Aug. 26, 1969 J. P. GOODMAN 3,463,165

ORTHOPEDIC SHOE

Filed May 29, 1967 3 Sheets-Sheet 1

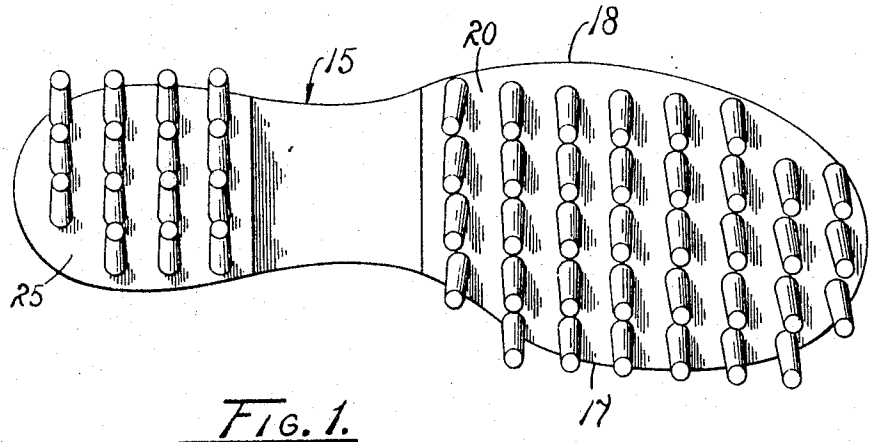


FIG. 1.

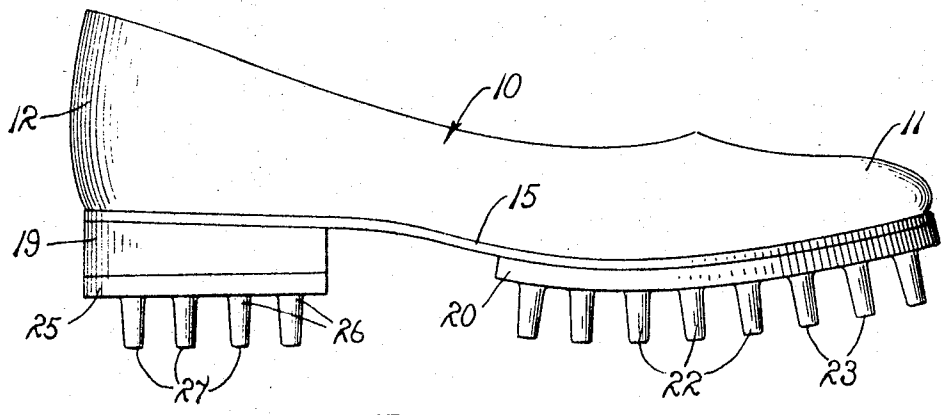


FIG. 2.

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Aug. 26, 1969 J. P. GOODMAN 3,463,165

ORTHOPEDIC SHOE

Filed May 29, 1967 3 Sheets-Sheet 2

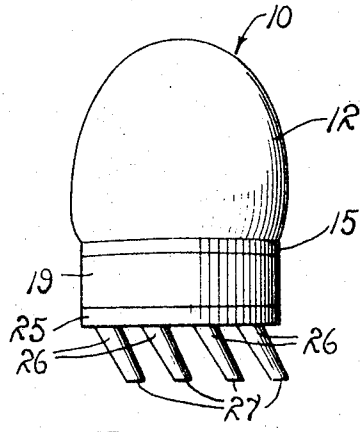


FIG. 3.

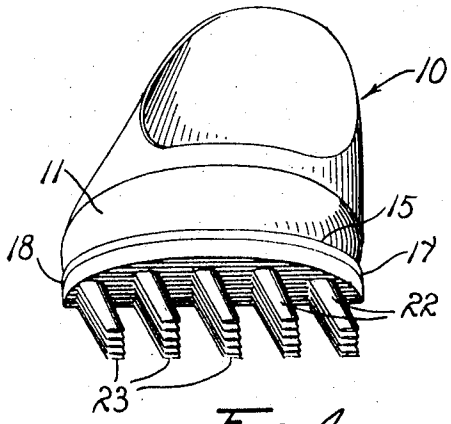


FIG. 4.

