May 4, 1948. G. SUPPLE 2,440,705

SOLE FOR FOOTWEAR

Filed Feb. 7, 1946

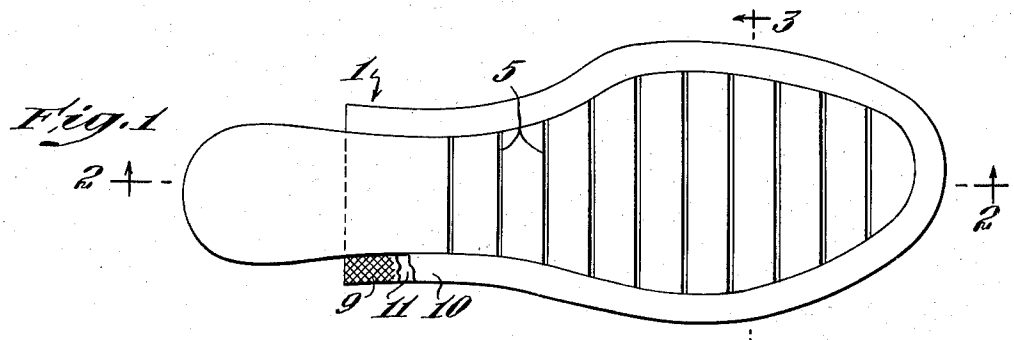


Fig. 1

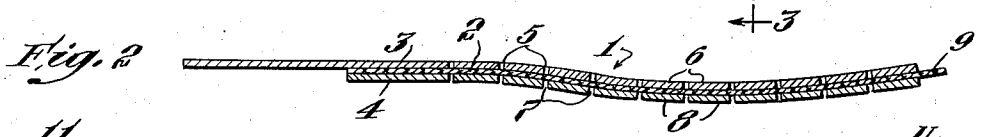


Fig. 2

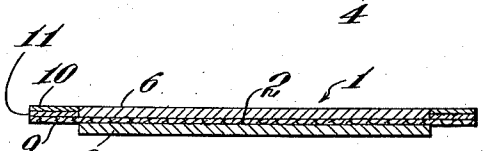


Fig. 3

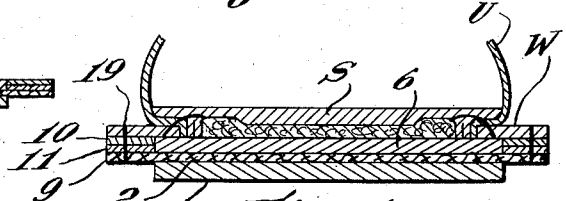


Fig. 4

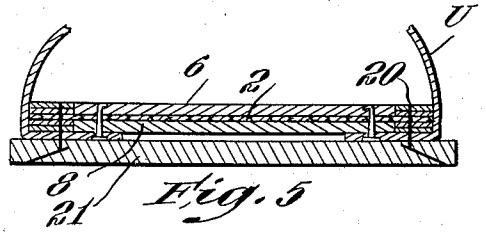


Fig. 5

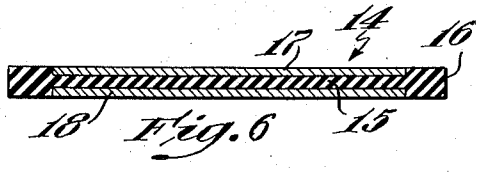


Fig. 6

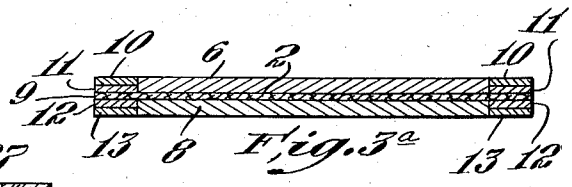


Fig. 3a

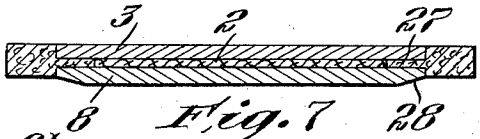


Fig. 7



Fig. 8

Inventor
Gilbert Supple
By Robert Cushman & Grover
Att'ys.

Patented May 4, 1948

2,440,705

UNITED STATES PATENT OFFICE

2,440,705

SOLE FOR FOOTWEAR

Gilbert Supple, Waban, Mass.

