It sometimes happens that a person requires increase of pressure, or perhaps relief of pressure, in certain localized areas of the soles of his feet. Relief of pressure is sometimes required to avoid aggravating a stone bruise, and increase of pressure is sometimes required to effect building up of a fallen arch.

Therefore, for the purpose of building up arches, there have been used permanently arched pieces of metal or the like, more or less rigidly and permanently formed into a given position or shape, but such arch supports, by the requirements of manufacturing processes, were all formed to one pattern, and being necessarily an approximation or generalization, could not fit all persons equally well, nor could they be changed from time to time as the process of rebuilding the arch progressed. As a matter of fact, they were more likely to become progressively flatter in use, rather than increasingly more arched. Attempts have been made to provide arch supporters which are adjustable, but only to the extent that such supporters are adjustable in their main contours, and in areas of fixed size and shape, which are of course adapted to the "average" foot. This still does not provide such means that can be adjusted in each individual or local area, or to fit any individual foot, and in no wise is there any provision made for relieving pressure over any given area.

It is therefore the principal object of the present invention to provide a device which, since it is not restricted only to the support of an arch, but to any part of the sole of the foot as it rests upon the sole of a shoe, may be termed a sole conformer for shoes, which device is capable of local adjustment to create or to relieve pressure in any individual area, great or small, in whatever part of the sole it may be located, and which is capable of adjustment from time to time to meet changed conditions.

The above indicating the principal object of the present invention, subsidiary objects have to do principally with the ease of adjustment, with the security by which a given adjustment is maintained, with the ruggedness of construction of the device, and similar details, all as will appear hereafter.

The invention will be better understood from a study of the accompanying drawings, wherein the invention is shown embodied in various illustrative forms, and of the present specification and the accompanying claims, the latter of which express the scope of novelty of the invention herein disclosed.

Figure 1 is a longitudinal section, generally along line 1—1 of Figure 2, through the sole of a shoe and through such a sole conformer in place therein, and Figure 2 is a plan view of the same, with parts broken away.

Figure 3 is a transverse section, substantially on the line 3—3 of Figure 2 and Figure 4 is a view similar to Figure 3, showing a slightly modified arrangement.

Figure 5 is a plan view of a form of an anchoring means connecting the two plates at one end of the device, and Figure 6 is a longitudinal section through the same, substantially on the line 6—6 of Figure 5.

Figure 7 is a plan view of a different anchoring means, and Figure 8 is a transverse section through the same substantially on the line 8—8 of Figure 7.

Figure 9 is a top plan view of the conformer, with parts broken away, showing a further modification, and Figure 10 is a longitudinal section through the same.

Figure 11 is an enlarged section, illustrating the modification of Figures 9 and 10, and illustrating also a further type of anchoring means.

Figure 12 is a section through the conformer, illustrating a further modified form.

Figure 13 is a longitudinal section, illustrating a further modified form.

In essence the invention comprises two plates one above the other, which are suitably connected together, preferably at a few points only, such as at front and at rear, by suitable anchoring means. The top plate is of flexible or formable material, such as brass or zinc. There are means interposed between the two plates and reacting between them whereby the upper plate may be made to conform, throughout localized areas, to any desired contour imposed upon it by means such as screws forcing the plates apart. Such a conformer is installed in or built into the sole of a shoe, approximately at the level of the normal inner sole of the shoe.

To illustrate, in Figures 1, 2 and 3, the sole 91 of a shoe 9 is provided with a recess 92 within its inner sole, within which recess the sole conformer is received. Within the bottom of this recess 92 is received a lower plate 2, and an upper plate 1 lies generally in the normal level of the shoe's inner sole. These two plates are secured together by anchoring means at their front and rear ends, as indicated at 20 and 21, respectively. As shown in these views, the anchoring means are both rigid connections, whereby no movement of one plate relative to and
lengthwise of the other is possible. The upper plate, however, is of relatively thin and pliant material, whereby it may flex and be stretched to conform fairly closely to changes of contour imposed upon it by screws 3 which are threaded within the lower plate 2, and which bear at their rounded upper ends on the under side of the upper plate 1. The lower plate, in such an arrangement, is preferably fairly rigid and sufficiently thick (at least, in those portions where the desired range of adjustment of the screws is large) to afford the necessary range of adjustment. The upper plate 2 may be, for instance, of steel. By threading the headless screws 3 through the plate 2 from the under side of the bottom plate, to bear against the plate 1, the latter may be pressed upward in certain selected areas to increase the pressure in those areas, or by retracting the screws 3 through the plate 2, the upper plate 1 may be permitted to be pressed downwardly to relieve the pressure over a given area. Such changes may be made from time to time as required, or to fit the device to an individual user or to an individual condition, or even temporarily.

