

[72] Inventor Carl Waddington Coplans
Capetown, South Africa
[21] Appl. No. 768,823
[22] Filed Oct. 18, 1968
[45] Patented Dec. 29, 1970
[73] Assignee Spring-Tred, Inc.,
New York, N.Y.
a corporation of New York, by mesne
assignment

FOREIGN PATENTS

836.413 6/1960 Great Britain.

Primary Examiner—Richard A. Gaudet

Assistant Examiner—J. Yasko

Attorney—Emanuel R. Posnack

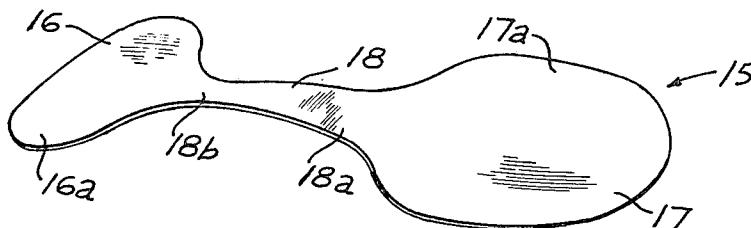
[54] FOOT SUPPORTING AND CORRECTIVE DEVICE 12 Claims, 15 Drawing Figs.

[52] U.S. Cl. 128/585,
128/608
[51] Int. Cl. A61f 5/14
[50] Field of Search 128/585,
584, 586, 589, 590—593, 596, 597, 598, 599, 600,
619, 607, 608, 609, 610—623

[56] References Cited UNITED STATES PATENTS

2,849,808 9/1958 Coplans..... 128/599

ABSTRACT: A foot supporting and corrective device for augmenting the natural torsionlike action of the foot in walking, or providing such action where it is entirely missing. The device, either as an integral part of a shoe or as a shoe accessory, is of relatively flat construction with front and rear main lifting sections rigidly connected to a resilient intermediate section twisted into the form of flat torsion spring which yieldably maintains said lifting sections in mutually inclined relation, at predetermined angles, in opposite directions about the longitudinal axis of the foot, the arrangement being such that said main lifting sections underlie the respective posterior and anterior portions of the foot. During walking, a yieldably torsional action is applied to the foot by said lifting sections, whereby the heel of the foot is urged upwardly at the inner side thereof, and the forefoot is raised upwardly at the outer side thereof, thereby producing a torsional action similar to the natural torsionlike action of the foot itself, as well as a comfortably cushioned tread.