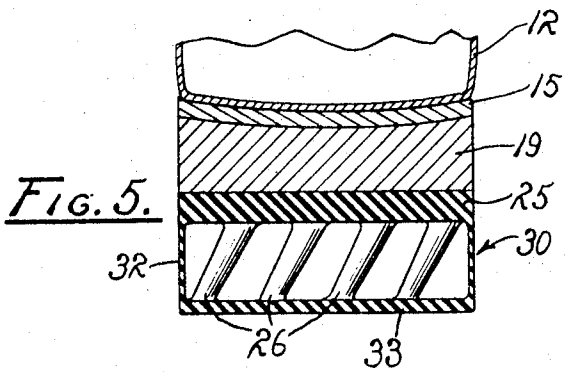


FIG. 5.

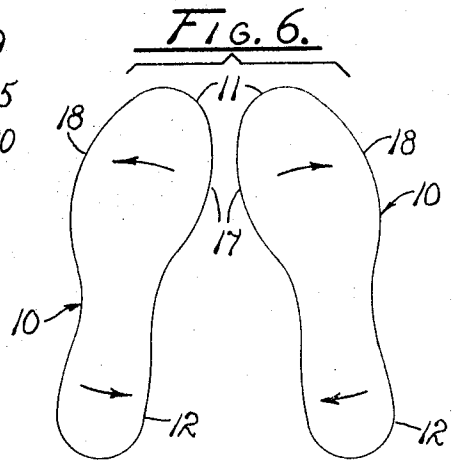


FIG. 6.

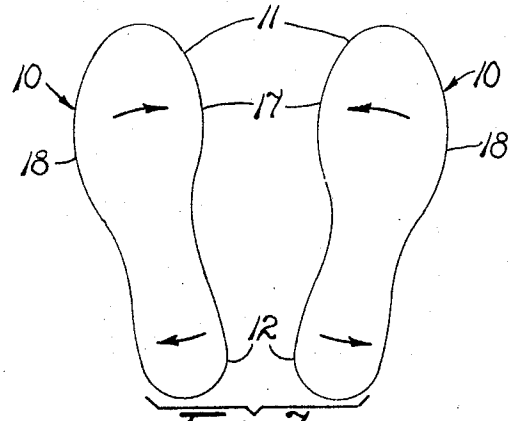


FIG. 7.

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Aug. 26, 1969 J. P. GOODMAN 3,463,165

ORTHOPEDIC SHOE

Filed May 29, 1967 3 Sheets-Sheet 3

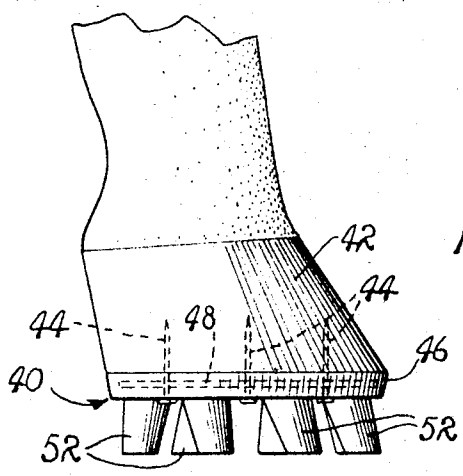


FIG. 8.

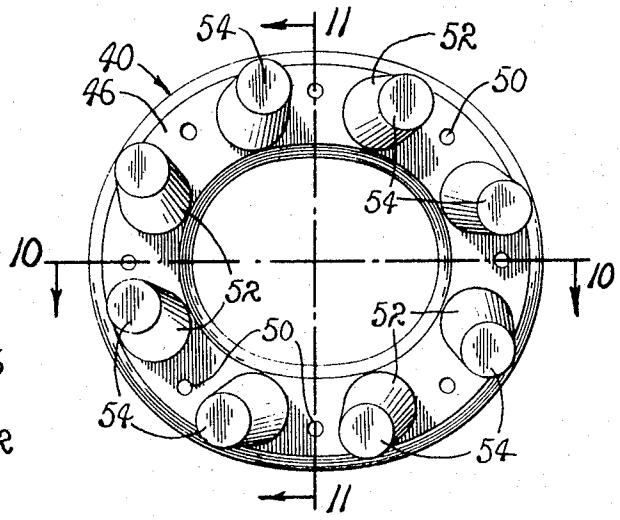


FIG. 9.

