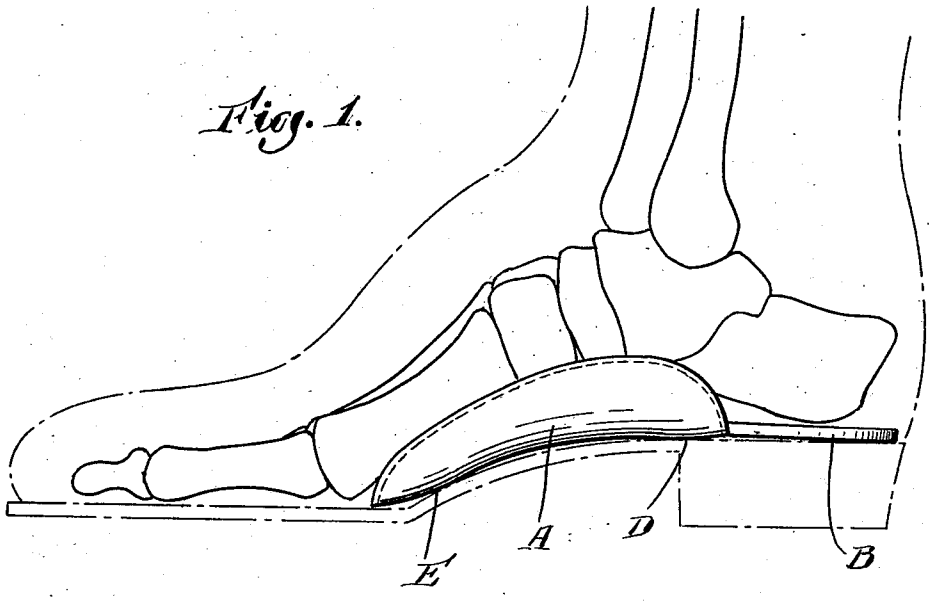
July 1, 1930. C. R. WELCH 1,768,648

ARCH SUPPORT

Filed Nov. 2, 1925

Fig. 1.



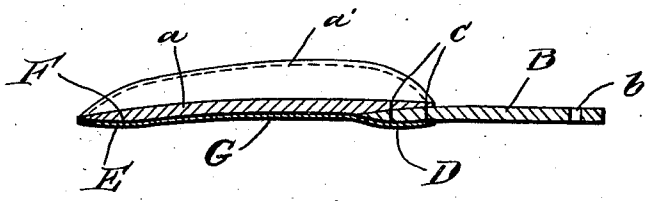
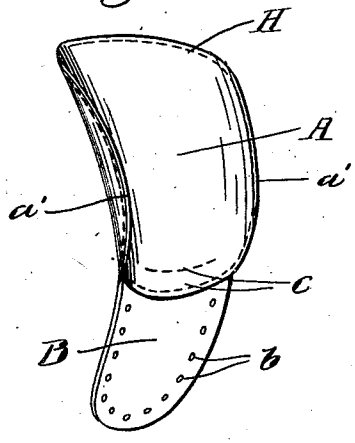


Fig. 2.

Fig. 3.



Inventor
Charles Ralph Welch
by Harry D. Peck.
Attorney

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UNITED STATES PATENT OFFICE

CHARLES RALPH WELCH, OF MARBLEHEAD, MASSACHUSETTS

ARCH SUPPORT

Application filed November 2, 1925. Serial No. 66,179.

This invention relates to arch supports, more especially to an arch support to be worn in shoes for the purpose of strengthening weakened foot arches, and correcting deformed or depressed foot arches.

So far as I am aware arch supports heretofore available have been made either exceedingly stiff or rigid—in some cases having metal parts to make them practically unyielding—or extremely flexible. Although the former actually support the arch, their rigidity prevents the normal action of the foot bones and this in time weakens the muscles and not infrequently causes serious injury to the foot. The flexible supports, while commendable in that they permit the bones of the foot to function, do not in fact offer any "support" and therefore fail to relieve the strained condition that is sought to be cured.

In a normal foot the bones from the oscalcis to the phalanges form a natural arch. This arch is not rigid because the bones move relatively to one another while a step is being taken in accordance with the action of their respective ligaments and muscles. If this natural arch becomes weakened or misshaped, it is important that it be supported until its natural strength or shape returns, but it is equally, if not more important that the bones be allowed some freedom of movement while they are being supported. This freedom of movement exercises the muscles and ligaments, maintains the lubrication between the bones, and tends in time to restore the foot arch to its normal shape and strength.

The present invention aims to provide an arch support that will be a support and at the same time permit relative movement of the foot bones during walking. Among its objects is the provision of an arch support that will supplement the weakened strength of the tarsus and metatarsal bones and yet permit them to follow their normal action so that the muscles of the foot may be exercised and strengthened while relieved of a part of their natural supporting duties. Another object is to provide a support having an arched body portion resting on the insole of the shoe only at the shank ends, thereby preventing breaking down of the shoe shank and deformation of the shoe; it being desirable in all footwear to maintain the original configuration of the shoe if possible. Another object is to provide a yieldable heel seat for the support and attach it to the arched body portion so that there may be relative movement between them.