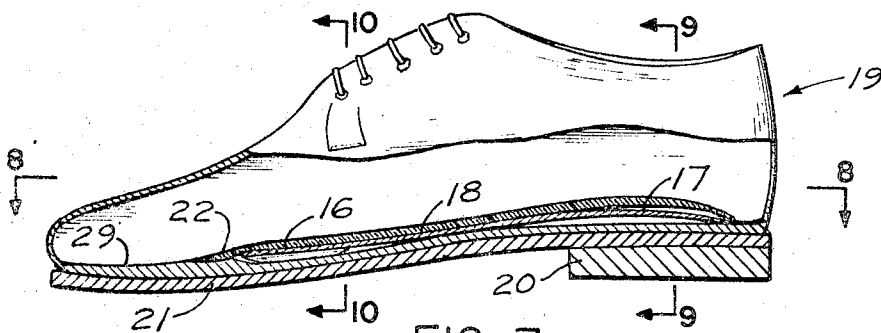
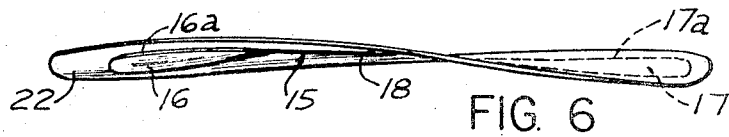
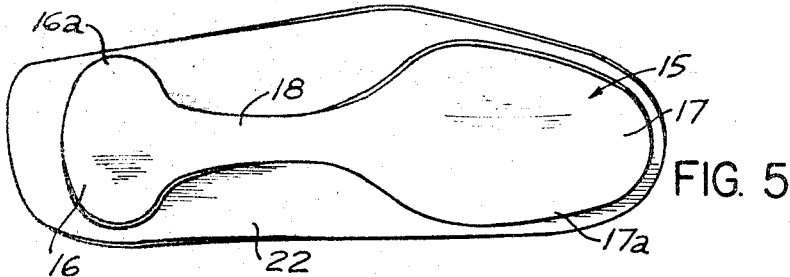
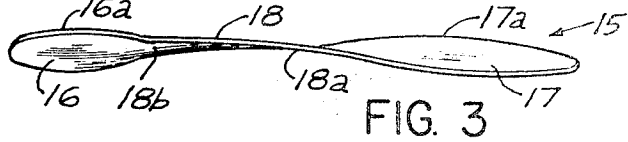
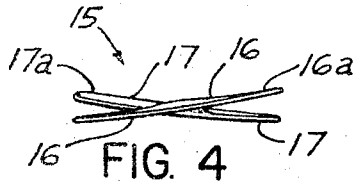
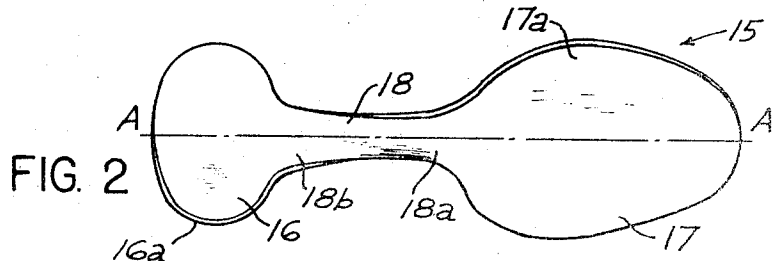
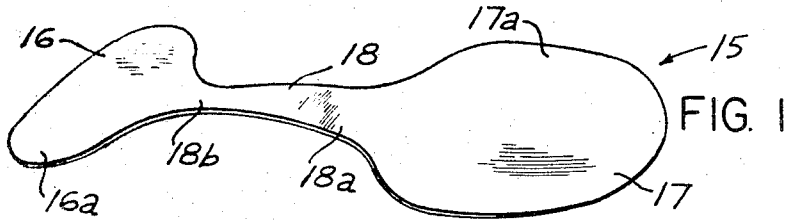