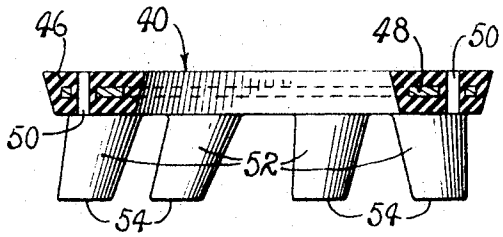


FIG. 10.

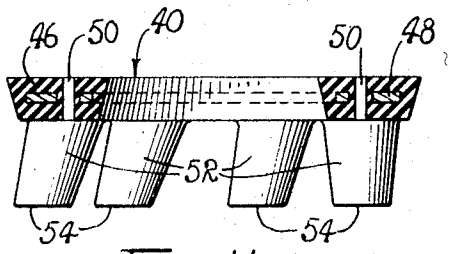


FIG. 11.

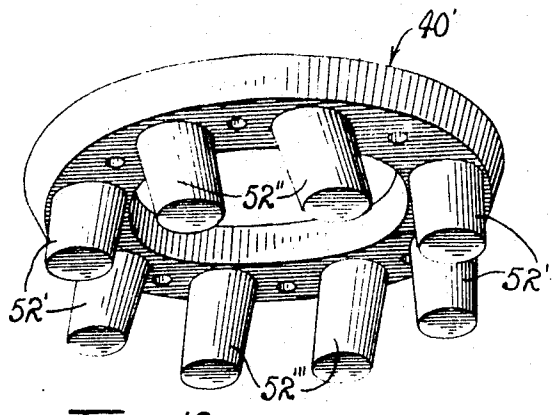


FIG. 13.

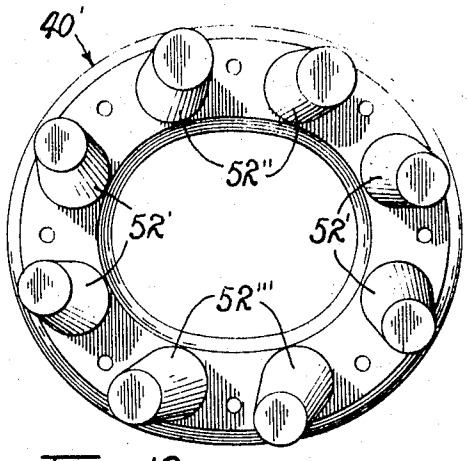


FIG. 12.

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3,463,165

ORTHOPEDIC SHOE

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Continuation-in-part of application Ser. No. 450,803, Apr. 26, 1965. This application May 29, 1967, Ser. No. 651,644

Int. Cl. A43b 7/24

U.S. Cl. 128—583

10 Claims

ABSTRACT OF THE DISCLOSURE

An orthopedic shoe having a sole-like member providing a plurality of deformable calks or studs outwardly obliquely extended therefrom for deformation upon the application of the weight of the wearer to impart a force to the member which is opposite to the direction of the oblique extension of the studs. The studs are varied in form to impart turning and/or tilting for correcting different types of defects.

Cross-reference to related applications

This is a continuation-in-part of my copending application Ser. No. 450,803, entitled "Orthopedic Shoe," filed Apr. 26, 1965, now abondoned.

Background of the invention

The present invention relates to an orthopedic shoe for correcting defects in the skeletal and muscular system of the feet and legs of a wearer and more particularly to such a shoe which produces a beneficial orthopedic effect while permitting full mobility of the wearer.

The correction of deformities in the skeletal and muscular systems of the legs and feet of humans, particularly small children, has long been a problem. Persons afflicted with these defects are commonly described as pigeon-toed, spray-toed, club-footed, and the like. In many instances, corrective surgery is required and prior to the present invention was resorted to perhaps more frequently than needed because of the lack of suitable alternatives for even simple afflictions. Such surgery has been expensive and in some instances hazardous. It has required complete immobilization of the patient and extended convalescent periods.

