

Oct. 18, 1927.

1,646,194

E. FISCHER

ORTHOPEDIC APPLIANCE

Filed March 20, 1926

2 Sheets-Sheet 1

Fig. 1.

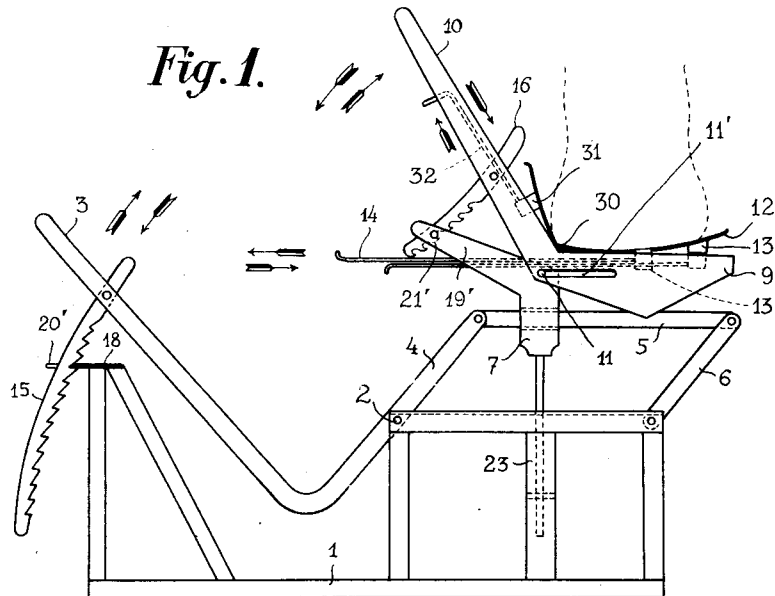
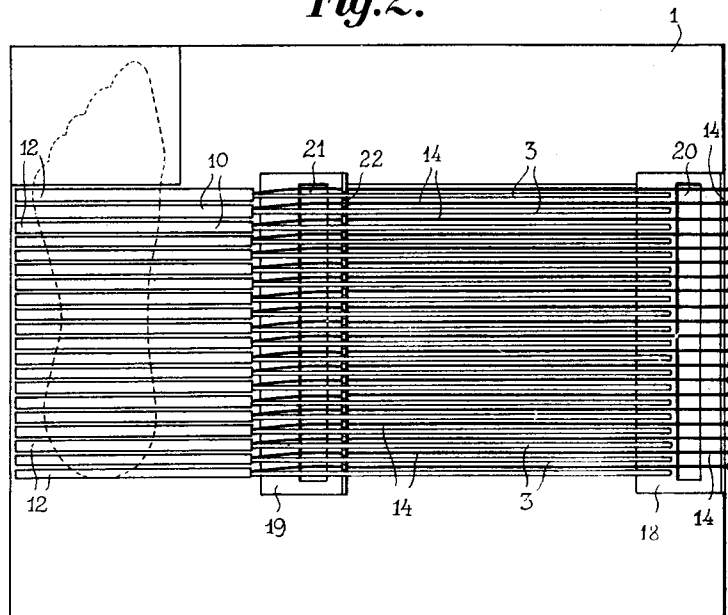


Fig. 2.



Inventor
Ernest Fischer
By
James Dan M. Edmund
Attorney

Oct. 18, 1927.

E. FISCHER

1,646,194

ORTHOPEDIC APPLIANCE

Filed March 20, 1926

2 Sheets-Sheet 2

Fig. 3.