The objects are attained by providing a rigid arched body portion, having transverse ridges or rockers on its under side across each end. These ridges rest on the insole, one across the rear of the forepart, just at the beginning of the shoe shank, and the other at the rear end of the said shank, where the heel portion begins. Between these ridges the arch support forms a bridge so that no downward stress is imposed upon the shoe shank. At the rear of the arched body portion is attached a heel seat, made preferably of a fine grade of flexible leather, and provided with a series of holes near its periphery to make it even more yielding. The heel of the foot rests on the heel seat, and the natural arch of the foot rests on and is supported by the stiff arched body portion of the support. When a step is taken the heel strikes the ground first and the arched body portion rocks upward slightly as the weight of the body is concentrated at the rear. As the body moves ahead, and the foot settles on the ground, the body portion tips forward and downward about the rear rocker until the forward rocker also rests firmly on the insole. As the body moves still further ahead and the weight is shifted to the forepart, the heel rising, the body portion of the support rocks upward at the rear about the forward rocker. These rockings of the support permit the arch bones to move relatively to one another in their natural manner, thereby exercising the muscles and ligaments and allowing them to grow stronger while freed of the task of holding the arch bones in place. The latter duty is for the most part performed by the support, but sufficient movement of the muscles is allowed to maintain the resilience of the foot action. As a consequence, depressed arch bones are returned to their proper position,

pains in the leg disappear, and the normal functions of the foot muscles are restored.

It is intended that the patent shall cover by suitable expression in the appended claims, whatever features of patentable novelty exist in the invention disclosed.

In the accompanying drawings,

Figure 1 is an elevation, showing graphically the present invention, with a shoe and the bones of a foot therein;

Figure 2 is a medial longitudinal section through the arch support; and

Figure 3 is a perspective of the arch support.

Referring to the drawings the arch support comprising a body portion A and a heel seat portion B. The former is made of stiffened leather *a* in arched shape longitudinally, with the forward and rear edges beveled and with side wings *a'* turned upward to conform to the shape of the inner and outer shank edges of the foot and afford lateral support thereto. At the rear edge of the body portion the soft leather heel seat B having a row of holes *b* near its edge to increase its flexibility, is attached by stitches C, the overlapping parts being beveled to avoid an over-thick section across the support. There is left enough stock, however, to provide an appreciable ridge or rocker D across the underside of the arch support, at the junction of the body portion and heel seat and a similar rocker E is provided at the forward end just rearward of the leading edge. These rockers are really more pronounced than appears from the showing of Figure 2, and constitute the bearing surfaces of the support. Moreover, the fact that the underside of the body portion is beveled upward beyond the front rocker E enables the support as a whole to be rocked about this forward rocker when the weight of the wearer is applied mainly to the support forward of the rocker E. A layer of rubber F or other moisture-proof material may be laid on the bottom of the body portion, and a thin cover layer G of leather laid outside that, the several layers being stitched together along their edges as at H.

When placed in the shoe, the rear rocker D rests on the insole above the forward edge of the heel of the shoe and the front rocker E rests on the forward end of the insole shank. The unyielding body portion A accordingly forms a true arch support between the rockers for the arch bones of the foot, so that when a person is standing the body portion of the support will effectively hold up the arch bones and relieve their muscles of any strain.

In walking the heel of the shoe strikes the ground first and accordingly the weight of the body is for the most part transmitted through the oscalcis and heel of the foot to the heel seat portion B of the support. Since the greater portion of the oscalcis is rearward of the rear rocker D, the weight of the body is almost entirely applied to the heel seat portion B and that part of the body portion A which is rearward of the rocker D. Accordingly, due to the lever action about the fulcrum provided by rocker D, the body portion A tends to lift and accordingly exerts a slight supporting pressure on the arch of the foot. This slight upward pressure on the shank of the foot encourages a movement of the foot bones at the posterior joint of the foot, the latter being considered as the junction between the oscalcis and cuboid and the astragulus and scaphoid.

As the body of the person moves forward and the forepart of the shoe touches the ground, the weight of the body shifts forward, being distributed primarily through the arch of the foot. At this time both the rear rocker D and the forward rocker E are pressed against the shoe and the body portion A rigidly supports the foot arch. As the body moves still further forward, the heel is raised from the ground and the weight of the body is then primarily centralized on the metatarsal bones. These overlie the forward portion of the body portion A and extend beyond the front edge of the support so that as the weight shifts forward there is a considerable pressure brought to bear on the front edge of the support forward of the front rocker E. That is, the anterior joint, being considered the joint between the metatarsal bones and the second proximate phalanges, moves so that the bulk of the weight carried by the metatarsal bones is impressed on the forward edge of the support thus causing the latter to rock slightly about the rocker E and thereby cause the body portion A to exert a slight supporting pressure against the arch of the foot.

The bones of the arch move relatively to one another during the rockings of the support, although they are relieved to a large extent of their supporting burden, because the stiff body portion, even when resting primarily upon only one or the other of its rockers, actually carries most of the weight imposed upon the foot arch. Thus the present invention provides an arch support that simultaneously supports the foot arch and allows the natural movements of the foot bones.

I claim as my invention:

1. An arch support for a foot comprising a stiff body portion and a yieldable heel seat attached thereto with their adjacent edges overlapping and forming a transverse ridge of greater thickness than the thickness of the adjacent portions of the support, thereby forming a rocker across the support close by the posterior transverse arch of the foot.

2. An arch support for a foot comprising an arched body portion having a stiff unyielding top layer, an intermediate layer of

moisture proof material, and a bottom layer covering said material; the top layer being thicker near its forward edge to form a rocker close by the anterior transverse arch of the foot.

3. An arch support for a foot comprising an arched body portion having a stiff unyielding top layer, a bottom layer and a yieldable heel seat with its forward edge secured between the rear edges of the body portion layers; the thickness of said support at the place where the heel-seat and body portion layers overlap being greater than the thickness of the adjacent portions of the support, thereby forming a rocker close by the posterior transverse arch of the foot.

In testimony whereof I affix my signature at Lynn, Massachusetts, this 20th day of October, 1925.

CHARLES RALPH WELCH.