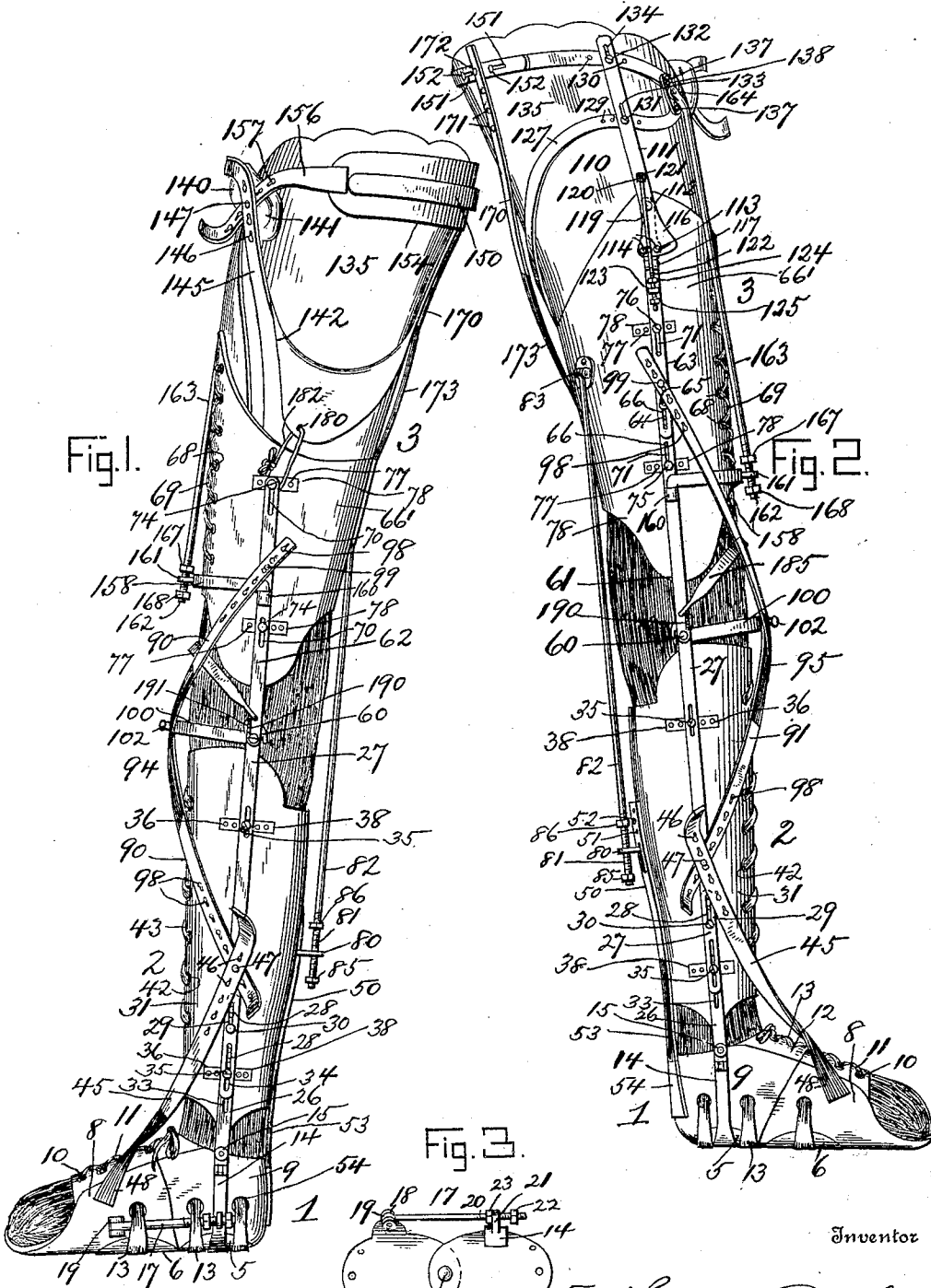


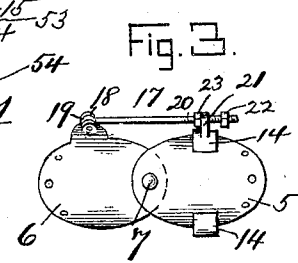
L. ROTH.
 ORTHOPEDIC DEVICE.
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ORTHOPEDIC DEVICE.

