May 14, 1935. A. KUSHINSKY 2,001,203

ARCH SUPPORT

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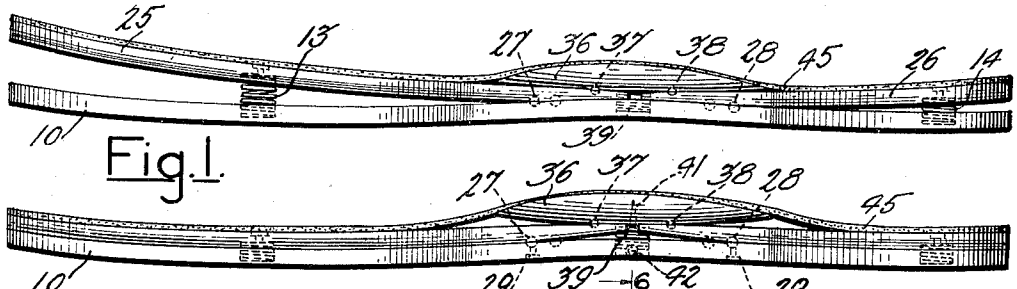


Fig.1.

Fig.2.



Fig.6.

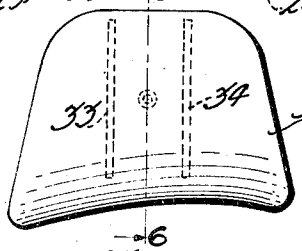


Fig.5.

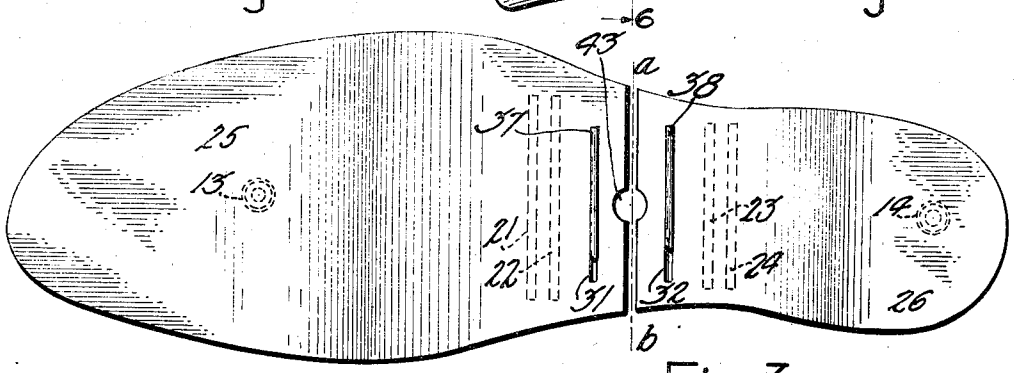


Fig.3.

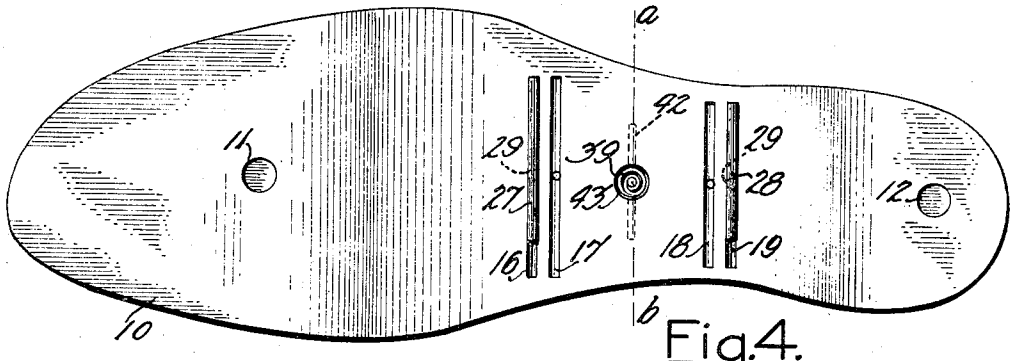


Fig.4.

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ARCH SUPPORT

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11 Claims. (Cl. 36—71)

This invention relates in general to arch supports and more particularly to a form of arch support adapted not only to support but to mechanically actuate such bones and muscles of the longitudinal and transverse arches of the human foot as may have become weakened as a result of excessive walking or standing, thereby creating a condition which is generally known as "fallen arches" or "flat feet".

An object of the invention is to provide an arch support that will exercise or gently massage the structural portion of the foot while a person is attending to his or her regular duties so that it may regain its normal healthy condition and permit the same to again function without the aid of any mechanical sustaining means.