FIG. 7

INVENTOR.
CARL WADDINGTON COPLANS
BY

E. Brown

ATTORNEY

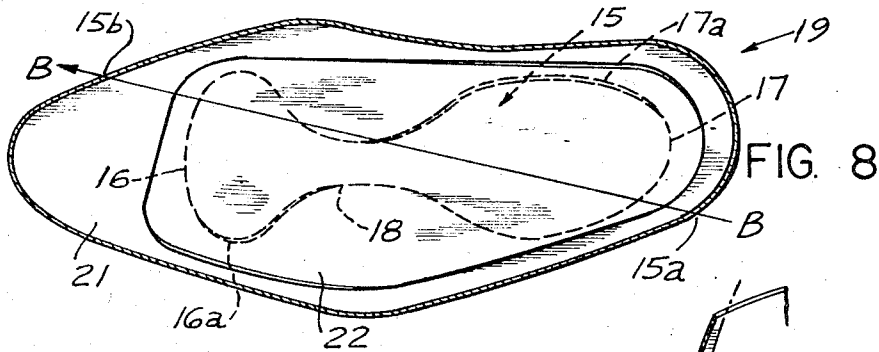


FIG. 8

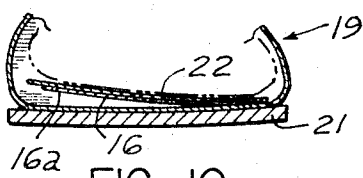


FIG. 10

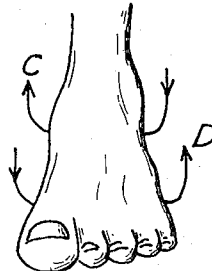


FIG. 11

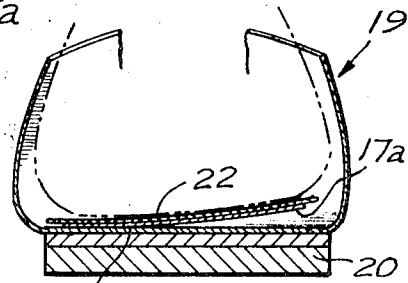


FIG. 9

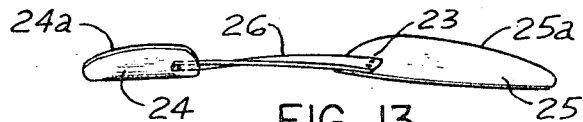


FIG. 13

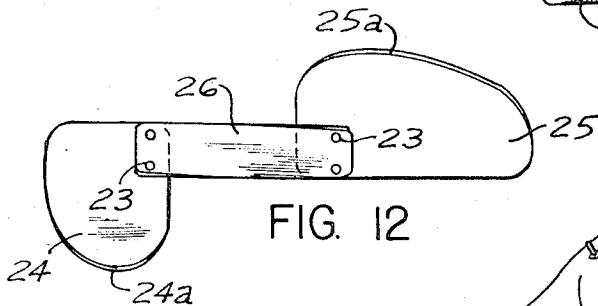


FIG. 12

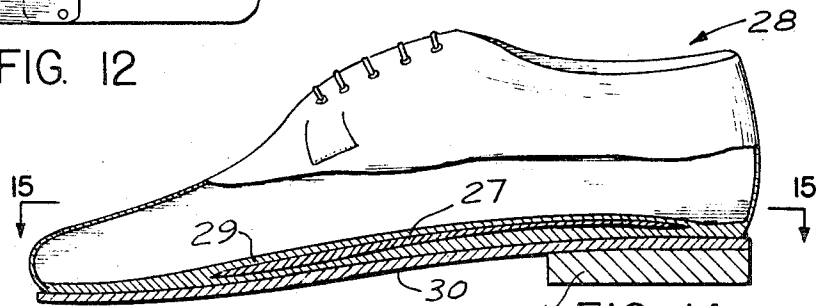


FIG. 14

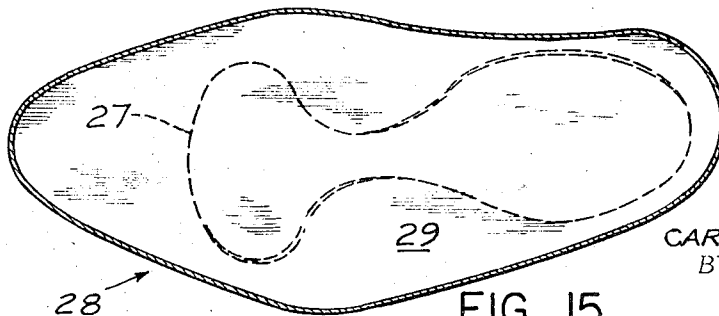


FIG. 15

INVENTOR.

CARL WADDINGTON COPLANS
BY

E. Rossmark

ATTORNEY

FOOT SUPPORTING AND CORRECTIVE DEVICE

BACKGROUND OF THE INVENTION

The Field of the Invention

This invention relates to foot supporting and corrective devices, and is particularly directed to the provision of torsional and corrective supporting actions to the walking step of the wearer.

In normal walking action there is a progressive pressure applied by the foot forwardly in a longitudinal direction, generally from the outer posterior portion of the foot along a longitudinal oblique axis extending forwardly and inwardly to the inner anterior portion. For example, the initial contact of the left shoe with the ground is generally at the rear left or outer side of the heel, with the final contact at the front right or inner side of the sole. During such walking action there is thus comparatively little pressure at the rear right or inner side of the heel at initial contact, and comparatively little pressure at the front left or outer side of the forefoot at final contact. This natural walking action thus produces a slight twist of the foot along the said oblique axis, the heel (of the left foot) turning slightly upwardly at the right or inner side of the foot upon initial contact, and the forefoot turning slightly upwardly at the left or outer side of the foot at final contact.