Braces have also been utilized quite extensively and, in many instances, to good advantage. However, such braces impair mobility, do not permit the wearer sufficient freedom of movement easily to accomplish other physical functions of the body and are cumbersome and difficult for the wearer to assemble and remove without assistance. During use, the braces are unsightly, require frequent adjustment, are uncomfortable, and are generally unsatisfactory. Furthermore, braces restrict the wearer's activity, frequently impose undue strain on adjacent healthy portions of the body and reduce the amount of exercise which the patient is able to perform during the period of correction. The present invention recognizes that such corrective procedures can be greatly improved and accelerated by providing an orthopedic device which can be utilized in a manner which does not interfere with the normal activity of the wearer. Many of the foregoing remarks apply as well to the skeletal and muscular system of the feet and legs of animals, particularly horses.

Therefore, it is an object of the present invention to provide an improved orthopedic shoe for the correction of deformities in the skeleton or muscular systems of the wearer.

Another object is to provide such an orthopedic shoe which is readily embodied in forms individually directed to the correction of specific deformities of a wide variety.

Another object is to provide an orthopedic shoe which may be used by wearers of all ages.

Another object is to provide an orthopedic shoe which is effective appreciably to reduce the required period of correction over that required by conventional devices.

Another object is to provide an orthopedic shoe which is capable of effecting such improved correction while permitting substantially full mobility of the wearer.

Another object is to provide an orthopedic shoe of the character described which is inexpensive, convenient to install and remove, comfortable to use, and which does not place undue strain on the wearer.

Other objects and advantages of the present invention will subsequently become more clearly apparent upon reference to the following description and accompanying drawings.

Brief description of the drawings

FIG. 1 is a bottom plan view of an orthopedic shoe embodying the principles of the present invention and adapted for wear by humans.

FIG. 2 is a side elevation of the orthopedic shoe of FIG. 1.

FIG. 3 is a rear elevation of the orthopedic shoe of FIG. 2.

FIG. 4 is a front elevation of the orthopedic shoe of FIG. 2.

FIG. 5 is a somewhat enlarged vertical transverse section of a modified form of the orthopedic shoe of the present invention.

FIG. 6 is a diagrammatic view illustrating the use of a pair of the orthopedic shoes of the present invention for correcting defects in the feet of a pigeon-toed wearer.

FIG. 7 is a diagrammatic view illustrating the use of a pair of the orthopedic shoes for correcting defects in the feet of a spray-toed wearer.

FIG. 8 is a side elevation of a modified form of orthopedic shoe embodying the principles of the present invention applied to the foot of an animal.

FIG. 9 is a somewhat enlarged bottom plan view of the shoe of FIG. 8.

FIG. 10 is a transverse section through the major diameter of the shoe taken on line **10—10** of FIG. 9.

FIG. 11 is a transverse section through the minor diameter of the shoe taken on line **11—11** of FIG. 9.

FIG. 12 is a bottom plan view of another form of the shoe modified from that shown in FIGS. 9 through 11.

FIG. 13 is a perspective of the shoe of FIG. 12.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

First form

Referring more particularly to the drawings, an orthopedic shoe embodying the principles of the present invention is shown in FIGS. 1 through 4 providing an upper foot receiving member **10** having opposite toe receiving and heel receiving ends **11** and **12**, respectively. Connected to member **10** in underlying relation is a sole **15** which is constructed of a lightweight leather or pliable rubber, plastic or other suitable material. As best shown in FIG. 1, the sole has a continuous marginal edge contoured to follow the general shape of the bottom of a wearer's foot and includes opposite inner and outer side edge portions **17** and **18**, respectively. A heel **19** is rigidly secured to the sole **15** in underlying relation to the heel receiving end **12** of the upper foot receiving member **10**.

Congruently secured to the front portion of the sole **15** in underlying relation is an oversole **20** of resiliently flexible material, such as composition rubber or the like. The oversole is provided with a plurality of elongated, flexible, integral, substantially parallel, protuberances or studs **22** extending obliquely downwardly therefrom toward the

inner side edge portion **17** of the sole. The studs are conveniently frusto-conical, tapering to respective outer ends **23**.