The invention herein shown and described might be more correctly termed a natural arch re-builder since it constitutes a form of mechanical apparatus adapted to automatically cause the longitudinal and transverse arches of the foot to be alternately elevated and lowered by the walking movement or pressure of the foot thereupon in a manner as to produce a desirable flexional action upon the supporting muscles of the arch whereby the same will be beneficially exercised in addition to receiving the support usually afforded by the conventional form of arch supporter.

A flexional action upon these foot muscles is highly desirable since it will tend to so strengthen the muscles as to restore the foot to its former usefulness. The common form of arch support, generally accepted as the only means for relief from the excruciating pain to which persons with fallen arches are subjected, does nothing further to correct this condition than to provide a support which does not remedy this evil. With the present invention however the beneficial exercising of these muscles in addition to the sustaining feature afforded will tend to restore the foot in a short time to such a condition that the use of any artificial correcting means may be dispensed with.

The present embodiment features a yieldable plate actuated by the combined pressure of the heel and the ball of the foot in a manner as to flex the longitudinal and transverse arches constantly during walking.

Various other objects and advantages will be in part obvious from an inspection of the accompanying drawing and a careful consideration of the following particular description and claims of one form of mechanism embodying my invention.

In the drawing:

Figure 1 is a side elevation of the invention showing the parts in a position as when relieved of foot pressure.

Figure 2 is a view similar to Fig. 1 showing the parts in another position as when actuated by foot pressure.

Figure 3 is a top plan view of the upper yieldable plates.

Figure 4 is a top plan view of the lower supporting member.

Figure 5 is a top plan view of the arch supporting element.

Figure 6 is a cross section taken on the line 6—6 of Fig. 5 looking in the direction indicated by the arrows.

With reference to the drawing, 10 designates a lower supporting member which can constitute the sole of a shoe or else be in the form of a relatively light plate to be inserted into the shoe. This member 10 is comparatively rigid and is provided on its upper surface with circular recesses 11 and 12 adapted to receive the compression springs 13 and 14. There is also formed on this upper surface a plurality of shallow grooves 16, 17, 18 and 19 disposed respectively fore and aft of the transverse arch center line *a*—*b*. These grooves are in alignment with a plurality of similar grooves 21, 22, 23, and 24 formed on the under surface of a two-piece plate comprising the forward portion 25 and the rearward portion 26, the dividing line being indicated by *a*—*b*. Upon this divided plate, the foot (not shown) normally bears.

In the grooves 16 and 19 I have secured the cylindrical rods 27 and 28 by means of rivets or screws 29 which extend through the lower member 10. These rods respectively provide a fore and aft fulcrum point for the plates 25 and 26 by engaging in the corresponding grooves 21 and 24 thereof and in which they are free to rotate when the two upper plates 25 and 26 are actuated in a manner hereinafter described.

The plates 25 and 26 are also provided on their upper surface with grooves 31 and 32 which are aligned with similar grooves 33 and 34 formed in the under surface of an arch supporting element 36. Cylindrical rods 37 and 38 are disposed in these grooves in a manner as to provide pivot means for the arch member 36 to rock upon. The combined parts are held in their relative positions shown in Figs. 1 and 2 by a tension spring 39 which is preferably secured to the arch member 36 by a screw 41 and to the lower member by a cross-bar 42. This spring extends through a clearance hole 43 so that it will not

interfere with the rocking movement of the fore and aft plates 25 and 26.

The compression springs 13 and 14 are interposed between the lower member 10 and the fore and aft plates in the manner shown and tend to rock the upper plates on their fulcrums 27 and 28 to the position shown in Fig. 1 which represents the position of the elements when the foot is raised from the ground. As the foot is brought to bear upon the structure as a whole, the forward plate 25 will be depressed by the ball of the foot and the rear plate 26 by the heel of the foot. The pressure thus created will cause the arch piece 36 to be elevated in a manner as to press against the arch of the foot as will be readily understood. As the pressure of the foot is relieved the springs 13 and 14 will again cause the ends of the fore and aft plates to be raised to the position of Fig. 1 and the arch piece lowered.

A cover portion 45 may be formed of relatively soft material such as leather and applied to the parts in any suitable manner.

It is obvious from the foregoing description that the device represented in the drawing will effect a flexional action upon the foot by the alternate raising and lowering of the arch member 36 thus tending to exercise both the longitudinal and the transverse arches of the foot in a manner so much desired.

Whereas I have shown and described a specific form of fulcrum and pivot means together with other less essential details of construction, I do not wish to convey the thought that the proper function of the invention is dependent upon the particular form of fulcrum and pivot means shown in the drawing since it is obvious that mechanical equivalents can readily be employed in place thereof.