It is this normal type of walking action with which the present invention is concerned, both in imparting such torsional action where the foot is deficient therein, and in augmenting the action in a normal foot for greater comfort in walking.

The Known Art

To provide a resilient shoe component, either integral or separate, for aiding this normal twisting action of the foot, or providing it where it is missing, the applicant had invented a device disclosed in U.S. Pat. No. 2,849,808, granted Sept. 2, 1958, comprising front and rear plate members proportioned and positioned for underlying engagement with the respective anterior and posterior portions of the foot, the plates being connected by a spring. This spring, illustrated in said patent as of helical construction, serves to exert a torsional force on the foot, turning the posterior portion of the foot upwardly at the inner side thereof, and turning the anterior portion of the foot upwardly at the outer side thereof.

While applicant's prior device effectively serves its intended purpose, it has certain shortcomings which it is the objective of the present invention to overcome. Because the two plates of said prior patented device are attached to the adjacent thin terminals of the helical spring, they are readily subject to relative displacement. Their proper relative positions thus are mainly dependent upon a preshaped supporting sheet to which they are attached; and since the said sheet is preferably made of somewhat flexible material, like leather, there can be no assurance that there will be the optimum positional relationship between said plates. Moreover, the separate and spaced positioning of said two plates prevents the imparting of the desirable continuous twisting action to the foot, the intervening spring interrupting such action. Another disadvantage of applicant's said prior construction is the need for a sufficiently strong and heavy spring to effect the required torsional lifting action against the weight of the wearer, such a spring being space-consuming and thus requiring a corresponding increase in the bulk of the shoe, and also being relatively difficult to adapt to the orthopedically optimum curvature between the sole and the heel. In addition, such a spring is relatively expensive and requires an assembling operation which adds to the cost. And still another shortcoming of the use of said separate torsion spring is that it serves no arch supporting function since its use necessarily results in a gap between the two supporting pressure-applying front and rear plates.

OBJECTIVES OF THE INVENTION

It is an objective of the present invention to provide a device having all the advantages of said previously patented device but having none of the aforesaid shortcomings. Specifically, among the objects of this invention are the following: the provision of a device of this category that is of relatively flat construction whereby it may be readily and conveniently accommodated in a shoe without increasing the bulk thereof or deforming its shape; that is of substantially continuous construction without any gap between the anterior and posterior operative portions thereof and yet having a torsional spring action, whereby the desired lifting and twisting action is effected in a continuous direction from the rear to the front of the foot to produce an uninterrupted operative pressure along the longitudinal extent of the foot; that is adapted to provide an arch-supporting action; that can be fabricated at relatively low cost, either in a one piece construction or in an easily assembled combination of rigidly connected components; that is adapted for shaping during production for correct conformity to the curvature between the sole and heel, for the proper relative positioning between the front and rear torsional lifting portions, and for the setting of the intermediate portion to obtain a predetermined spring torsion effect; and that can be readily applied and assembled within a shoe either as an integral portion thereof or as an independently insertable shoe accessory.

Other objects, features and advantages will appear from the drawings and the description hereinafter given.

SUMMARY OF THE INVENTION

This invention in essence comprises a relatively flat device with front and rear main torsional lifting sections inclined with respect to each other at predetermined angles about the longitudinal axis of the foot to which the device is applied, said main lifting sections being connected by an intermediate longitudinal extending section of relatively stiff spring properties and twisted around the longitudinal axis for yieldably maintaining said lifting sections in their said angular positions. In the preferred embodiment, the said intermediate member is flat and narrower than said main lifting sections, is shaped to the contour of the underlying portion of the shoe, and is rigidly connected to said front and rear lifting sections, said latter sections being proportioned and positioned for underlying relation with the respective anterior and posterior portions of the foot.

