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F. A. THOMAS

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ARCH SUPPORTER

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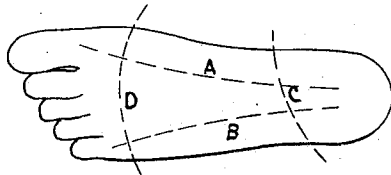
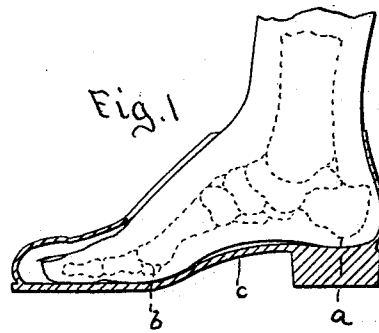
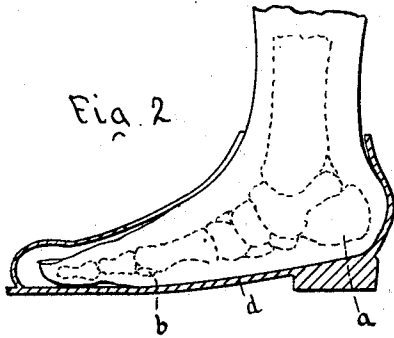


Fig. 3

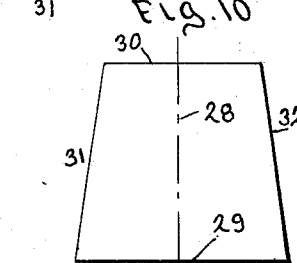
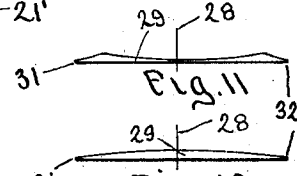
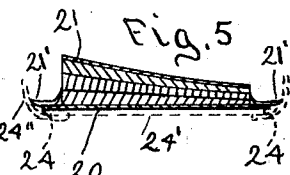
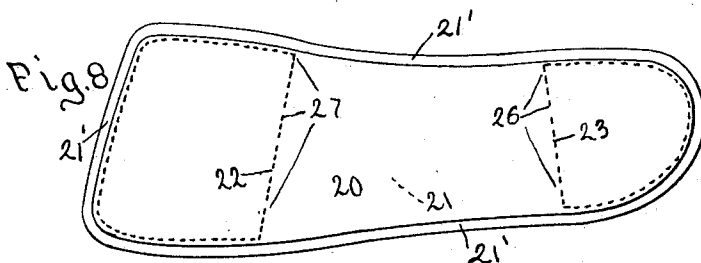
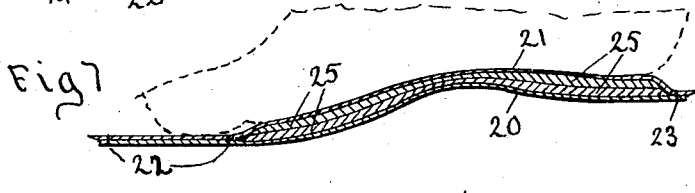
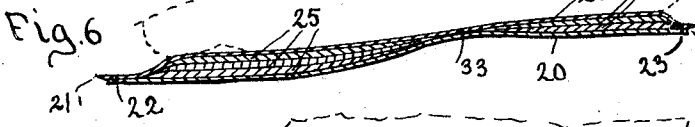
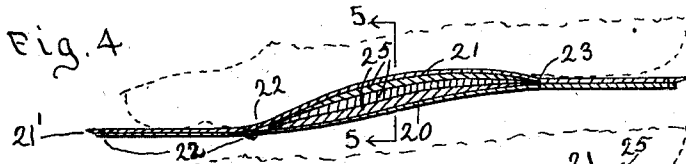


Fig. 9

INVENTOR  
FRANKLIN A THOMAS

by *Fred W. Andle*  
att'y

## UNITED STATES PATENT OFFICE

FRANKLIN A. THOMAS, OF MALDEN, MASSACHUSETTS

## ARCH SUPPORTER

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My invention relates to supports for the human foot, of the kind inserted and worn with shoes and commonly known as arch supporters.

5 My invention differs from the usual form of arch supporters as will be hereinafter explained.

The object of my invention is to provide a device by means of which corrective means  
10 may be applied to the foot and weak or strained muscles and similar abnormalities treated, for the purpose of restoring the bones and muscles to a normal condition; or for relieving conditions when permanent, as in the  
15 case of flat foot.

