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ARCH SUPPORT

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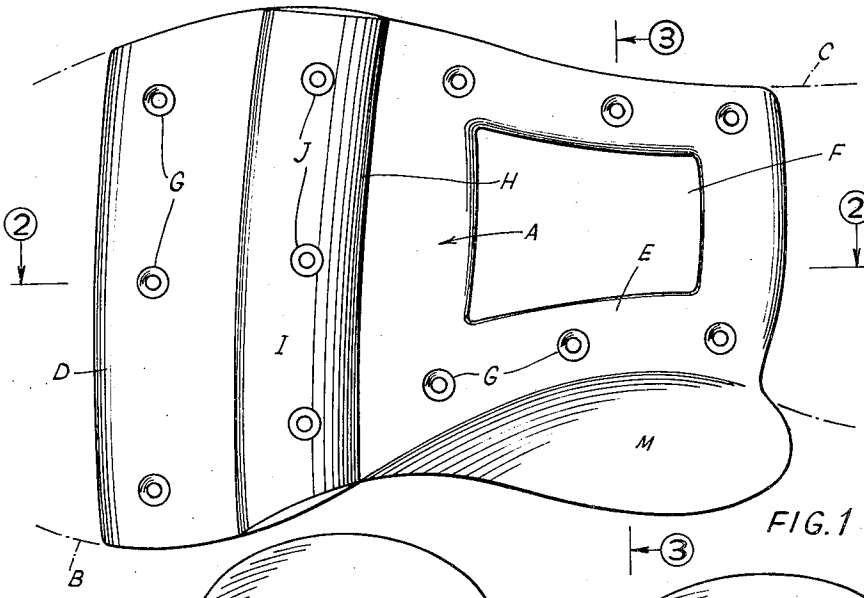


FIG. 1

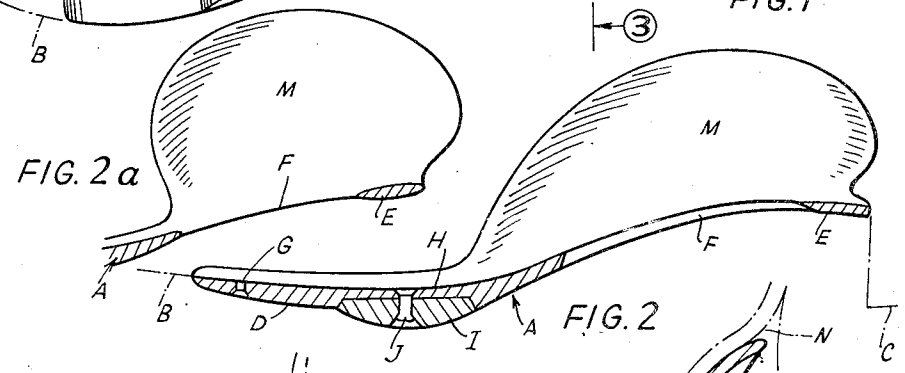


FIG. 2a

FIG. 2

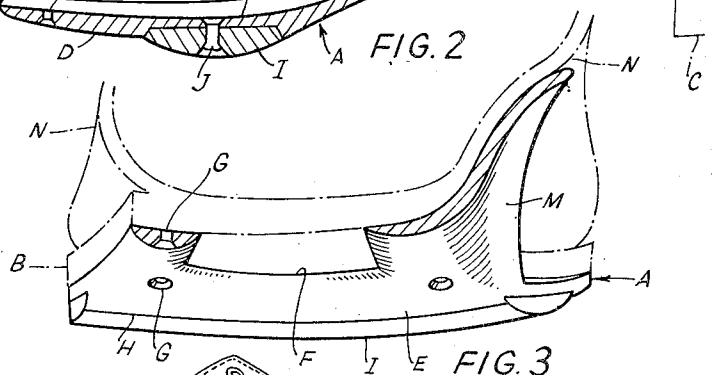


FIG. 3

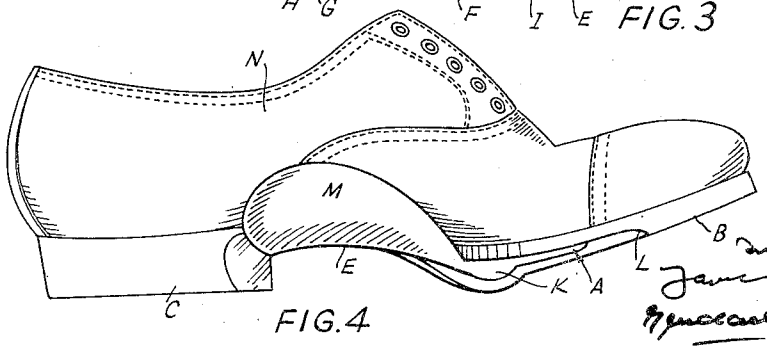


FIG. 4

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ARCH SUPPORT

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7 Claims. (Cl. 36—76)

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Deformities of the human foot tending to make walking difficult or painful may be either congenital or acquired, usually as a result of unsuitable boots or shoes being worn.

