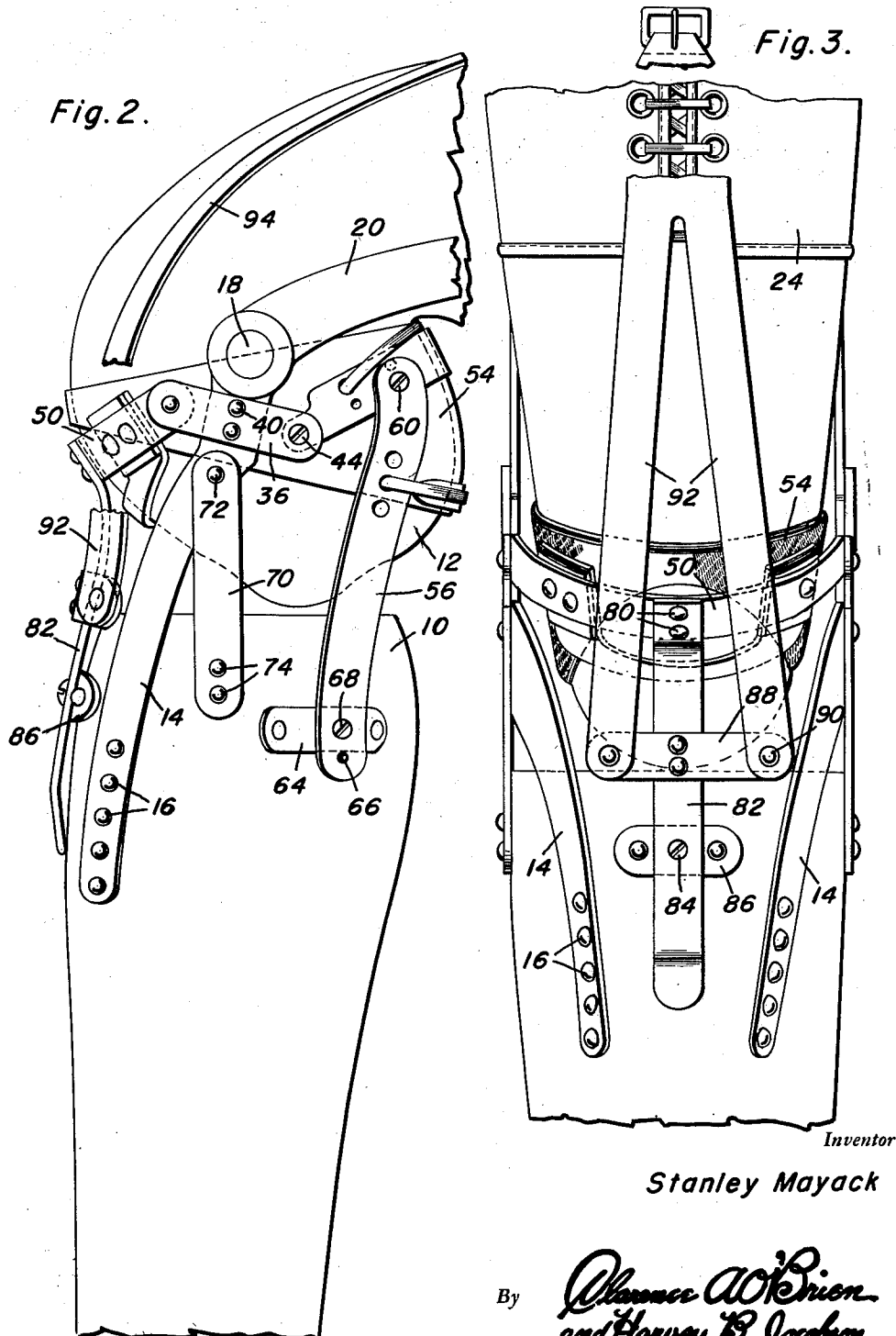
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ARTIFICIAL LEG

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2 SHEETS—SHEET 2



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ARTIFICIAL LEG

Stanley Mayack, Frankfort, N. Y.

Application February 7, 1951, Serial No. 209,758

11 Claims. (Cl. 3—3)

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This invention comprises novel and useful improvements in an artificial leg and has as its primary object the provision of an artificial leg which shall be more effective in its operation, will greatly minimize the discomfort of artificial legs and, in general, will afford a more effective control as well as provide a more comfortable, more satisfactory, and much more efficient artificial limb.

Previous artificial limbs which are adapted to receive a stump amputated below the knee cap have heretofore had the disadvantage that an undesirable movement of the stump in the socket of the artificial leg was unavoidable or was permitted, which frequently resulted in chafing, blistering, muscle aches, poor air circulation for the stump, poor control of the limb and were very wearing and tiring in their use. It is therefore a very important purpose of this invention to provide an artificial limb particularly adapted for supporting stumps which have been amputated below the knee cap or socket, at the conventional three to six inches therebelow, and which will permit much longer use of the artificial leg without discomfort or fatigue, which shall have a much better air circulation and permit better blood circulation for the stump, which will provide a better posture and a better position of the stump, resulting in much better use of the artificial limb and which, in general, will provide an artificial limb having a very improved operation.