932,177.

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To all whom it may concern:

Be it known that I, LOUIS ROTH, citizen of Hungary, residing at New York, in the county of New York and State of New York, have invented certain new and useful improvements in Orthopedic Devices, of which the following is a specification.

My invention relates to orthopedic devices and relates particularly to a device adapted for the correction of different deformities of the hips, lower limbs and feet, and among the objects in view is to provide a device of the character described which shall be capable of an extensive range of adjustments to adapt it for use with limbs varying in size and to accommodate it to deformities of varying degrees and location and which device may be readily applied to a limb and detached therefrom when desired.

A further object is to provide a device of the described character which shall be simple and may be economically manufactured and not liable to get out of order.

The invention consists in the novel construction, arrangement and combination of parts as hereinafter fully described, illustrated in the accompanying drawings and pointed out in the appended claims.

In the drawings:—Figures 1 and 2 are opposite side elevations of the device. Fig. 3 is a bottom plan view of the pivoted plates of the foot section and means for adjusting said plates.

My device comprises three sections or members—a foot member 1, a lower leg member 2 and an upper leg member 3. These members are pivotally connected together to give a certain freedom of movement to the leg when in the act of walking.

The foot section or member 1 comprises plates 5, 6, of approximately the shape seen in Fig. 3 and pivotally connected together as at 7. To the plates 5, 6, are riveted soft leather pieces 8, 9, adapted to pass beneath the foot and partially inclose same, the piece 8 having eyelets 10 to receive a lacing 11 whereby the piece 8 may be laced snugly over the foot. The piece 9 is also provided with eyelets 12 to receive a lacing 13 to lace said piece snugly over the foot. To the

plate 5 are secured metallic straps 14 which inclose the heel portion of the foot and which straps are pivotally connected as at 15, to the lower leg member 2 presently described. As the plates 5 and 6 are pivotally connected, said plates may have a certain swinging movement relatively to each other to adapt the same to assume a proper position relatively to the deformed foot of the patient.

For the purpose of causing the plate 6 to be swung around on its pivot to enable the said plates to adapt themselves to the deformed foot, and also for enabling the plate 6 and consequently the foot of the patient to be put under a certain tension and by degrees bring the plate 6 around into proper straight position relative to the plate 5, thereby gradually correcting the deformity of the foot, I provide adjusting means preferably comprising a rod 17 pivoted at 18 to an ear 19 on plate 6 and having its opposite end threaded as at 20, which rod passes loosely through an eye 21 on one of the straps 14 and carrying an adjusting nut 22; a nut 23 is provided on the threaded portion of the rod. By adjusting the nuts 22, 23, on the rod the plate 6 will be swung more or less into line with plate 5 and after the proper position has been secured, the nuts are screwed up tightly against opposite sides of the eye 21 thereby holding the plates 5, 6, in fixed relative position.

The lower leg member 2 comprises metallic strips 26 and 27 on opposite sides, the straps 14 being pivotally connected to the lower end of the strips 26. The strips 26, 27, are adjustably connected together, as by providing the strips 26 with threaded apertures 28, and the strips 27 with slots 29, and tightening screws 30 extending through the slots and engaging the apertures 28, so that by tightening the said screws the strips 26, 27, may be held in adjusted position. A stiff leather casing 31 adapted to encircle the lower limb is carried by the strips 26, 27, and is adjusted longitudinally of said strips, as by providing slots 33, 34, in the strips 26, 27, respectively through which pass tightening screws 35 adapted to engage threaded apertures 36 in metallic pieces 38 riveted to the

casing 31. The casing is first adjusted to the proper position on the limb and then the screws 35 are tightened thereby fixing the casing in position. The casing is split longitudinally at the front and has eyelets 42 receiving a lacing 43 whereby the casing 31 may be drawn snugly around the limb.

In order that the foot member may be put under a certain tension in its movements relative to the lower leg member and thus put the foot of the patient under a certain tension which may be desirable in some cases, I provide a tension device preferably comprising leather straps 45 having apertures 46 to be engaged by studs 47 on the strips 27 and to which strips are secured one end of elastic webbing 48 secured at the opposite end to the leather pieces 8. A leather strap 50 is provided with apertures 51 to be engaged by a stud 52 on the casing 31, at the rear thereof and to which strap 50 is secured one end of an elastic webbing 53 whose opposite end is secured to a leather strap 54 which is secured to the leather piece 9. Thus the movement of the foot member, as in the act of walking, is under a certain degree of tension which may be varied by adjusting the leather straps 45 and 50 to cause the studs to engage different apertures in said straps.