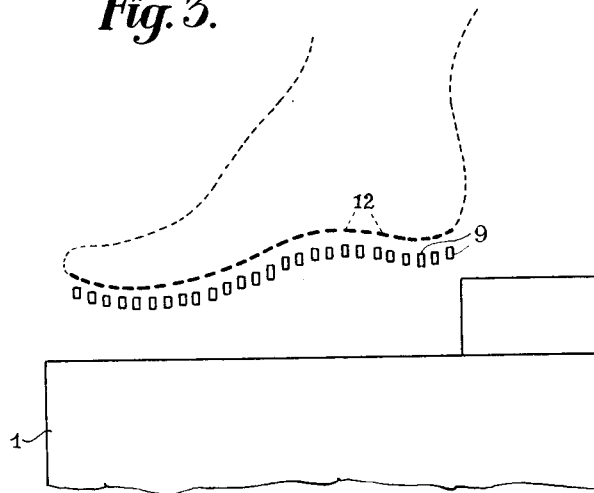
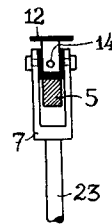


Fig. 4.



Inventor
Ernest Fischer
By
Pamie, Davis, Main & Smith
Attorneys

UNITED STATES PATENT OFFICE.

ERNEST FISCHER, OF BUDAPEST, HUNGARY.

ORTHOPEDIC APPLIANCE.

Application filed March 20, 1926, Serial No. 96,191, and in Hungary January 28, 1926.

This invention relates to an appliance for straightening or removing deformity from and at the same time modelling or shaping the feet whilst they are bearing the weight of the body.

In orthopedy, deformed feet have been modelled up to the present time, either in a suspended state, or by putting the foot into a bandage in partly solidified plaster.

The first method of treatment has been carried out and the necessary pressure obtained by means of fittings in the boots, lasts and orthopedic shoes, but these do not satisfactorily meet requirements, because, as is well known, the foot, when exposed to the weight of the body, assumes a different shape to that which it assumes when not under such weight.

In the second method of treatment, it is true that, under the weight of the body, the foot assumes the shape due to such weight, but in this case also, fitting for insertion into the boot, shaping lasts and shoes do not fulfil the necessary requirements, because they are produced, as to the shape and size, from the measurements of the foot, which becomes considerably deformed when the weight of the body is borne thereby.

The present invention has for its object the production of an appliance for facilitating the restoration to its proper shape of the deformed foot, with the weight upon it, and for modelling or shaping the foot in the straightened or restored condition.

By this means modelling devices may be obtained for the production of fittings for the interior of a boot, or lasts, but it is of course obvious that the appliance can be utilized for the production of lasts for boots and shoes for the footwear for normal feet.

The appliance in question for rendering it possible to manufacture models for orthopedic fittings corresponding to the straightened foot, or for obtaining absolutely accurate lasts for boots, consists essentially of a row of adjustable members adapted to be pressed singly or in groups against the sole of the foot and to be locked in that position. These adjustable members are positively operated and consist preferably of bell crank levers arranged in a suitable manner in a longitudinal or transverse direction, or diagonally, with respect to the sole of

the foot, the members being adjustable transversely and in a vertical direction and operated in any appropriate manner, for instance, by mechanical, pneumatic or hydraulic means.

In order to facilitate the accurate fitting of the adjustable members to the contour of the foot, according to a preferred constructional embodiment, each of the adjustable members is provided with a resilient attachment.

There may for instance be provided a resilient plate over each adjustable member. Each of these resilient plates is bent by slidable and adjustable wedges, pegs, or eccentrics, so that it accommodates itself exactly to the curvature or contour of the foot.

The pressure of an individual bell crank lever or of a group of levers against the surface of the foot can be regulated with any desired amount of force, so that the doctor or operator carrying out the treatment can feel and check simultaneously at every point on the foot the pressure which is to be exerted.

The drawings, show, by way of example, one constructional embodiment of an appliance made according to the invention.

Fig. 1 is a side elevation of the appliance.

Fig. 2 is a plan of same.

Fig. 3 is a diagrammatic front elevation.

Fig. 4 is a detail.