A heel plate **25** of the same material as the oversole **20** is congruently secured to the heel **19**, the heel plate being similarly provided with a plurality of integral studs **26** which are substantialy identical to the studs **22** on the oversole **20** and have outer ends **27**. However, as best shown in FIGS. 1, 3 and 4, the studs **26** extend obliquely downwardly from the heel plate toward the outer side edge **18** of the sole in a direction opposite to the oblique extension of the studs **22** from the oversole. Alternatively, the studs **22** and **26** may be constructed of a rigid material and be pivotally mounted on the oversole and heel plate in the obliquely extended positions shown in the drawings.

A somewhat modified structure of the first form of the present invention is shown in FIG. 5 which, in addition to the structure previously described, includes a casing or cover of suitable resiliently flexible material generally indicated by the reference numeral **30** and disposed about the studs **22** and **26**. The cover may be of unitary construction so as to extend the full length of the sole **15** or may be divided in opposite heel and toe portions individually to enclose the studs **22** and **26**. The section of the shoe shown in FIG. 5 is taken through the heel portion of the shoe wherein it is seen that the cover **30** has side walls **32** which are connected to, or may be integral with, the heel plate **25**. A lower wall or second sole **33** is disposed in interconnecting relation with the side walls in underlying relation to the outer ends of the studs **26** and **27**. The second sole is conveniently integral with the outer ends of the studs.

With the addition of the cover **30** of FIG. 5, the lower wall **33** provides a wear surface which, during ground contact, precludes abrading of the outer ends **23** and **27** of the studs. Furthermore, when walking on soft or muddy ground, it effectively precludes the entrance of mud, debris and other foreign material between the studs. Accordingly, the cover enables the shoe of the present invention to be effective even when the wearer is walking on ground which ordinarily would not be sufficiently firm to permit proper collapsing of the studs.

Operation of the first form

The operation of the described embodiment of the orthopedic shoe of the present invention is believed to be clearly apparent and is briefly summarized at this point. With the orthopedic shoe of the first form disposed on the foot of a wearer, the weight imposed by the wearer on the sole **15** while standing, walking or running subjects the studs **22** and **26** to compression. The flexibility of the studs permits them partially to collapse or to deform under such compression. Since the studs are obliquely disposed, their partial or collapse deformation during flexing is akin to a pivoting action about their lower ends which imparts a component of force on the sole in a transverse direction opposite to the lateral direction of downward stud extension. During such deformation or collapsing of the studs **22**, the sole **15** adjacent to the toe receiving end **11** of the shoe is shifted laterally to the right of the wearer or to the left as viewed from the front in FIG. 4. Where viewed from the rear as in FIG. 3, during deformation or collapsing of the studs **26** on heel plate **25**, the heel receiving end **12** of the shoe is urged to the left. This causes the foot and leg of the wearer to be twisted or turned in a counterclockwise direction, as viewed in FIG. 1, during each step that is taken. Thus, to correct a pigeon-toed condition, the right foot of a wearer is provided with a shoe equipped with studs having the oblique extensions shown in FIG. 1. The left foot is provided with a shoe having studs which are oppositely laterally obliquely extended. As a result, the studs impart opposite twisting forces to the shoes tending to spread the toes and to move the heels toward each other, as shown in FIG. 6. For people having a tendency excessively to spread their toes, shoes are employed which counteract this tendency by opposite twisting forces, as illustrated in FIG. 7. For this purpose, the studs on the sole of the right shoe and on the heel of the left shoe are extended downwardly and obliquely to the right while the studs on the sole of the left shoe and on the heel of the right shoe are extended downwardly and obliquely to the left. Accordingly, during each step, the weight of the person is imposed on the studs and their partial deformation or collapse is utilized to impart the desired twisting forces to the feet and legs of the wearer.

It will be appreciated that the form of the shoe of the present invention shown in FIGS. 1 through 5 may be varied to accommodate the various types of previously discussed deformities by merely changing the direction of oblique extension of the studs relative to the sole of the shoe. In addition, the studs at one side of the shoe may be made longer than at the opposite side to obtain any desired transverse tilting. Similarly the studs at the heel may be made longer or shorter than those at the toe to achieve desired fore or aft tilting. Still further, opposite tilting of the heel and toe portions of a shoe can be achieved by making the studs at one side of the sole and at the opposite side of the heel longer than their respectively transversely adjacent studs and by utilizing a flexible sole. Thus, it has been discovered that by predetermining the relative stud lengths and the direction of oblique downward extension of the studs, a wide range of corrective forces can be caused to be imposed upon the feet and legs of a wearer of the shoes of the present invention while the user is standing, walking or running. Such universal accommodation to the orthopedic needs of a patient and the beneficial translation of forces inherent to standing, walking or running into corrective forces while permitting substantially full mobility has proved highly effective in treating structural and muscular difficulties of the feet and legs.