The upper plate 1 lies generally in what would otherwise be the normal contour of the inner sole 91, although it may depart therefrom in some portions, as may be clearly seen in Figure 1. Preferably the device as a whole should be prevented from shifting about in the shoe, since it is employed for its effect within certain definite and localized areas, but any suitable means to this end may be employed. In fact the mere disposition of plate 2 within the sole recess is usually sufficient for this purpose. Additional securing means, if found desirable, have been suggested by the screw 4 which is threaded through from the under side of the sole into the lower plate 2, a suitable gasket being provided to make the fit of the screw in the sole watertight. Further or alternative positioning and securing means may take the form of the forwardly projecting tongue 10 formed upon the forward end of the upper plate 1, and capable of being pressed forwardly between the outer sole and an inner sole (shown in Figure 11), bendable outwardly by pressure into the side margins of the depression 92.

In the built-in arrangement such expedients should not be necessary.

It will be observed that the adjusting screws 3 are distributed over substantially the entire area of the plate 2. It might be considered that these screws would produce sensible points in the conformable plate 1, but the plate is sufficiently stiff, and the screws are sufficiently closely spaced, that this does not occur; and the contour is determined by the points or upper ends of the screws 3, and the interstices between the screws and over their points are filled in by the plate 1, to make a smooth surface of proper contour.

Preferably the upper plate 1 extends beyond the margin of the lower plate 2, at most points, since the lower plate must be within the margins of the inner sole 91, and the upper plate 1 should extend substantially from side to side of the shoe. Accordingly, to afford better support to the margins of the upper plate 1, the screws may be inclined toward the margins, as indicated at 31 in Figure 4.

Alternative forms of anchorage as between the two plates are illustrated in Figures 5 to 8 inclusive. In Figures 5 and 6 the upper plate 1 at its forward end (except for that part which forms the tongue 10) is turned downwardly and under the forward end of the lower plate 2, as indicated at 11, and its tip is again turned upwardly, as indicated at 12, and received within a transverse groove in the under side of the plate 2. This affords a firm and secure anchorage between the front ends of the cooperating plates. At their rear end, as shown in Figures 7 and 8, a spring connection may be permitted in some instances, as by the threaded and shouldered sleeve 13 secured to the under side of the upper plate 1, and with its reduced neck received in the lower plate 2. The headless screws 3 then cooperate with the shoulder of the sleeve 13 at the opposite side of the flange of the groove 22, as shown, to prevent separation of the plates, and to hold them properly spaced, yet limited relative lengthwise movement of the plates is permitted. This eliminates any necessity for stretching or anchoring of the upper plate 1, as must be done where the two ends are anchored rigidly.

In the form shown in Figures 1 to 4 the screws 3 have been headless in form and adjustable from the under side of the lower plate. In Figure 9, the forged-in conformer is removed from the shoe. In the form shown in Figures 9, 10 and 11, the adjust- ment is effected by first removing the upper plate, removable anchoring screws 15 permitting this to be done, after which the screws 32 are readily adjustable in nuts 28 which are afixed to the lower plate 2, as in Figures 9 and 10, or as shown in Figure 11, the screw 32 is threaded directly in the plate 2, as before, but a lock nut 33 serves to prevent accidental alteration of the adjusted position of the screw head.

The securing means 25 to hold the conformer within the shoe, is shown in Figures 9, 10, and 11, in the form of tabs projecting from the margins of the lower plate 2, initially in the position shown in dotted lines in Figure 11, but upon pressure being applied these tabs are pressed outwardly and upwardly, somewhat after the fashion of cats' claws, to engage with the side margins of the recess 92. The lower plate 2 is thus held securely in place, and is not readily removable, but since adjustment can be effected by removal of the upper plate 1, this is not objectionable.

In Figure 12, instead of threading the screws within the lower plate 2, or in a nut secured thereto, the arrangement is reversed, and the screws 34 are swivelled at 33 within holes through the lower plate 2, and are threadedly received in sleeves or nuts 27 fixed to the under side of the upper plate 1.

In the form shown in Figure 13 the lower plate 28 is non-rigid as well as the upper plate 1. The lower plate is supported from the bottom of the recess 92 by spacers 5, and the screws 3 are still adjustable in the lower plate 28 to effect variation of the spacing as between the plates 1 and 28.

If it is desired to build up an arch, whether the longitudinal arch or the metatarsal arch, the upper plate 1, by adjustment of the screws or equivalent spacing means between the plates, is forced upwardly in exactly the desired area, to accomplish the result of forcing the arch upwardly, the upwardly forming contour given the plate 1 may at first be but slight, but as the arch is forced back into proper position it is desirable to increase the upwardly pressing contour of the plate, and this may be accomplished by progressive and periodical adjustment of the screws, 75.
and through them of the plate 1. If for any reason it is desired to relieve a given area of pressure, that may be accomplished by backing off the screws in this particular area, or, conversely, by screwing out the screws surrounding this area and in other areas, but omitting to screw out the screws in this particular area.

By such means all manner of desired adjustments may be made. The conformer readily adapts itself to all sorts of individual or changing conditions. It may be made to fit any given person or individual. The conformer may be built into the shoe or, by cutting a recess $2$ in the inner sole of the shoe, it may be inserted into a shoe already made.

