July 1, 1930. E. FISCHER 1,768,898

ORTHOPEDIC APPLIANCE

Filed Sept. 12, 1928

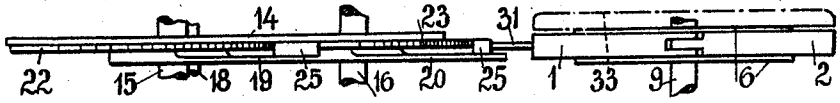

FIG. 2

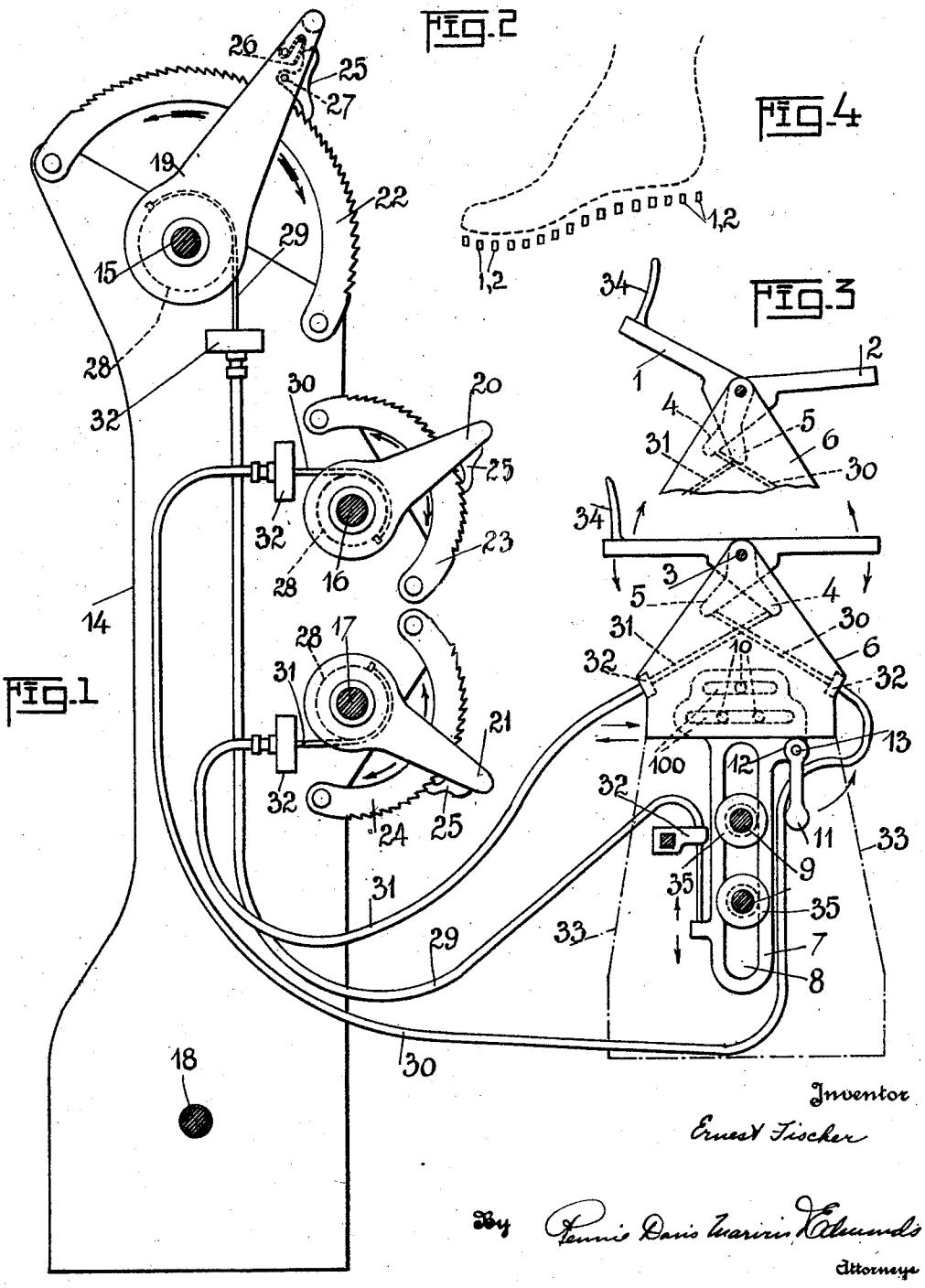

FIG. 1

FIG. 4

FIG. 3

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ORTHOPEDIC APPLIANCE

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This invention relates to an auxiliary appliance for simultaneously straightening or removing deformities from feet and modelling them while they are bearing the weight of the body.

In orthopedy, deformed feet heretofore have been modelled either while in a suspended state or by putting the feet into a bandage of 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 feet, when exposed to the weight of the body, assume a different shape to that which they possess when not under such weight.

In the second method of treatment, it is true that under the weight of the body the feet assume a shape due to such weight, but in this case also fittings for insertion into the boots, shaping lasts and shoes do not fulfill 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 object of the present invention is to create an auxiliary appliance which on the one hand permits the straightening or restoration of a deformed foot to its proper shape, while carrying the full body weight upon it, and at the same time also renders possible the modelling of the foot in its straightened or restored condition.

By this means there may be obtained in the first place, models suitable for the production of fittings for the interior of a boot, or of lasts to be used in connection with boots for deformed feet, but it is of course obvious that the auxiliary appliance may also be used for the production of lasts for boots and shoes for normal feet.

Known appliances of this kind consist of a plurality of pegs, each of which is capable of being raised individually, or of positively guided adjusting members capable of being pressed against the sole of the foot and of being locked in any position. These adjusting members consist of parallel levers arranged in the transverse direction of the footsole, which are adjustable in the vertical direction and capable of swinging movement sideways.