The arrangement is such that upon the heel's operative contact with the ground during normal walking action, the rear of the heel making initial ground contact at a point adjacent the outer side of the shoe, the yieldably supported rear lifting section of the device is free to urge the overlying portion of the heel at the inner side of the shoe upwardly. As the walking movement progressively proceeds forwardly the foot is continuously being yieldably supported until the anterior sole portion makes final contact at the front inner side of the shoe, with greater pressure on said inner side than at the opposite outer side. The yieldably supported front lifting section at the anterior outer side of the shoe, being under less foot pressure than is applied at the inner side, is free to urge the overlying outer side of the forefoot upwardly.

This yieldable upward action of the device applied to the inner heel and outer sole portions of the foot on opposite sides of its longitudinal axis thus provides yieldable assistance to the foot in its natural progressive torsionlike walking action. Moreover, during each forward step of the foot the progressive forwardly moving pressure along the longitudinal pressure axis is yieldably resisted successively by the rear, intermediate and front sections of the device. The combined twisting and lifting action thus provides considerable walking comfort, with a reduction of the strain that generally produces tired and aching feet. The device also produces the natural torsionlike movement in flat feet which lack the natural physical structure for such torsional action.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of an embodiment of the foot supporting and correcting torsion member according to this invention.

FIG. 2 is a top plan view thereof.

FIG. 3 is a side view thereof.

FIG. 4 is a front end view thereof.

FIG. 5 is a bottom view of a shoe accessory comprising the device of the previous FIGS. attached to an overlying sheet member, the combination constituting a unitary member adapted for placement within a shoe.

FIG. 6 is a side view of FIG. 5.

FIG. 7 is a longitudinal sectional elevation of a shoe for a left foot having therein the device of FIGS. 5 and 6.

FIG. 8 is a sectional plan of FIG. 7 taken along line 8-8 and indicating by the direction of the arrow the oblique axis of walking pressure.

FIG. 9 is a section of FIG. 7 taken along line 9-9.

FIG. 10 is a section of FIG. 7 taken along line 10-10.

FIG. 11 is a front perspective view of a left foot showing by arrows the direction of the torsional forces exerted on the foot under the operative action of the device of this invention.

FIG. 12 is a top plan view of a modified form of the torsion member of this invention.

FIG. 13 is a side view thereof.

FIG. 14 is a longitudinal cross section of a shoe with the torsion device of this invention forming an integral portion thereof.

FIG. 15 is a sectional plan of FIG. 14 taken along line 15-15 thereof.

DESCRIPTION OF PREFERRED EMBODIMENTS

In the particular form of this invention illustrated in FIGS. 1-10, the torsion element is a unitary member 15 made of suitable flat material, which may for example be metal or plastic, and comprises three sections, a front lifting section 16, a rear lifting section 17 and an intermediate twisted section 18 forming a continuous connection between said front and rear sections. Said intermediate section 18 is of resilient properties and is preferably relatively stiff structurally. It is twisted about the longitudinal axis A-A (FIG. 2) so that the said main lifting sections 16 and 17 are disposed in mutually inclined relation. In other words, said twisted intermediate section 18 serves as a flat torsion spring yieldably maintaining said front and rear sections 16 and 17 at opposite inclinations with respect to said longitudinal axis A-A. Specifically, said lifting sections lie in respective inclined planes so oriented with respect to the foot that the front section 16 is raised at the outside portion 16a thereof, in the outside region of the sole portion 21 of the shoe 19, and the rear section 17 is raised at the inside portion 17a thereof, in the inside region of the heel portion 20 of the shoe. This construction provides a torsional lifting action which supplements the natural torsionlike action of the foot, as will more clearly appear from the description hereinbelow given.

In the embodiment illustrated in FIGS. 5 to 8, the torsion member 15 is suitably mounted on the flexible sheet 22 which is adapted for insertion in a shoe, as an accessory thereof, as illustrated in FIG. 7. It is also preferred that the said intermediate relatively stiff torsion-spring portion 18 be arched upwardly, whereby it serves as an arch support as well as the above-described connection between the front and rear lifting sections 16 and 17 for yieldably maintaining them in their predetermined operatively inclined positions.