The upper end of the strips 27 are pivoted at 60 to the lower end of metallic strips 61, 62 of the upper leg member 3, at points corresponding to the knee of the patient. The strip 61 is adapted to have an adjustable connection with a metallic strip 63 as by providing the strip 61 with threaded apertures 64 in which can engage a tightening screw 65 which passes through a slot 66 in the strip 63.

66' is a stiff leather casing carried by the upper leg member and adapted to embrace the upper leg of the patient. The casing 66 is divided at the front end and is provided with eyelets 68 receiving a lacing 69 by which the casing may be made to more or less snugly surround the limb. The casing 66' is adjustably secured to the upper leg member 3 as by providing the strip 62 with slots 70 and the strips 61, 63 with slots 71 through which slots 70 and 71 pass screws 74, 75, and 76 respectively, adapted to engage threaded apertures 77 in metallic pieces 78 riveted to the casing 66'. The casing 66' is first adjusted to the proper position on the limb and the screws 74, 75 and 76 are then screwed up tight to hold the casing fixedly in position.

In order to vary the position of the lower and upper leg members relatively to each other to restrict the movement of the members, that is to say to render relative movement of these parts impossible as may be desirable in some cases, I provide the casing

31 with an apertured lug 80 through which passes the threaded end 81 of a rod 82 whose opposite end is pivoted to ears 83 carried by the casing 66. Nuts 85 and 86 are mounted on the threaded end of the rod on opposite sides of the lug 80. By properly turning the nuts 85, 86 the rod can be adjusted, thereby adjusting the position of the lower leg member relatively to the upper leg member. A certain degree of movement of the member 2 relative to the member 3 could be allowed in some cases where desirable by running the nut 86 up on the rod 82 away from the lug 80 so as to permit the rod to move down through the lug when the member 2 is flexed as in the act of walking until the nut 86 abuts against the lug, and said rod moving upwardly until the nut 85 abuts against the lug. Thus the nut 86 limits the flexure of the member 2 in one direction while the nut 85 limits such flexure in the opposite direction.

To prevent too free a movement of the lower and upper leg members relatively to each other, I provide means for exerting a yielding tension upon these parts comprising leather straps 90 and 91, one end of the bands 90 having an adjustable connection with one of the strips 27 and with strip 62, while one end of the straps 91 has adjustable connection with the other strip 27 and with the strip 63. The adjoining ends of the straps 90 and 91 are connected by pieces 94 and 95 respectively, of elastic webbing which exert a yielding tension on the members 2, 3, in the flexing movement thereof. The ends of the straps 90 and 91 are each provided with a plurality of apertures 98 to be adjustably engaged with studs 47 on the strips 27, and studs 99 on strips 62 and 63, whereby the tension may be varied. To prevent pressure or friction of the straps and elastic pieces on the limb of the patient, I provide a metallic bail 100 pivotally connected at its ends as at 60 with the upper ends of the strips 27, said bail being provided with a stud 102 to engage suitable eyelets in the elastic webbing pieces.

The upper member 3 also comprises a section 110, the strip 111 of which is pivotally connected at 112 with a piece 116 hinged at 117 to the strip 63, and has curved slots 113 through which pass tightening screws 114 which engage with suitable threaded apertures in the piece 116. The slots 113 permit of a limited pivotal movement of the strips 111 for the purpose of adjusting the piece 111 to proper position, and the screws 114 serve to fix the piece 111 in the adjusted position.

By reason of the above described construction the section 110 may have one swinging movement relatively to the strip 63 upon the pivot 112 and also another swinging move-

ment upon the hinge 117, the two movements being at right angles to each other. The movement of piece 111 permitted by the hinge 117 may be limited by a rod 119 pivoted at 120 to lugs 121 on the strip 111 and the threaded end 122 passing loosely through an apertured lug 123. Nuts 124, 125, are mounted on the rod 119 on opposite sides of the lug 113 and by adjusting said nuts the position of the strip 111 may be adjusted and then locked in adjusted position. 127 is a metallic strip curved as shown and adapted to pass partially around the upper part of the leg and provided with threaded apertures 129, 130 to receive tightening screws 131, 132, which pass through slots 133, 134 in the piece 111.