The extra grooves 17, 18 and 22, 23 are for the purpose of changing the position of the rods 27 and 28 to a location more adjacent to the center line *a*—*b* when so desired thus making the fulcrum points adjustable which will effect the movement of the arch member 36 to a greater or lesser degree.

Variations may be resorted to within the scope of the invention and portions of the improvements may be used without the others whilst not departing from the spirit of the invention.

Having thus described my invention, I claim:

1. In apparatus of the class described, in combination, a substantially rigid base member, a pair of lever elements fulcrumed thereupon and adapted for actuation by the human foot during its natural operation of walking, and an arch supporting element having a loose connection with said lever elements, and adapted to be alternately elevated and lowered by the action of said elements in a manner as to exercise the foot constantly during walking.

2. In apparatus of the class described, the combination with a substantially rigid base member, of a pair of lever elements fulcrumed thereupon and adapted for actuation by the human foot during its natural operation of walking, and an arch supporting element pivoted upon each of said lever elements for actuation thereby in a manner as to be alternately elevated and lowered during the operation of walking.

3. In apparatus of the class described, the combination with a substantially rigid base member, of a pair of lever elements fulcrumed thereupon and adapted for actuation by the human foot during its natural operation of walking, an arch supporting element pivoted upon each of said lever elements for actuation thereby in a manner as to be alternately elevated and lowered during the operation of walking, and adjusting means adapted to regulate the leverage of said pair of elements.

4. In apparatus of the class described, in combination, means adapted to be placed under the sole of the human foot for actuation thereby in a manner as to exercise the arch thereof, comprising an arch supporting element, flexible means operatively related to said element and having longitudinal extremities that are depressible by the pressure of the foot in a manner such as to elevate an inner portion thereof together with said element, and resilient means to lower said arch supporting element when said pressure is relieved.

5. In apparatus of the class described, in combination, individual fore and aft leverage means adapted to be actuated by the combined pressure of the ball and heel of the human foot, and an arch supporting element articulated to said leverage means in a manner such as to cause said element to be forcefully elevated thereby against the foot when said pressure is applied.

6. In apparatus of the class described, in combination, individual fore and aft leverage means adapted to be actuated by the combined pressure of the ball and heel of the human foot, resilient means adapted to return the same to an initial position when the pressure is relieved, and an arch supporting element articulately mounted upon said leverage means in a manner such as to cause said element to be forcefully elevated thereby against the foot when said pressure is applied.

7. In apparatus of the class described, the combination with a substantially rigid base member having a contour approximating the sole of the human foot, of a pair of lever elements approximating the form of the base member and disposed thereupon; said pair of lever elements arranged in adjoining end to end relation, a fulcrum for each element connecting with said base and adapted to cause an elevation of the inner adjoining portions of said elements when the outer extremities thereof are depressed, adjusting means for said fulcrums, and an arch supporting element pivoted upon both of said lever elements directly over the adjoining portions in a manner as to be actuated thereby.

8. In apparatus of the class described, in combination, a relatively rigid means adapted to be placed under the sole of the human foot, a yieldable means mounted thereupon for actuation by the combined pressure of the ball and heel of the foot, and means pivoted upon said yieldable means to bear under the arch of the foot to a greater degree as said pressure is increased, and means adapted to adjust the amount of pressure effective upon said pivoted means.

9. In apparatus of the class described, the combination with a relatively rigid base member, of a divided upper plate comprising fore and aft adjoining portions each fulcrumed upon said base member at a point intermediate its longitudinal extremities, an arch supporting element pivoted upon said fore and aft portions directly over their adjoining ends, and yieldable means between said base member and said portions tending to depress their inner ends.

10. An article of manufacture, comprising a base member having a contour approximating the sole of the human foot, an upper divided plate comprising a fore and an aft portion hav-

ing a point of juncture adjacent the longitudinal arch region of the foot, an arch supporting element pivoted upon said fore and aft portions for vertical movement, a fulcrum for each portion connecting the same to the base member; said fulcrums being adjustable to a position nearer or more remote from said juncture so as to vary the degree of vertical movement of said element, resilient compression means effective to normally cause a depression of said element, and a yielding tension means connected to said element and to said base member for the maintenance of all of the parts in their effective relation.

11. In apparatus of the class described, in combination, means adapted to be placed under the sole of the human foot for actuation thereby in a manner as to exercise the arch portion thereof, said means comprising an arch supporting element, and fore and aft flexible members depressible at their extremities and articulated intermediate said extremities to said arch supporting element in a manner as to elevate the same when said extremities are depressed.

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