Second form

A second form of orthopedic shoe embodying the principles of the present invention is shown in FIGS. 8 through 13 and is generally designated by the reference numeral **40**. The shoe is applied to the foot **42** of an animal, for example, a horse's hoof, and is held in place by a plurality of nails **44**. With particular reference to FIGS. 9 through 11, it will be noted that shoe **40** has an annular base or sole **46** of suitable resiliently flexible material similar to the material of the sole **20** of the first form which is reinforced or stiffened by an annular, relatively thin, somewhat flexible metallic plate **48** imbedded therein. The sole **46** and plate **48** are suitably perforated to provide a plurality of nail holes **50**. Integral with or suitably secured to the sole is a plurality of projecting studs or calks **52** of frusto-conical configuration which extend obliquely downwardly therefrom and have ground-contacting ends **54**. It will be appreciated that the sole **46** and the studs **52** are the counterparts of the sole **20** and the studs **22** of the first form and serve the same purpose. However, as shown in FIG. 9, the studs **52** are substantially circularly arranged in substantially equally spaced relation about the sole rather than in rows as in the first form.

In the case of defects which require more than mere turning or twisting of the foot for correction, the orthopedic shoe shown in FIGS. 9 through 11 may be varied in form to achieve transverse or fore and aft tilting or a combination of turning and tilting. Thus, some of the studs may be lengthened or shortened, or diametrically enlarged and strengthened to deform less, or vice versa, as necessary to obtain the results desired. FIGS. 12 and 13 show an example of one of such variations in which an orthopedic shoe **40'** has elements similar to that provided by the shoe **40** including an annular sole **46'** from which a plurality of calks or studs of various forms are

obliquely extended. A pair of sets of opposed studs **52'** are identical to the studs **52** of the shoe **40**. However, a pair of studs **52''** on one portion of the sole are thicker transversely than the studs **52'**, and are thus better able to support the weight of the wearer. A pair of studs **'''** are disposed on the sole in diametrically opposed relation to the studs **52''** and are somewhat longer. With such a shoe there is some turning similar to shoe **40** but also, since the studs **52''** are compressed a lesser amount than the studs **52'** by the imposition of the weight of the wearer they therefore deform or collapse less, and cause some transverse tilting upward on the right side of the shoe. This is somewhat illustrated in FIG. 13 although, of course, in actual practice all the studs would be deformed or collapsed to some degree. The added length of studs **52'''** serves to initiate turning of the foot slightly ahead of the same action by the rest of the studs. And, of course, the studs could be utilized to impart tilting without turning.

Alternatively, the studs could all be of the same length but possess different degrees of flexibility to obtain the desired effects. However, making all the studs of one material and varying their forms for different effects is preferred because of greater ease and economy in manufacture of the shoes.

Shoe **40** and its variations may be modified after the fashion of FIG. 5 to encase the studs in a protective cover while permitting the desired action they provide.

Also in cases where only one of a pair of feet is defective, it may be desirable to fashion a built-up shoe with no corrective action for the non-defective foot merely to provide balance with an orthopedic shoe of the present invention on another foot.

Operation of the second form

The operation of the second form of the orthopedic shoe of the present invention shown in FIGS. 9 through 13 is believed to be apparent from the foregoing description. However, briefly and in summary, with the oblique disposition of the studs **52**, the imposition of the weight of the wearer on the sole **46** causes the studs to collapse which imparts a twisting or turning force in a counterclockwise direction or to the wearer's right as viewed in FIG. 9. Thus, placed on the right foot, shoe **40** tends to turn the foot outwardly; on the left foot the urging would be inwardly. To obtain an opposite effect, the studs may be oppositely directed in their obliqueness from the sole. In the case of shoe **40'**, studs **52''** being less compressive, the shoe is both turned to the wearer's right and the right side of the shoe is tilted upwardly.