Amongst such deformities may be mentioned an excessive or deficient longitudinal arch (pes cavus or pes planus), collapse of the transverse arch (with resultant painful conditions such as "Morton's toe" and metatarsalgia, when nerves are impinged or otherwise affected by the displaced bones), distortion or stiffness of the big toe (hallux valgus or hallux rigidus), and bursitis or callosities resulting from one or more of the above conditions or simply from tight or ill-fitting footwear.

Displacements of the metatarsal bones may be treated by manipulative surgery, but arch supports are frequently applied to boots and shoes with a view to giving progressive treatment of the deformity, or at least of alleviating the pain in walking which usually results therefrom.

Hitherto it has been the normal practice to construct foot-arch supports as shaped pads or linings to be worn inside the boot or shoe, but such appliances are liable to work out of position, in which event they may easily do more harm than good, and even when correctly made and fitted the forcible restoration of the transverse arch which they induce is often exceedingly painful.

Furthermore, by reducing the space inside the boot or shoe, the known form of internal arch support restricts circulation and is a contributory cause of calluses and inflammation.

Another form of metatarsal support sometimes employed consists of a built-up pad of leather permanently secured across the underside of the boot or shoe sole at the position of the transverse arch of the foot, or alternatively the sole itself may be thickened at this point by building in an extra layer or layers of leather between the insole and the outer sole.

Such metatarsal bars have the disadvantage that, for initial attention and subsequent repair, the footwear must be taken to a surgical bootmaker who has particulars of the deformity under treatment, a further drawback in the case of outside metatarsal bars being the tendency of the boot or shoe sole to crack or collapse under the localized stresses imposed thereon.

The object of the present invention is to provide an improved construction of foot-arch support which will obviate the disadvantages of known appliances and which, once fitted, will remain anatomically effective in a high degree,

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without requiring any more attention than can be given by the user or by an ordinary repairer, whilst being quite unobtrusive in wear.

According to this invention, I provide, for application to a boot or shoe sole, a foot-arch support comprising a stiffener element adapted to extend forwardly from the heel to beneath the ball of the foot and provided with a rib across its underside at such a position as to lie beneath the transverse arch of the foot when the support is in use.

The stiffener element aforesaid may be adapted for attachment to the exterior of the boot or shoe sole, in which case the transverse rib is constituted by a renewable pad, the latter preferably having a rounded underside and being riveted or otherwise secured in a relatively shallow transverse groove in the stiffener element.

Alternatively, the stiffener element may be adapted for permanent incorporation in the boot or shoe sole. For example, it may be built into the thickness of such sole, the outer layer of the latter covering the transverse rib and the part of the stiffener element extending forwardly thereof.

If desired, there may be formed integrally with the stiffener element an upwardly directed lateral extension which co-operates with the side of the boot or shoe in supporting the longitudinal arch of the foot.

In the accompanying drawings:

Fig. 1 is an underside plan view of one form of the improved foot-arch support intended for attachment to the exterior of a boot or shoe sole.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 2a is a corresponding fragmentary view showing a modification.

Fig. 3 is a section on the line 3—3 of Fig. 1.

Fig. 4 is a side elevation of a shoe having an alternative form of the improved arch support permanently incorporated in the sole thereof.

In the construction illustrated in Figs. 1–3, the stiffener element A of the improved arch-support is shaped to fit the underside of a boot or shoe sole (indicated at B) from the breast of the heel C to a line well in front of the position of the transverse arch of the foot when the boot or shoe is in wear.

It is proposed to produce such stiffener elements in a variety of different sizes or half-sizes corresponding to those normal in footwear.

As applied to a size 8 man's shoe, the stiffener element A may be some 5½ inches long, so that when its rear end is abutting the breast of the heel C it will extend about 2 inches forwardly of

the average position of the wearer's transverse arch.