By referring to FIG. 8, which is a top sectional plan of a left foot shoe containing the torsion member 15 of this invention, it will be noted that there is a representation of an arrow B-B inclined with respect to the longitudinal axis of the shoe. Said arrow represents the progressive line of pressure applied by the foot in normal walking action. As hereinabove explained, said line constitutes a longitudinally oblique pressure axis extending from the outer posterior portion 15a of the shoe to the inner anterior portion 15b thereof. For the left shoe illustrated, the initial ground contact of the shoe is at the region of

said portion 15a, the walking step pressure proceeding progressively forwardly and inwardly to the shoe's final contact at the region of said portion 15b. The maximum applied pressures on the posterior and anterior portions of the foot during walking action are accordingly, respectively, at the rear outer heel portion and the front inner portion of the sole; consequently there is relatively little pressure at the rear inner heel portion and the front outer sole portion. This natural walking action is thus torsionlike in effect, there being produced a twist of the foot in opposite directions with respect to its longitudinal axis.

The operative action of the torsion member 15 is to supportably conform to this natural twisting action by yieldably lifting the inner posterior portion of the foot when there is relatively little pressure at that region, as shown in FIG. 9, and by yieldably lifting the outer anterior portion of the foot when there is relatively little pressure at that point. The result is a yieldable torsional action on the foot as illustrated in FIG. 11, the inner posterior or heel portion of the foot being yieldably urged upwardly in the direction of arrow C, and the outer anterior or sole portion being yieldably urged upwardly in the direction of arrow D. Since, in the preferred form of this invention, the said intermediate section 18 is also in underlying engagement with the arch portion of the foot intermediate the anterior and posterior portions thereof, it also effects a yieldable torsional lifting effort on the overlying portion of the foot, the portion 18a thereof adjacent section 17 exerting a lifting effort on the inner heel portion and the portion 18b thereof adjacent section 16 exerting a lifting effort on the outer front sole portion thereof. Since the maximum torsional lifting movements must necessarily occur at the anterior and posterior portions of the foot, the intermediate section 18 is made narrower than said sections 16 and 17. The arrangement is such as to cause a noninterrupted torsional and lifting action from the rear to the front of the foot, all three sections 16, 17 and 18 participating in a continuous torsional lifting effort. Moreover, as aforesaid, the upward arched configuration of the intermediate section 18 serves also an arch-supporting function.

The torsional lifting action of this device thus enhances the natural torsionlike movement of the foot, providing with each step a comfortable lifting effort in orthopedically correct manner, as well as a comfortably cushioned tread of particular value to those prone to develop tired feet. And where, as in flat feet, there is insufficient or a total absence of natural torsionlike movement, this device will supply such orthopedically desirable action.

The present invention thus accomplishes its aforesaid objectives of providing or enhancing the above-described torsional foot action without the disadvantages of the said patented device hereinabove mentioned, the present device being superior in action, easier and less costly to fabricate and install, and resulting in a neater and less bulky shoe construction.

The embodiment of this invention shown in FIGS. 12 and 13 comprises three separate sections secured together by fasteners 23, the anterior lifting section 24 being offset in the direction of the outer side of the foot to provide an edge 24a at the region of maximum lift, and the posterior lifting section 25 being offset in the direction of the inner side of the foot to provide an edge 25a at the region of maximum lift. This form of my invention is analogous in functioning to that of FIGS. 1 to 3, differing mainly in that the lifting sections 24 and 25 are separate members attached to the intermediate section 26 by rivets or the like, and are of smaller proportions than the corresponding sections 16 and 17 and are adapted to underlie only those anterior and posterior portions that are to be lifted.

In the form of my invention illustrated in FIGS. 14 and 15 the torsion member 27 is an integral part of the shoe 28, being disposed between the inner sole 29 and the outer sole 30 and heel 31. Its functioning is the same as the other forms above described.