The foregoing, together with various other ancillary objects and features of the invention which will be later apparent as the following description proceeds, are attained by the present invention, a preferred embodiment of which has been illustrated by way of example only in the accompanying drawings, wherein:

Figure 1 is a side elevational view showing the artificial limb secured to a leg stump for supporting the same;

Figure 2 is a fragmentary elevational view of the arrangement of Figure 1, the artificial limb being disclosed in a different position;

Figure 3 is a front elevational view of the artificial limb of Figure 1, taken substantially upon the plane indicated by the section line 3—3 of Figure 1;

Figure 4 is a horizontal sectional view taken substantially upon the plane of the broken section line 4—4 of Figure 1 and showing, in particular, the manner in which the stump is supported in the artificial limb; and

Figure 5 is a fragmentary elevational view showing a portion of the leg fastening means.

Referring now more specifically to the accompanying drawings wherein like numerals designate similar parts throughout the various views, it will be seen that the numeral 10 designates an

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artificial leg, the upper portion only of which is shown to illustrate the use of this invention, this artificial leg being of any desired construction and of a conventional design, and in itself forms no part of this invention other than the mechanism for fastening the same to a leg stump. The numeral 12 designates the lower portion of the stump of a leg which has been amputated at the conventional distance of from three to six inches below the knee cap or socket of the limb and to which it is desired to secure the artificial limb 10 by the fastening means which forms the gist or subject matter of this invention.

Indicated at 14 are metallic straps which form the lower portions of the knee joint of the artificial limb fastening means and which are attached, as by rivets or other suitable means 16, to the artificial limb at the two sides thereof. At their upper ends, the lower parts of the knee joints are pivoted, as at 18, to the lower extremities of metal straps 20 which form the upper halves of the knee joints. The upper members 20 are secured, as by rivets or the like 22, to a corset or belt 24 of any suitable material which is adapted to encircle the leg shank, this corset being open at its front and provided with a lacing 26 extending through eyelets 28 by means of which the corset may be firmly fixed to the leg shank.

At its rear side, the corset 24 is provided with straps 30 and 32 which cooperate with vertically notched portions 34 of the corset whereby the same may be adjustably strapped together to more firmly secure the corset to the shank.

A pair of cross bars 36 and 38, see Figure 4, are rigidly attached to the upper ends of the lower straps 14 adjacent their upper ends, as by rivets 40, and extend laterally therefrom with their forward and rear ends disposed forwardly and rearwardly of the lower straps, these extending ends providing pivotal connections 42 and 44 for the cross bar 36, and 46 and 48 for the cross bar 38, with front and rear arcuate supports 50 and 52 which are in the form of curved straps contoured to fit the front and rear portions of the lower end of the stump 12.

The two cross bars, the front and rear supports, and the upper and lower sets of straps constitute a framework within which is suspended and received the lower end of the stump 12 in a manner which does not contact the lower leg 10 of the artificial limb, as will be apparent from Figures 1 and 2.

This rear support 52 is provided with a strip 54 of a suitable cushioning material, such as sponge rubber, felt, or the like, it being understood that any suitable material may be employed which is suitably attached to the inner surface of the support 52 to yieldingly cushion and receive and support the lower end of the

stump 12. This rear support 52 is disposed in an angular relation of a predetermined extent with respect to the cross bars 36 and 38, as by means of rear braces 56 and 58, these braces being terminally pivoted at their upper ends, as at 60 and 62, to the support 52, and at their lower ends are secured to a fastening bar or bracket 64, in vertical adjustment upon the same as by means of a series of longitudinally and vertically spaced apertures 66 and a fastening screw 68. Thus, by inserting the screw 60 in the proper aperture 66 and securing the same to the bracket 64, the rear support 52 may be vertically adjusted in angular relation about its pivot pins 44 and 48 as desired.

Each of the lower straps 14 is further provided with a reinforcement or brace strip indicated at 70, this strip being terminally secured, as at 72 and 74, to the strap 14 and to the lower limb 10 to form a rigid brace and support for the same.

The front support 50 has a resilient, distortable, and cushioning or an elastic strip 76 secured to the interior surface thereof at its ends, as by rivets 78, this strip extending across the front surface of the stump and below the under surface thereof as shown clearly in Figures 1 and 2, in order to support the stump and the weight placed thereon. It will thus be seen that the weight of the stump is distributed between the cushioning material 54 on the rear support 52 and the elastic strip or strap 76 of the front support, whereby the weight is distributed over a greater area and the stump is maintained out of direct contact with the customary and conventional pads carried by and below the knee socket or joint.

At its mid point, the front support 50 has fixedly secured thereto, as by rivets 80, the upper end of a vertically disposed combined shield, brace and reinforcing strip 82, whose lower end is attached, as by a screw 84, to a fastening bracket 86 mounted upon the lower leg 10, this strip having rigidly affixed thereto intermediate its ends a cross arm 88 which is terminally connected, as by rivets 90 with the bifurcated ends 92 of a strap 94 adapted to be secured to a belt about the waist of the wearer.