A second object is to provide a device which may be applied to a shoe, by means of which the normal arch of a foot may be fitted to a particular shoe having an arch which would  
20 not otherwise be suitable to that foot. By means of my device, a shoe with high arch may thus be worn with a foot having a normally low arch, or vice versa.

In the specifications herewith the condition  
25 of flat foot is differentiated from that of fallen arches as will be explained.

The structure of the human foot comprises twenty six bones which with connective muscles, form a compound arch, subdivided  
30 into four recognized component arches known respectively as the inner longitudinal and outer longitudinal arches, extending respectively from the heel bone or os calcis to the sesamoids of the first and fifth metatarsals; the transverse arch and the anterior meta-  
35 tarsal arch extending laterally.

These arches merge and form the compound arch of the foot, which is adapted to yield as the lines of force due to the weight of the  
40 body, vary in relation to the several component arches.

These arches thus operate to cushion the jar due to walking and the foot muscles are exercised to maintain their normal action and  
45 to insure their functioning.

With fallen arches and particularly in cases of flat foot, the foot muscles lack a part or all of the exercise required for their healthy activity, and a condition is soon established  
50 where little if any activity of the muscles is

possible, other than in those of the great toe. In the usual form of arch supporter, particular attention is given to the support of the inner longitudinal arch, little or no attention  
55 being paid to the other arches on the theory that if this arch is supported, the correction will be sufficient to take care of the other arches. On this basis arch supporters have been used which have pockets formed there-  
60 in, in which filling material or separate lifts of sole leather may be inserted. These, while supporting the inner longitudinal arch, do not extend laterally to support the outer longitudinal arch, and provide only a partial support to the transverse arches.  
65

The need for the proper support of the outer longitudinal and the transverse arches as well as the inner longitudinal arch will be evident if it is considered that in walking, the weight of the body is supported progres-  
70 sively, first by the heel, then by the outer longitudinal arch; thence transferring through the medium of the transverse arches to the inner longitudinal arch, and finally to the great toe as the stride is completed, and the same  
75 action is transferred to the other foot.

With the usual type of arch supporter, as the support is mainly applied to the inner longitudinal arch, the foot is thrown off balance, the circulation is retarded, and part of the  
80 muscles subjected to undue strain while others are insufficiently exercised. My arch being adapted to be adjusted to support all the arches, assists in retaining the balance of the foot, and relieves undue strain on any particular set of foot muscles. When the muscular  
85 connections to the bones of the foot are in normal condition and subject to normal freedom of action to enable them to exercise and function, the arches retain their form and resili-  
90 ence, but if for any reason the muscles cannot properly support the weight of the body on account of overweight, ill-fitting shoes or other well known causes, there is a displacement of the bones of the foot which causes a  
95 lengthening of the foot and a falling of the arch. This condition is subject to corrective treatment which may restore the tone of the muscles and the normal condition of the arch. One of the main uses of the arch supporter is  
100

to bring about through corrective means, the restoration of the foot to normal, and when so restored and a suitable shoe worn, the arch supporter may be dispensed with.

If however conditions persist a sufficient length of time without corrective treatment, or because the muscles are of insufficient strength to support the weight of the body, the bones of the foot assume a permanent relocation and a condition known as "flat foot" results. In the usual model of shoe, there is provided a built in arch varying in form and height with the particular model, which while partially supporting the arches, still permits free exercise of the foot muscles.

When the condition of "flat foot" exists, this type of shoe cannot be worn with comfort, and special foot wear is necessary for the particular case, or in lieu, a shoe with flexible arch, or one without arch is necessary. My arch supporter is adapted to function with both fallen arches and permanent flat foot conditions, in the one case operating as a corrective means for restoration of the arch to normal, and in the other serving to give sufficient support to the foot to enable one to wear a shoe with the usual form of arch without bringing undue pressure to bear at any point and with minimum restriction of the circulation. As the height of the normal arch of the foot differs according to the individual, my invention may be used with a shoe having an ordinary height of arch, to enable one with a normally low arch foot, to wear such a shoe with comfort.

My invention comprises a flexible base extending longitudinally when in position in the shoe. In this is formed one or more transverse passages in which may be inserted adjustment lifts, adapted to extend there-through and varying in thickness at different cross sections, to coact with the flexible base to build up the arch supporter to function within the scope of the foregoing cases.

In the accompanying specifications and claim, and the drawings forming a part thereof, I have described and illustrated my invention.

In the drawings,

Fig. 1 represents a human foot with a normal arch.

Fig. 2 is a similar view in which a fallen arch or permanent flat foot condition is shown.

Fig. 3 is a diagram of the foot in which the several arches are indicated.

Fig. 4 is a sectional elevation of my arch supporter as used for fallen arches.