This design is a rather complicated one and possesses also the further disadvantage that the swinging bell crank levers pivoted at their ends, that is to say, on one side only, are incapable of accommodating themselves with a necessary degree of exactitude to the shape of the foot sole or to the shape of the foot arch. In order to remedy this defect it has been suggested to employ in known appliances, lamellæ reposing on the bell crank levers and adjustable wedges or pegs co-operating with these lamellæ With this modification, however, the appliances are rendered even more complicated and, moreover, when placed in operation they are found to function in an unreliable manner.

The present invention relates to a further improvement in appliances of this kind rendering possible a much closer accommodation of the lamellæ to the arch of the foot, owing to the provision of means whereby a wide variation of the contact surface may be obtained.

The invention consists essentially in the subdivision of the bell crank levers at the middle of their length, and in the operation of the two halves of each bell crank lever in a mutually independent manner, for instance, by means of flexible tension members or flexible power transmitting cables. One tension member is employed for operating each of the two halves of the bell crank levers and a third tension member is provided for effecting the raising and lowering of the supporting body carrying the bell crank lever halves.

The drawing illustrates by way of example an embodiment of the invention.

Fig. 1 is a side elevation of a pair of bell crank levers carried by a suitable supporting body and provided with members for effecting their motion;

Fig. 2 is a plan of the same mechanism;

Fig. 3 illustrates a pair of bell crank levers in adjusted position, and

Fig. 4 is a diagrammatic front view.

In accordance with the invention, the bell crank levers 1—2, arranged in the transverse direction of the foot sole and capable of being raised or lowered, are subdivided, preferably at the central point of their length, in such a manner that on each short pivot 3, the longitudinal centre-line of which is parallel to the longitudinal direction of the foot sole, two bell crank levers 1—5 and 2—4 are pivoted, so as to allow of a swinging motion of the said levers. Each pivot passes through the adjoining central parts of the corresponding pairs of bell crank levers as well as through the distance piece 6 provided for each pair. The mutually independent operation of the bell crank levers 1—5 and 2—4 is effected by the elastic tension members 30 and 31, one of which acts upon lever arm 4 while the other acts upon lever arm 5. These tension members are carried in guides 32 while their ends are secured to pulleys 28. These pulleys are securely fixed to shafts 16 and 17, which shafts are capable of a swinging motion in both directions, such motion being imparted to them by levers 20—21. Pawls arranged on levers 20—21 and engaging with the teeth of ratchet segments lock the levers 20—21 in any position and thus enable the bell crank lever pairs 1—5 and 2—4 to be operated independently of each other. For raising and lowering the individual pairs of bell crank levers in a mutually independent manner, tension members 29 are employed, the guiding members for which are indicated at 32. These tension members are operated in the manner explained above by lever arm 19 pivoted on shaft 15, the end of the cable 29 being secured to a pulley 28 mounted on the shaft. To permit step by step movement of the lever arm 19 a ratchet segment 22 and pawl 25 mounted on pivot 27 and biased by a leaf spring 26 are provided. The free end of the cable acts upon plate 7, in which a longitudinal slot 8 is provided sliding over fixed horizontal bars 9. Guiding pegs 10 are also provided on the plate, which are guided in horizontal slots 100 in the distance pieces 6. The pegs 10 serve as carrier pegs for distance pieces 6 and the corresponding bell crank lever pairs 1—2, whereby the latter may be fixed at any vertical height by means of eccentric cam 12 adapted to be rotated around shaft 13 by lever 11. The side support 34 is capable of sliding motion between the lamellæ of bell crank levers 1 and serves as a support for the edge of the foot.

The series of bell crank levers 1—2 are held together at each end by the framework 33 shown in dotted lines.

It will be understood, of course, that the details of the invention may be modified in many ways without departing from the spirit and scope of the invention as defined by the following claims.

What I claim is:

1. An auxiliary appliance for modelling feet whilst they carry weight consisting of positively guided adjusting members, capable of being pressed against the surface of the foot and of being fixed in any position, in which the adjusting members are sub-divided in their length and the separate parts thus formed are capable of being raised or lowered, simultaneously or one after the other, in a mutually independent manner.

2. An auxiliary appliance for modelling feet whilst they carry weight consisting of positively guided adjusting members, capable of being pressed against the surface of the foot and of being fixed in any position in which the adjusting members are subdivided bell crank levers capable of being raised or lowered, simultaneously or one after the other, in a mutually independent manner.

3. An auxiliary appliance for modelling feet whilst they carry weight consisting of positively guided adjusting members, capable of being pressed against the surface of the foot and of being fixed in any position, in which a distance piece is provided for each pair of bell-crank levers this distance piece being connected with the corresponding pair of bell crank levers by a pivot around which the bell-crank levers are pivoted.

4. An auxiliary appliance for modelling feet whilst they carry weight consisting of positively guided adjusting members, capable of being pressed against the surface of the foot and of being fixed in any position, in which each distance piece and with it, the pairs of bell-crank levers with which it is connected, are arranged on a support plate capable of being raised and lowered.

5. An auxiliary appliance for modelling feet whilst they carry weight consisting of positively guided adjusting members, capable of being pressed against the surface of the foot and of being fixed in any position, in which the swinging of the bell-crank levers as well as the raising and lowering of the support plates is effected by means of flexible power transmitting members.

6. An auxiliary appliance for modelling feet whilst they carry weight consisting of positively guided adjusting members, capable of being pressed against the surface of the foot and of being fixed in any position, in which the operation of the tension members is effected by means of cams, capable of swinging motion, which cams glide along segments.

In testimony whereof I affix my signature.

DR. ERNEST FISCHER.