In the constructional embodiment shown in the drawings, a plurality of adjustable devices 9, 10, are provided located transversely with respect to the foot, parallel to one another, and preferably shaped as bell crank levers, as shown at 9 and 10, Figs. 1 and 2. These devices are adjustable in a vertical direction, and are adapted to oscillate about pivots 11, Fig. 1. The raising of the bell crank lever 9, 10 is effected, in the construction illustrated in the drawings, by means of a bell crank lever 3, 4, pivoted at 2. The short arm 4 of this bell crank lever constitutes with the links 5 and 6, which come under the bell crank lever 9, 10, a parallelogram. The longer arm 3 is connected to a toothed segment 15, which is adapted to be locked in any position to which the bell crank lever 3, 4 is set when turning about its pivot 2.

In order to effect this, teeth are provided

on the segment adapted to co-operate with a slot 20' in a plate 18 having a tapering edge in the slot functioning as a pawl.

On pressing the arm 3 and the segment 15 downwards, the corresponding bell crank lever 9, 10 is raised through the parallelogram 4, 5, 6 and by the stirrup 7.

The horizontal arm of the parallelogram passes through this stirrup 7 which carries the bearing pin 11.

When the parallelogram 4, 5, 6 is set into position it takes with it the stirrup and the bell crank lever 9, 10, the rod 23 attached to the stirrup 7 sliding in a fixed sleeve.

The oscillation of the bell crank lever may, for instance, be effected in the following manner.

The horizontal arm 9 of the bell crank lever is extended, beyond the pivotal point 11 upwards, into the inclined arm 10, which has attached thereto a segment 16. On oscillating the arm 10 around the pivot 11, the segment 16 moves downwards together with the said arm, and is provided with means for locking it in the new position.

In the constructional embodiment illustrated, the means in question comprises an arm 19' extending from the stirrup and carrying a pin 21' adapted to engage in teeth in the segment 16 and to hold the segment locked in any position.

The method of fixing just described may be replaced by any other suitable retaining means functioning in the same manner.

On pressing down any one of the segments 16, the corresponding bell crank lever 9, 10 is oscillated correspondingly around the pivot 11.

The pivot pins 11 engage in horizontal slots 11' in the parts, so that the pins 11 can be adjusted in the slots or slid in a horizontal direction.

In order to hold the pivot firmly in any position, the lower edge of a slot 11' may be provided with notches or saw teeth.

The apparatus just described renders it possible not only to raise and lower the bell crank levers 9, 10, but also to regulate their oscillation about the pivots 11 and to adjust their position in a longitudinal direction.

The foregoing movements or adjustments are however not sufficient to fit the adjustable parts accurately to the contour of the foot. With this object in view the adjustable members are provided with flexible or resilient surfaces.

In the constructional embodiment shown in the drawings 12 are resilient or springy devices fitted to the lever arms 9. Beneath these devices are wedges or pegs 13, 13' slidable in the horizontal arms 9 and having rounded heads adapted to press against the under surfaces of the devices 12. 14 are operating rods by means of which the wedges or pegs 13, 13' may be moved and adjusted

according to the shape of the foot. The fitting contact between the lever arms 9 and the surface of the foot is therefore effected through the devices 12, and by means of the wedges or pegs 13, 13' co-operating therewith. The devices are so attached to the lever arms 10 that they conform as far as possible throughout their whole length to the sole of the foot. The simplest method of obtaining this result is to attach them only at one point, preferably at the angle 30 of the bell crank lever 9, 10. The portion of the resilient strip extending diagonally upwards is accommodated to the foot by means of a block 31 adjusted by an operating handle 32.

The raising of the bell crank lever may in some cases be effected by means of an eccentric.

The appliance is operated in the following manner:—

The bell crank levers 9, 10 are brought to the required height by pushing down the segments 15, where they are locked, for instance, by engaging the pawl like edges in the teeth of the segments. Then, the bell crank levers 9, 10 are oscillated sideways around their pivots 11, and finally, the resilient strips 12 are adjusted by means of sliding wedges or pegs, 13, 13' and the blocks 31, so as to conform exactly to the contour of the foot.

Fig. 3 shows diagrammatically, the position of the bell crank levers 9, 10 after they have been set into positions corresponding to the contour of the foot.