The stiffener element A may be cast in a light metal or alloy or alternatively moulded in a synthetic resin or other thermoplastic material having the necessary rigidity when set. When metal is employed, it may be coloured by anodic or other treatment to match the footwear, and when a plastic moulding is employed, it is of course a simple matter to provide for the requisite coloration of the material.

The average thickness of the stiffener element may be anything between, say, 3/16 and 3/8 inch, and the portion D thereof in front of the transverse arch may be tapered off to a relatively sharp edge. The shank portion E of the stiffener element may be made somewhat thinner than the rest and if desired, it may be formed with one or more longitudinal ribs to increase its rigidity. Furthermore, the portion E may be apertured as at F in the interests of lightness.

Attachment of the stiffener element in a semi-permanent manner to the boot or shoe may be effected by means of screws, rivets or the equivalent passed through holes G therein into the adjacent position of the sole B. There may be, for example, a row of three screw-holes G or the equivalent along each side of the shank aperture F, and a row of three others suitably disposed across the wider end of the element.

Each size of stiffener element may be made slightly over-width in the first place so that, after attachment, its lateral edges may be trimmed down to the exact contour of the boot or shoe sole B.

The outer face or underside of the stiffener element A has a shallow groove H formed transversely of its widest part to receive a renewable wearing pad I, which latter, when in position, will be disposed at an angle to the centre-line of the boot or shoe as shewn in Fig. 1 to suit the natural position of the wearer's transverse arch.

This transverse pad I, which may be a strip of metal, rubber, leather or other suitable material having the requisite wear-resisting qualities and, say, one inch across, extends the full width of the stiffener element A and is thick enough to project appreciably from the groove H, its exposed surface preferably being part cylindrical or otherwise convex about a longitudinal axis.

It is proposed to supply with each stiffener element or pair of such elements, a suitable number of such renewable pads (say, three), which may be fixed in position by rivets J when made of metal. In the case of a non-metallic pad, the stiffener element A may be provided with tapped holes, or separate tapped bushes moulded in position (according to its manner of construction), to receive set-screws for securing the pad.

The overall thickness of the appliance at the position of the renewable pad depends upon the nature of the deformity to be corrected, and may be anything between, say, five-sixteenths and five-eighths of an inch. It will be appreciated that the toe end of the boot or shoe sole B is raised from the ground by this amount, in addition to the elevation imposed by the normal "cast" of the sole.

In wear, however, the increased elevation of the front end of the sole B is scarcely noticeable, and if desired, the appearance of the boot or shoe may be improved by slightly recessing the outer sole, or by removing its outer layer, to receive the stiffener element A, and by thickening the toe end of the sole B to obviate any pronounced shoulder at the front of the stiffener element.

It is preferred to employ an externally-fitted arch support such as that shewn in Figs. 1–3 for the early treatment of foot deformities, and for the subsequent or advanced treatment to use a form of arch-support which is adapted for permanent incorporation in the boot or shoe sole B.

The method of applying the improved arch support in this latter connection is illustrated in Fig. 4, the stiffener element A being constructed substantially as above described but having (as applied to standard sizes of footwear) an integral rounded rib K in place of the renewable pad I. When dealing with individual fittings and shapes of footwear, it may be found preferable to employ a separately formed pad as aforesaid.

In the construction of a boot or shoe with a built-in arch support, the stiffener element A is secured in position before the outer layer of the sole B, such outer layer when affixed covering the whole surface of the element A except for its shank or instep portion E. If desired, the outer layer of the sole B may be formed in two sections, with a transverse joint at L in front of the stiffener element A.

Whichever method of applying the arch support is employed, the shank portion E of the stiffener element may be formed at its inner edge with an integral upwardly directed extension M which, when the appliance is in position, co-operates with the side of the boot or shoe upper N to support the longitudinal arch of the foot.

This lateral extension M of the stiffener element may be faced with leather or otherwise treated to match the footwear so that it in no way detracts from the appearance of the latter.

For average purposes, the profile shape of the extension M may be as shewn in Figs. 1–3, but in some instances it may be preferable to use a different contour. For example, the extension may be made somewhat higher and shorter as in Fig. 2*a*.

In operation, the stiffener element A maintains the central portion of the sole B substantially rigid, the weight being taken upon the wearing pad I or rib K beneath the transverse arch so that the metatarsal bones are not affected when the wearer is standing still.

When walking, however, the boot or shoe is rocked upon the wearing pad I or rib K and the weight is transferred to the toe, thus flexing the foot in a normal manner and gently urging the bones towards their correct position. In other words, the pad I or rib K or the portion of the wear sole covering it serves as a fulcrum in walking, so that whenever the weight of the wearer is transferred to the forward end of the stiffener element, the latter virtually becomes a first class lever, with the rear portion thereof pressing upwardly beneath the longitudinal arch of the foot, as already intimated.