What I claim as my invention is:

1. A sole conformer comprising an upper and a lower plate, the upper plate being of conformable material, of a shape and size for disposition within a shoe, and supported from the lower plate, and a multitude of members individually adjustable in effective length spacing the upper plate from the lower plate at a multitude of laterally spaced locations, the spacer members being of the lower plate to establish the conformer generally of an adjustable and variable affording variations in conformation of selected local areas of such upper plate.

2. In combination, in a device of the character described, a rigid lower plate, an upper plate of conformable material, coupling means connecting the plates at spaced locations, and a multitude of spacer members distributed over the area of and supported in the lower plate for individual movement of their upper ends toward and from such plate, to support said upper conformable plate on the upper ends of said members in correspondingly varying conformations.

3. In combination, in a device of the character described, a rigid lower plate having a multitude of holes distributed over its area, an upper plate of conformable material extending outwardly beyond the margin of the lower plate, coupling means connecting the plates at spaced locations, and a plurality of screws threaded in one or said holes and adjustable independently of the other screws to support said upper plate in correspondingly varying conformations, those screws threaded in holes near the margin of said lower plate being inclined upwardly and outwardly to afford support to the margin of said upper plate.

4. The combination of claim 3, wherein the holes in the lower plate are threaded, and the screws bear against the under side of the upper plate.

5. The combination of claim 3, wherein the holes in the lower plate are threaded, and the screws are headless, and are engageable for rotation from the under side of the lower plate, the rigid lower plate being of sufficient thickness to afford all necessary range of adjustment.

6. The combination of claim 2, wherein the coupling means comprise two longitudinally unyielding connections between the plates, one between the front ends of each plate and the other between their rearward ends.

7. The combination of claim 2, wherein the coupling means comprise a fixed connection between the plates at one end and a longitudinally yieldable connection between opposite ends of the plates.

8. A sole conformer comprising a lower plate, means to define a variable warped sole-contacting surface, and means for supporting the same, the warped surface being defined collectively by their upper ends, the warped surface defined means also including a plurality upper plate extending between and carried by all the upper ends of said spacer members, the conformation of such upper plate, by reason of its plantiness, coinciding with the warped surface defined collectively by the upper ends of said spacer members.

9. A sole conformer comprising a lower plate, a variable, warped, sole-conforming surface defined by screws adjustably threading into said lower plate in sufficient numbers and in positions so distributed over the surface of such plate, that the upper ends of said screws individually support but slight weight, but together define such warped surface, corresponding to the projection of the individual screws above said plate, such surface being variable in conformation corresponding to the adjustment of the upper ends of the individual screws toward or away from said lower plate, and a pinless upper plate resting upon all the upper ends of said screws, the conformer being variable in conformation of the upper plate coinciding and varying with the warped surface defined collectively by the upper ends of said screws.

10. In combination, in a device of the character described, a rigid lower plate having a plurality of holes distributed over its area, an upper plate of conformable material extending outwardly beyond the margin of the lower plate, coupling means connecting the plates at spaced locations, and a plurality of screws threaded in one or said holes and adjustable independently of the other screws to support said upper plate in correspondingly varying conformations, those screws threaded in holes near the margin of said lower plate being inclined upwardly and outwardly to afford support to the margin of said upper plate.

11. A sole conformer comprising a plate for disposition within a shoe, and means to define a variable, warped, sole-conforming surface, including members upstanding from and held by said plate against lengthwise reciprocation with respect thereto, in sufficient numbers and sufficiently closely spaced that the projecting ends of said members together define such a warped surface, and such members being individually variable in effective length for changing the conformation of the warped surface defined collectively by their projecting ends.

12. A sole conformer comprising a plate for disposition within a shoe, and means to define a variable, warped, sole-conforming surface, including members upstanding from and held by said plate against lengthwise reciprocation with respect thereto, in sufficient numbers and sufficiently closely spaced that the projecting ends of said screws together define such a warped surface, and such screws being individually adjustable for changing the conformation of the warped surface defined collectively by their projecting ends.

13. A sole conformer comprising a plate of fixed thickness, and of a size for disposition beneath a material part of the user's sole, and individual members projecting from a surface of said plate to varying distances, in sufficient numbers and sufficiently closely spaced, to cooperatively define, with said plate, a conformer of varying thickness in its several portions, and with a
warped surface disposed, with the conformer supported from below, to conform with the appropriate part of the user's sole, said members being individually adjustable to vary their projection from said plate, for altering the configuration of the warped, sole-conforming surface.

14. A sole conformer comprising a plate of fixed thickness, and of a size for disposition beneath a material part of the user's sole, and individual members projecting from a surface of said plate to varying distances, in sufficient numbers and sufficiently closely spaced, to cooperatively define, with said plate, a conformer of varying thickness in its several portions, and with a warped surface disposed, with the conformer supported from below, to conform with the appropriate part of the user's sole.

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DISCLAIMER


Hereby disclaims from the scope of claim 14 all sole conformers defined thereby except those which are substantially incompressible by including individual members projecting from a surface of the plate which are unyielding.

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