In view of the foregoing, it is readily apparent that the structures of the present invention have provided improved orthopedic shoes which are effective to provide a beneficial orthopedic effect during normal activity of the wearer without unduly restricting the mobility of the wearer. The shoe may be comfortably worn and is readily adapted to wearers of all ages for correcting varied types of deformities. The orthopedic shoes of the present invention are relatively inexpensive and can be worn without adversely affecting adjacent healthy body portions of the wearer.

Although the invention has been herein shown and described in what are conceived to be the most practical and preferred embodiments, it is recognized that departures may be made therefrom within the scope of the invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices and apparatus.

Having desribed my invention, what I claim as new and desire to secure by Letters Patent is:

1. An orthopedic shoe including fore and aft portions having an axis extending therebetween comprising a member adapted to be supported on the foot of a wearer; and elongated deformable means extending obliquely from said member transversely of said axis and having free distal ends engageable with a support, said means being operable upon deformation to swing toward the member and impose a turning froce on said member in a direction which turns the foot of the wearer about an upright axis.

2. The shoe as defined in claim **1** further including a cover of flexible material encasing the deformable means and deformable therewith.

3. The shoe as defined in claim **1** wherein said deformable means comprise a plurality of substantially parallel transversely obliquely extending elongated studs mounted on the member and constituting the sole support therefor, said studs being collapsible for movement of the distal ends theroef toward the member upon the imposition of a force thereagainst for imposing a component of said force on the member transversely thereof in a direction which is opposite to the direction of oblique extension of the studs.

4. The shoe as defined in claim **1** wherein said member comprises forward and rearward portions, and said deformable means comprise substantially parallel elongated flexible support elements mounted on said portions respectively, said elements extending laterally obliquely from their respective portions in opposite directions.

5. An orthopedic shoe comprising a member adapted to be supported on the foot of a wearer, said member including a heel portion and a sole portion having opposite side edges, elongated flexible studs mounted on the sole portion and extending obliquely therefrom substantially parallel to each other, said studs upon deformation serving to impose a force on the sole portion in a direction laterally toward one of the side edges and opposite to the direction of oblique extension of the studs, and said heel portion having substantially parallel elongated flexible studs mounted thereon and extended obliquely therefrom in a lateral direction opposite to the direction of the studs on said sole portion.

6. The shoe as defined in claim **1** wherein said deformable means comprise elongated flexible studs and some of the studs are of less flexibility than others for taking more of the weight of the wearer and for tilting the shoe.

7. An orthopedic shoe including fore and aft portions having an axis extending therebetween comprising a member adapted to be supported on the foot of a wearer, said member having a forward portion and a rearward portion; and ground engaging deformable means extending obliquely from the member and operable upon deformation to impose a force on the member transversely of said axis, said member having an upright axis intermediate said portions; and said deformable means including elongated flexible studs mounted on the portions and extending laterally obliquely therefrom, the studs on the rear portion having a lateral direction of oblique extension opposite to the lateral direction of oblique extension of the studs on the forward portion whereby deformation of said studs upon application of the weight of the wearer serves to impart a turning force to the wearer's foot and turn it about the axis of the member.

8. The shoe as defined in claim **7** wherein some of said studs are longer than the other studs for initiating turning of the wearers' foot slightly ahead of the same action by the other studs.

9. The shoe as defined in claim **7** wherein some of the studs are of thicker construction for taking more of the weight of wearer and for tilting of the shoe.

10. An orthopedic shoe comprising a member adapted to be supported on the foot of a wearer and providing a sole portion, and a pair of sets of elongated flexible studs mounted on the sole portion, each set consisting of a plurality of studs extending obliquely from the sole portion in substantially the same direction, said studs upon deformation serving to impose a force on the sole portion in a direction opposite to their direction of oblique extension, the studs of the separate sets extending obliquely in opposite directions on opposite sides of a predetermined

substantially upright twisting axis, whereby the respective forces of the sets imposed on the sole portion are in opposite directions and exert a twisting action on said member about said axis.

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U.S. Cl. X.R.

36—67; 168—29