135 is a stiff leather casing riveted to the strip 127 and adapted to partially embrace the upper part of the leg. The strip 127 also has suitable apertures to receive tightening screws 137 which pass through slots 138 in a piece 140 adapted to bear upon the leg and provided with a padding 141. A soft leather piece 142 is secured to the casing 135 on the inner side thereof and has a strap 145 provided with apertures 146 to be engaged by a stud 147 on the piece 140, whereby the pressure of the piece 142 on the leg may be varied.

150 indicates a curved metallic strip which at one end has an adjustable connection with the strip 127, for which purpose said strip 150 is provided with slots 151 through which pass tightening screws 152 engaging threaded apertures in the strip 127. A stiff leather band 154 is riveted to the strip 150 and is provided with a strap 156 having apertures 157 adapted to receive the stud 147. By adjusting the strap so as to cause the stud to engage the different apertures, the band may be adapted to snugly fit around the upper portion of the limb.

To firmly brace the section 110 in its adjusted positions, I provide a bail 158 whose ends are seated within sockets 160 secured to the strips 61 and 62. The bail 158 is provided with an apertured lug 161 through which passes the threaded end 162 of a rod 163 whose upper end is pivotally connected at 164 to the piece 140. The threaded end of the rod 163 is provided with adjusting nuts 167 and 168 on opposite sides of the lug 161.

170 indicates a strap having apertures 171 to be engaged by a stud 172 carried by the strip 150 and to the lower end of which strap is secured an elastic webbing 173 which is secured at its opposite end to the leather casing 66'. The provision of the strap 170 and webbing 173 enables a certain degree of tension to be exerted upon the section 110 in any movement of the latter relative to the strip 63 upon the pivot 112.

The soft leather piece 142 is provided with an eyelet 180 through which passes a lacing 182 which latter may be engaged with any fixed portion of the member 3 to hold the said piece 142 in its turned-over position whereby the said piece forms more or less of a support for the inner side of the limb.

185 indicates a bail whose ends are pivotally connected to the strips 61 and 62, which carry stops 190 to limit the downward swinging movement of said bail. The edges 191 of the stops 190 are to be curved the purpose of which is to spread apart the ends of the bail in the downward swinging movement of the latter and to cause said bail owing to the springing apart of its ends, to resume its normal position which is that seen in Fig. 1. This bail serves to more or less brace the limb above the knee by bearing against the leather casing 66.

It will be noted that I have provided a device which is particularly well adapted for the correction of different deformities of the lower limbs and that I have provided for a variety of adjustments to suit each individual case whereby the best results may be obtained.

All of the various strips excepting those specified as being of leather or elastic webbing, may be made of any desired metal as steel, aluminum, etc.

Various minor changes may be made in the details of construction and arrangement without departing from the scope of the invention.

What I claim is,

1. In a device of the character described, the combination of a foot member, a lower leg member and an upper leg member pivotally connected together, with means for exerting yielding tension on the foot member in its pivotal movement relative to the lower leg member comprising leather straps having adjustable connection at one end with the lower leg member, and elastic webbing secured at one end to the foot member and at the other end to the leather straps.

2. In a device of the character described, the combination with a lower leg member, of a foot member pivotally connected thereto and comprising metallic plates pivotally connected together, flexible casings secured to said plates, and means for adjusting one of the plates relatively to the other and securing the same in adjusted position comprising a threaded rod pivoted at one end to one of the plates and passing loosely through an apertured lug having connection with the other plate, and nuts upon the threaded end of the rod on opposite sides of said lug.

3. In a device of the character described, the combination with a lower leg member, of a foot member pivotally connected therewith, and means for exerting a yielding tension

upon the foot member in its swinging movement comprising leather straps having apertures engaged by studs on the lower leg member, and provided with elastic webbing secured to the foot member.

4. In a device of the character described, the combination with a lower leg member, of a foot member pivotally connected therewith and comprising flexible casings adapted to embrace the foot, a strap having adjustable connection with the lower leg member, elastic webbing secured to said strap and a strap also secured to said webbing and to one of the flexible casings of the foot member at the rear or heel end thereof.