Fig. 5 is a section on line 5—5, Fig. 4.

Fig. 6 is a sectional elevation in which my arch supporter is shown as applicable to the condition of "flat foot".

Fig. 7 is a similar view showing the arch supporter as used with a low arch foot to compensate when wearing a high arch shoe.

Fig. 8 is an inverted plan view of my arch supporter.

Fig. 9 is a plan view of a filling lift.

Fig. 10 is an end elevation of a lift such as would be used with fallen arches or "flat foot".

Fig. 11 is a similar view of a lift such as would be used for compensating purposes.

In the drawings I have shown a preferred form of my invention in which I use a pair of flexible base elements, 20—21 stitched at 22—23 to form a lateral passage therebetween, open at both ends, and converging toward the side corresponding with the outer longitudinal arch of the foot.

The stitching is continued around the heel and toe portions of the base, and the upper element 21 of the base is formed to overlap the lower element 20. In a shoe as usually constructed, the junction of the upper with the inner sole forms a seam as at 24, Fig. 5, resulting often in the formation of callouses on the sole of the foot where it overlaps the inner sole. The additional thickness of the arch supporter base as it is usually made, aggravates this tendency, but in my invention the overlapping upper element overlaps and bridges this seam and cushions the sole of the foot where it would otherwise mould along the seam and from the callous.

While I prefer the form of base formed from two elements, it may also be formed of a single element to include the passage described. In either case the overlapping portion 21' is embodied, and may be skived to approximately an edge where it engages the upper of the shoe. In Fig. 5 I have indicated this condition, 24' representing the inner sole and 24'' the contiguous portion of the upper. The passage described is adapted to receive lifts 25 of the required form and in sufficient number for the purpose for which the arch supporter is to be used. The longitudinal limits of the passage approximate the lines of the transverse and anterior metatarsal arches respectively as at 26—27, and in the wedge shaped passage thus formed, the insertable lifts 25, of corresponding outline, may be introduced. These lifts vary in thickness, diminishing on the median line 28 from the widest part 29 of the wedge toward the narrowest, 30. Transversely the lifts are varied in thickness according as they are to be used as a corrective means for fallen arches, or to form a compensating means when a high arch shoe is worn with a normally low arched foot. In addition, the thickness of the lifts may be varied for the purpose of furnishing support for weak ankle muscles and thus prevent unequal wear on the sides of the heel.

In the first case, the lift is formed in section as in Fig. 10, with a lateral section tapering in thickness toward the edges 31—32. In the second case the lift is beveled from a

relatively thick section near the lateral limits to a thin section at the median line. For the support of weak ankle muscles, the longitudinal and the lateral thickness of the lifts would necessarily depend on the degree of correction required. For cases of "flat foot", I prefer to use a modification of my arch supporter, in which I form two passages by means of an extra line of stitching, 33, on or near the lateral median line of the base.

In this form I enlarge the extreme longitudinal limits of the passages to provide space to insert lifts in each passage to secure the results shown in Fig. 6. The form of lift shown in Fig. 11 may however be used in connection with an arch supporter having a single passage for use with a medium arched shoe and an ordinary case of "flat foot". In each case the lifts extend laterally of the base and support both longitudinal arches, as well as the transverse and interior metatarsal arches, the beveled sections of the lifts contacting with the walls of the passage to conform both with the sole of the foot and with the arch of the shoe worn. While the size and form of the arch supporter base and the corresponding lifts may be varied according to the particular foot and shoe, my invention is susceptible of standardization for use with different models and sizes of shoe and for different conditions of the foot within the scope of this specification.

In Figs. 1 and 2 the os calcis is indicated at *a* and the sesamoid at *b* showing the limits of the inner longitudinal arch; the arch of the average shoe is indicated at *c* Fig. 1 and the corresponding portion as applicable to a flat foot is indicated at *d* Fig. 2. In Fig. 3 the relative positions of the four component arches are indicated, A showing diagrammatically the inner longitudinal and B the outer longitudinal arches, C showing the transverse arch and D the anterior metatarsal arches, all merging as explained to form the compound arch of the foot.

Having thus described my invention I claim:

In an arch supporter of the character described, in combination with a flexible member having a lateral passage extending there-through, filling lifts tapered in their length, each having a truncated wedge section on its median line and laterally tapered therefrom, and adaptable to be inserted in and through the passage formed in the flexible member and adjustable to support both longitudinal arches, and to coact with the walls of the passage in the flexible member, to conform with, and to support both the transverse and the anterior metatarsal arches.

FRANKLIN A. THOMAS.