Sufferers from most foot deformities will experience a sense of great relief immediately they put on footwear fitted with the improved appliance, which, not being fitted inside the boot or shoe, allows full room for the foot to thrive, and permits a natural heel-and-toe movement in walking, with no tendency to back-ache, whilst control and balance, spring and elasticity are rapidly regained.

As a result of the continual flexing of the toes during walking, circulation is improved, inflammation subsides, and hard skin or calluses disappear. The mere act of wearing the appliance

amounts in fact to a continuous course of manipulative treatment, which proceeds, without any discomfort to the wearer, until, in most cases, complete recovery is obtained.

In the case of sufferers from congenital pes cavus, the improved arch support, in conjunction with a somewhat higher heel than normal, is found to give greatly increased comfort in walking, with special relief to the Achilles tendon.

The appliance above described also gives great relief, and often promotes a complete cure, in cases of collapsed transverse arch, hallux valgus, hallux rigidus, Morton's toe, pes planus, rheumatic and metatarsalgic conditions of the foot, bunions or bursitis.

What I claim is:

1. A foot-arch support comprising a stiffener element adapted for attachment to the exterior of a boot or shoe sole so as to extend forwardly from the heel to beneath the ball of the foot, and a renewable pad applied to the underside of said stiffener element and forming a transverse rib thereon at such a position as to lie beneath the transverse arch of the foot when the support is in use.

2. A foot-arch support comprising a stiffener element adapted for attachment to the exterior of a boot or shoe sole so as to extend forwardly from the heel to beneath the ball of the foot, the underside of said stiffener element being formed with a relatively shallow transverse groove at such a position as to lie beneath the transverse arch of the foot when the support is in use, and a renewable pad secured in said groove, said pad having a rounded exterior surface which forms a rib across said stiffener element.

3. A boot or shoe incorporating a foot-arch support which comprises a stiffener element built into the thickness of the sole so as to extend forwardly from the heel to beneath the ball of the foot, a transverse rib on the underside of said stiffener element at such a position as to lie beneath the transverse arch of the foot when the support is in use, the outer layer of said sole covering both said transverse rib and the part of said stiffener element extending forwardly of the latter, and an upwardly directed lateral extension of said stiffener element engaging the exterior of the boot or shoe upper so as to cooperate therewith in supporting the longitudinal arch of the foot.

4. An appliance adapted for application to a boot or shoe sole, including a unitary external foot-arch support, comprising a stiffener element normally extending forwardly in rigid manner from the heel to beneath the ball of the foot, and said stiffener element having a downwardly projecting exterior rib forming a fulcrum extending across the underside of said stiffener element at such a position as to lie beneath the transverse arch of the foot and allow rocking of the boot or shoe involved on said rib when the support is in use.

5. A boot or shoe incorporating a unitary foot-arch support including a stiffener element built into the thickness of the sole so as to extend forwardly in rigid manner from the heel to beneath the ball of the foot, said stiffener element having a downwardly projecting rib forming a fulcrum extending across the underside of said stiffener element at such a position as to lie beneath the transverse arch of the foot and allow rocking of the boot or shoe upon said rib when the support is in use, and the outer layer of said sole covering both said transverse rib and the part of said stiffener element extending forwardly of the latter.

6. An appliance adapted for application to a boot or shoe sole comprising a stiffener element of sufficient length to extend forwardly in rigid manner from the heel to beneath the ball of the foot, a downwardly projecting transverse rib forming a fulcrum on the underside of said stiffener element at such a position as to lie beneath the transverse arch of the foot and allow rocking of the boot or shoe upon said transverse rib when the support is in use, and an upwardly directed rigid lateral extension upon said stiffener element adapted to cooperate with the side of the boot or shoe involved for supporting the longitudinal arch of the foot.

7. An appliance adapted for application to a boot or shoe sole comprising a stiffener element of sufficient length to extend forwardly in rigid manner from the heel to beneath the ball of the foot, a continuous downwardly projecting transverse rib forming a fulcrum fixed integrally on the underside of said stiffener element intermediate the ends thereof at such a position as to lie beneath the transverse arch of the foot and allow rocking of the boot or shoe upon said transverse rib when the support is in use, and an integral upwardly directed rigid lateral extension upon said stiffener element adapted to cooperate with the side of the boot or shoe involved for supporting the longitudinal arch of the foot.

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