In order to make the matter clearer, in this figure, the other constructional elements of the appliance have been omitted.

It will be understood that in modelling normal feet for the purpose of obtaining absolutely accurate lasts for boots, the bell crank levers 9, 10 as well as the resilient strips 12 are so adjusted as to follow exactly the existing curvature or contour of the foot, while for the production of models for orthopedic fittings, the adjustable members are pressed with the necessary amount of force against the deformed areas in order to correct deformities of the foot as far as allowed by the existing condition of the abnormal foot.

To obtain a model of the foot, the same is covered with a layer of plastic material, as for instance a plaster of Paris bandage, prior to being put upon the appliance. After all elements of the appliance have been adjusted and locked in position, the foot is allowed to remain in position until the plastic material has fully hardened. The hardened material when removed from the foot represents a mold which may be utilized for making a casting of plaster or like material which will exactly correspond to the foot in its normal or restored shape

assumed when the weight of the body bears on it.

As regards details, the appliance according to the invention may be modified in many respects.

For instance the resilient strips may be replaced by pneumatic devices.

What I claim and desire to secure by Letters Patent in the United States of America is:—

1. An orthopedic appliance of the type specified comprising in combination a framework, bent levers carried pivotally from the said framework, the said levers being arranged substantially parallel to one another and at a suitable angle with respect to the sole of the foot, together with means for adjusting the levers vertically and for oscillating the said levers and for holding the said levers in the adjusted positions.

2. An orthopedic appliance of the type specified comprising in combination a framework, a plurality of elements each of which includes a stirrup carried by a rod slidable in a suitable guide, a bell crank lever pivoted to each of the said stirrups, a parallel link mechanism a link of which passes through the stirrup and means for oscillating the parallel lever mechanism so as to raise and lower the stirrup together with means for locking the parts in the adjusted positions.

3. An orthopedic appliance of the type specified comprising in combination a framework, a plurality of elements each of which is vertically adjustable, means for holding each such element in the adjusted position, a bell crank lever pivoted to each of the said elements, the pivotal connection including a pin and a horizontal slot to enable the pivotal point of connection to be adjusted horizontally, for the purposes set forth.

4. An orthopedic appliance of the type specified comprising in combination a framework, a plurality of elements each of which is vertically adjustable with respect to the said framework, means for holding each such element in an adjusted position, a bell crank lever pivoted to each of the said elements the pivotal connection including a

pin and a horizontal slot provided with notches along its edge, to enable the pin to be adjusted horizontally and held in adjusted positions, for the purposes set forth.

5. An orthopedic appliance of the type specified comprising in combination a framework, a plurality of elements each of which is vertically adjustable with respect to the said framework, a bell crank lever pivotally carried by each of such elements, an extension arm carried by each of such elements, the said arm being provided with a pin, and a pivoted rack carried by one of the arms of the bell crank lever, the teeth of said rack being adapted to engage with the said pin, to hold the bell crank lever in adjusted positions substantially as and for the purposes set forth.

6. An orthopedic appliance of the type specified comprising in combination a framework, pivoted bell crank levers carried from said framework means for adjusting the said levers vertically and for oscillating the said levers, and a resilient plate connected to each such lever and adapted to conform to the sole and contour of the foot, for the purposes set forth.

7. An orthopedic appliance of the type specified comprising in combination a framework, a plurality of bell crank levers carried from said framework, each such lever having mounted thereon in the neighbourhood of the angle thereof, a resilient plate, together with means for adjusting the free ends of the plate to conform to the sole and contour of the foot.

8. An orthopedic appliance of the type specified comprising in combination a framework, a plurality of bell crank levers carried from the said framework, each such lever having mounted thereon a resilient plate attached in the neighbourhood of the angle of the lever, together with sliding blocks adapted to slide along the arms of the lever and to press the plates into contact with the sole and contour of the foot, together with means for sliding the said blocks, substantially as described.

In testimony whereof I affix my signature.

DR. ERNEST FISCHER.