5. In a device of the character described, the combination with a foot member, a lower leg member and an upper leg member, all pivotally connected together, of means for varying the relative position of the upper and lower leg members and securing the same in adjusted position comprising a threaded rod having pivotal connection with the upper leg member and passing through an apertured lug on the lower leg member and nuts upon the threaded end of the rod on opposite sides of said lug.

6. In a device of the character described the combination with a foot member, a lower leg member, and an upper leg member, all pivotally connected together as described, of means for exerting a yielding tension on the upper and lower leg members comprising leather straps 90, 91, and elastic webbing pieces connecting the adjoining ends of each of the straps 90 and 91, said straps having adjustable connection with the upper and lower leg members.

7. In a device of the character described the combination with a foot member, a lower leg member, and an upper leg member, all pivotally connected together as described, of means for exerting a yielding tension on the upper and lower leg members comprising leather straps 90, 91, and elastic webbing pieces connecting the adjoining ends of each of the straps 90 and 91, said straps having adjustable connection with the upper and lower leg members, and a metallic bail 100 pivotally connected with the lower leg member and to which bail the said elastic webbing pieces are connected.

8. In a device of the character described the combination of a foot member, a lower leg member and an upper leg member, all pivotally connected as described, said upper leg member comprising a section 110 having a strip 111, a strip 63 carried by the upper leg member and means for permitting the section 110 and strip 111 to have swinging movements relatively to the strip 63 said swinging movements being at right angles to each other as set forth.

9. In a device of the character described

the combination of a foot member, a lower leg member and an upper leg member, all pivotally connected as described, said upper leg member comprising a section 110 having a strip 111, a strip 63 carried by the upper leg member and means for permitting the section 110 and strip 111 to have swinging movements relatively to the strip 63 said swinging movements being at right angles to each other as set forth, means for limiting the movement of the strip 111 comprising a rod pivoted to strip 111 and having a threaded end passing through a lug on the strip 63, and nuts on said threaded end of the rod on opposite sides of the lug.

10. In a device of the character described, the combination with a lower leg member and an upper leg member pivotally connected together, of a stiff leather casing carried by the upper leg member, a metallic strip 127 also carried by the upper leg member and to which strip 127 the said casing is riveted, said strip having apertures, a piece 140 having slots, screws passing through said slots and engaging in the apertures in strip 127, and padding 141 carried by the piece 140.

11. In a device of the character described, the combination with the lower leg member and an upper leg member, both pivotally connected, said upper leg member having a stiff leather casing 135, of a soft leather piece 142 secured to the stiff leather casing, a strap having apertures secured to the piece 142 and a stud on the piece 140 engaging the apertures in said strap.

12. In a device of the character described the combination with a lower leg member and an upper leg member, both pivotally connected, of a metallic strip 150 carried by the upper leg member and having slots, a strip 127 also carried by the upper leg member, and having threaded apertures, screws passing through said slots and engaging the said apertures, a leather band 154 secured to the strip 150, a strap 156 secured to strip 150 and having apertures, a piece 140 secured to strip 127 and having a stud which engages the apertures in the strap 156.

13. In a device of the character described the combination with a lower leg member and an upper leg member pivotally connected together, said upper member comprising a section 110, of strips 61, 62, carried by the upper section, a bail 168 carried by said strips and having a lug, a rod 163 having a threaded end passing loosely through said lug, nuts on said threaded end of the rod on opposite sides of the lug, a piece 140 carried by the upper leg member and to which piece the other end of the rod is pivotally connected.

14. In a device of the character described, the combination with a lower leg member

and an upper leg member pivotally connected together, of strips 61, 62 carried by the upper leg member, a bail pivoted to the strips 61, 62, and straps on the said strips to limit the downward swinging movement of the bail.

15. In a device of the character described the combination with a lower leg member and an upper leg member pivotally connected together, the upper leg member comprising the pivoted member 110, of a leather casing 66' on the upper leg member, a

strip 150 carried by the member 110, a stud on the strip 150, a strap 170 having apertures engaged by the said stud, and elastic webbing secured to the said strap and to the casing 66'.

In testimony whereof I affix my signature in presence of two witnesses.

LOUIS ROTH.

Witnesses:

CHRISTIAN POCHER,
LEO ROTH.