In the above description, the invention has been disclosed merely by way of example and in preferred manner; but obvi-

ously many variations and modifications may be made therein. It is to be understood, therefore, that the invention is not limited to any form or manner of practicing same, except insofar as such limitations are specified in the appended claims.

I claim:

1. In a foot supporting and correcting device, a torsional lifting member comprising front, intermediate and rear sections, said front and rear sections being proportioned and positioned for underlying relation to the respective anterior and posterior portions of a foot to which said device is applied, said front and rear sections being in laterally opposite inclined relation with respect to a longitudinal axis corresponding generally to the longitudinal extent of the foot, said intermediate section being substantially flat and comprising a longitudinally extending length of substantially stiff resilient material rigidly joined to said front and rear sections and being twisted along its longitudinal extent for yieldably supporting said front and rear sections in their said inclined positions, whereby said front and rear sections will yieldably urge laterally opposite sides of the respective anterior and posterior portions of the foot upwardly, thereby producing a yieldable torsional force on the foot during a walking step.

2. In a foot supporting and correcting device, the combination according to claim 1, wherein said intermediate section extends along and is twisted about said longitudinal axis to a degree for operatively supporting said front and rear sections in their said respective inclined positions.

3. In a foot supporting and correcting device, the combination according to claim 2, said front and rear sections being made of substantially flat material and joined to the respective adjacent flat portions of said intermediate section, whereby the configuration of said torsional lifting member is that of a generally flat longitudinally twisted sheet.

4. In a foot supporting and correcting device, the combination according to claim 3, said torsional lifting member being formed from a single sheet of material, said front, intermediate and rear sections being integral portions thereof.

5. In a foot supporting and correcting device, the combination according to claim 3, said front, intermediate and rear sections being separate pieces secured together by fastening means.

6. In a foot supporting and correcting device, the combination according to claim 3, said intermediate section being of less transverse width than that of said front and rear sections.

7. In a foot supporting and correcting device, the combination according to claim 1, said intermediate section being upwardly arched, whereby it additionally serves as a support for

the portion of the foot intermediate its said anterior and posterior portions.

8. In a foot supporting and correcting device, the combination according to claim 1, the said inclined position of the front section being such that its lateral outer portion is at a higher elevation than its lateral inner portion, the said inclined position of said rear section being such that its lateral inner portion is at a higher elevation than its lateral outer portion.

9. In a foot supporting and correcting device, the combination according to claim 2, the said inclined position of the front section being such that its lateral outer portion is at a higher elevation than its lateral inner portion, the said inclined position of said rear section being such that its lateral inner portion is at a higher elevation than its lateral outer portion, the front portion of said intermediate section being twisted into an inclination corresponding generally to that of said front section, and the rear portion of said intermediate section being twisted into an inclination corresponding generally to that of said rear section.

10. In a foot supporting and correcting device, the combination according to claim 2, said front section being offset laterally from said intermediate section toward the outer side of the foot, and said rear section being offset laterally from said intermediate section toward the inner side of the foot.

11. In a foot supporting and correcting device, the combination according to claim 3, including a flexible member of sheet material attached to said torsional lifting member, whereby said flexible member conforms generally to the twisted configuration of said front, intermediate and rear sections.

12. In a shoe, an inner sole, a bottom outer sole, and a torsional lifting member disposed between said inner and outer soles, said torsional lifting member comprising front, intermediate and rear sections made of substantially flat material, said front and rear sections being proportioned and positioned for underlying relation to the respective anterior and posterior portions of the shoe and being in laterally opposite inclined relation with respect to the longitudinal extent of the shoe, said intermediate section being of substantially stiff resilient material rigidly joined to said front and rear sections and being twisted along its longitudinal extent for yieldably supporting said front and rear sections in their said inclined positions, the said inclined position of the front section being such that its lateral outer portion is at a higher elevation than its lateral inner portion, the said inclined position of said rear section being such that its lateral inner portion is at a higher elevation than its lateral outer portion.

50

55

60

65

70

75