It should be here noted that it is a very important principle of this invention to provide an elastic or resilient band 96 of plain rubber or the like terminally secured to apertures 98 in the member 52 adjacent the rivets 44 for embracing the upper rear portion of the stump. An elastic cover web 100, terminally secured in apertures 102 of the braces 56, 58, is similarly provided to embrace the lower rear portion of the stump. The elastic members 96 and 100 secure the padding 54, prevent the same from slipping down or becoming displaced, and constitute a means for controlling the artificial limb from the motion of the leg knee cap.

The transverse axis of the pivot pins 18 which hingedly connect the upper and lower straps are disposed rearwardly of a vertical transverse medial plane extending through the upper and lower limbs, as illustrated in Figure 1, whereby the hinges 18 of the joint will be disposed rearwardly of the vertical axis through the center of gravity of the leg stump 12. This arrangement places the weight of the user forwardly of the pivots 18, thus greatly contributing to and facilitating the naturalness of the movement of the artificial limb 10 during walking and the like.

From the foregoing, the construction and operation of the device will be readily understood, and further explanation is believed to be unnecessary. However, since numerous modifications and changes will readily occur to those skilled in the art after a consideration of the foregoing specification and accompanying drawings, it is not desired to limit the invention to the exact construction shown and described, but all suitable modifications and equivalents may be resorted to, falling within the scope of the appended claims.

Having disclosed and described the invention, what is claimed as new is as follows:

1. An artificial leg below the knee stump socket comprising terminally pivoted upper and lower straps, a corset for embracing a leg shank secured to said upper straps, front and rear arcuate supports each terminally and pivotally supported by said lower straps, front and rear elastic cushioning straps secured within said supports for resiliently supporting a leg stump, said front strap being distortable to engage and support the front and lower portion of a leg stump.
2. An artificial leg socket comprising terminally pivoted upper and lower straps, a corset for embracing a leg shank secured to said upper straps, front and rear arcuate supports each terminally and pivotally supported by said lower straps, front and rear elastic cushioning straps secured within said supports for resiliently supporting a leg stump, said front strap being distortable to engage and support the front and lower portion of a leg stump, said lower straps having lateral cross bars rigidly secured thereto with their ends extending forwardly and rearwardly of the knee joint, said front and rear supports being respectively pivoted to and between the front and rear ends of said cross bars.
3. The combination of claim 1 including brace means for supporting said supports at predetermined angular relation with respect to said lower straps.
4. The combination of claim 2 including brace means for supporting said supports at predetermined angular relation to said cross bars.
5. In an artificial limb, an artificial lower leg, a knee joint comprising a pair of lower straps secured to said lower leg and pivoted to a pair of upper straps, a corset secured to and between said upper straps for securing said artificial limb to an upper leg stump, a strip of elastic and distortable material for supporting the front and under portion of a leg stump and a further strip for supporting the back portion of said stump, means for mounting said strips on said lower straps.
6. The combination of claim 5 wherein said last means includes front and rear arcuate supports carried by and between said lower straps, said strips being each mounted in one of said supports.
7. The combination of claim 5 wherein said last means includes lateral cross bars rigidly secured each to one of said lower straps and having its ends extending forwardly and rearwardly thereof, front and rear arcuate supports respectively terminally pivoted between the front ends and the rear ends of said cross bars, said strips being each mounted in one of said supports.
8. The combination of claim 7 including braces pivoted to said rear support and adjustably fastened to said lower leg.
9. The combination of claim 5 wherein said last means include lateral cross bars rigidly secured each to one of said lower straps and having

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its ends extending forwardly and rearwardly thereof, front and rear arcuate supports respectively terminally pivoted between the front ends and the rear ends of said cross bars, said strips being each mounted in one of said supports, a protective brace attached to the front of said lower leg and to said front support and overlying and shielding the space between said upper and lower straps at their pivot.

10. An artificial leg below the knee socket comprising terminally pivoted upper and lower straps, a corset for embracing a leg shank secured to said upper straps, front and rear arcuate supports each terminally and pivotally supported by said lower straps, front and rear elastic cushioning straps secured within said supports for resiliently supporting a leg stump, said front strap being distortable to engage and support the front and lower portion of a leg stump, said upper and lower straps being pivoted upon an axis transverse the

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artificial stump socket, said axis being located rearward of a vertical transverse medial plane through the knee joint when the latter is in its erect position.

11. The combination of claim 5 wherein said last means includes lateral cross bars rigidly secured each to one of said lower straps and having its ends extending forwardly and rearwardly thereof, front and rear arcuate supports respectively terminally pivoted between the front ends and the rear ends of said cross bars, said strips being each mounted in one of said supports, said upper and lower straps being pivoted upon an axis transverse the artificial stump socket, said axis being located rearward of a vertical transverse medial plane through the knee joint when the latter is in its erect position.

STANLEY MAYACK.

No references cited.