Application February 7, 1946, Serial No. 646,115

15 Claims. (Cl. 36—30)

1

This invention pertains to footwear and more especially to a novel multi-ply sole element. In my Patent No. 2,381,937, dated August 14, 1945, I have disclosed a shoe sole element of a highly desirable construction comprising a body portion of a normally substantially rigid material, for instance wood, so modified (as by the provision of transverse incisions) as to make it flexible lengthwise of the shoe while preserving its transverse rigidity, and having assembled with the body portion a marginal strip or welt of relatively flexible material which not only constitutes a reinforce for the body portion, counteracting any tendency to crack during flexing, but also providing suitable means for the reception of sewing stitches, staples or the like by means of which the sole element may be united to other portions of the shoe.

Shoes made in accordance with the disclosure of said patent are unique in respect to the fact that they possess a high degree of longitudinal flexibility coupled with transverse rigidity. Such shoes are of especial value for orthopedic purposes, since they offer a transversely inflexible support for the foot, thus opposing pronation and promoting toe-to-heel walking. Not only are such shoes very acceptable for remedial purposes, but they are also desirable for use by workers in certain trades, for example in dye houses, tanneries, chemical works, etc., and also for sportswear, for instance as golfing shoes, by reason of their flexibility, heat-insulating qualities, and moisture-resistance.

The patent suggests wood for the body of the sole element. However, it is not always easy to obtain natural wood in pieces of large extent, and free from knots, cracks, or other defects, and thus it would seem that plywood would constitute a better material than natural wood, by reason of its uniformity and availability in sheets of large area. If three-ply plywood were to be employed, the grain of the middle ply should obviously extend lengthwise of the shoe, the incisions being formed in the outer plies, but when the sole element is thus constructed, the central ply being very thin, tends to crack and produce a grating vibration when the shoe is worn. Five-ply plywood is ordinarily too thick for the purpose.

One object of the present invention is to provide a sole element, constituting an improvement over that disclosed in my prior patent, but having all of the advantages of the sole therein described, as well as others, from the standpoint of shoe construction, but which may be made more easily, cheaply and with more uniform results than if

2

made of a single piece of natural wood. A further object is to provide a sole element of plied construction, very flexible longitudinally but rigid transversely, and which is even more resistant to penetration by moisture than sole elements made of natural wood. A further object is to provide a sole element which is transversely rigid and including means for uniting it to other parts of the shoe, and incorporating within its substance a tough, flexible attaching element to which the other shoe parts may be directly or indirectly secured as desired. A further object is to provide a sole element which, while flexible longitudinally and rigid transversely, does not tend to squeak or generate grating vibrations when flexed during use. A further object is to provide a sole element useful either as an outer sole; an inner sole; a sock lining; or a cushion, middle or platform sole, as may be desired. Other and further objects and advantages of the invention will be pointed out in the following more detailed description and by reference to the accompanying drawings, wherein

Fig. 1 is a bottom view, with a portion broken away, illustrating one embodiment of the sole element of the present invention;

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

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

Fig. 3ª is a view similar to Fig. 3, but illustrating a modification;

Fig. 4 is a fragmentary transverse diagrammatic section through a shoe of Goodyear-welt type in which a sole element like that of Figs. 2 and 3 constitutes the outer sole;

Fig. 5 is a fragmentary transverse diagrammatic section through a shoe of the McKay type in which the sole element of the present invention constitutes the inner sole;

Fig. 6 is a section generally similar to Fig. 3, but illustrating a sole element of modified construction;

Fig. 7 is a section similar to Fig. 3, but illustrating a further modification; and

Fig. 8 is a section, similar to Fig. 6, but illustrating a further modification.

Referring to the drawings, the numeral 1 designates a sole element embodying the present invention. This sole element, as illustrated, comprises a mid-ply 2 and upper and lower plies 3 and 4, the several plies being permanently united, for example, by a suitable adhesive. While both upper and lower plies such as 3 and 4 will usually be employed, it is contemplated that the sole element may consist of but two plies, one of these plies having the characteristics of the ply 2 here-

inafter more fully described, and the other having the characteristics of one of the plies 3 or 4, as hereafter described.

The ply 2 is of a material which is flexible both transversely and longitudinally of the sole element; should be readily penetrable by a sewing needle; and should be tough and strong so as to retain sewing stitches without readily tearing out. Close woven textile material, for example, cotton duck, is desirable for the purpose, although other textile materials or thin leather may be employed. Preferably, although not necessarily, this ply 2 is of waterproof or at least moisture-resistant character. For instance, the textile fabric, if such be employed, may be frictioned with rubber or impregnated with a suitable asphaltic compound, oxidized oil or a plasticized synthetic resin. Instead of a textile fabric, sheeted synthetic resin having the desired flexibility may be employed, and such resin may be reinforced in any suitable way, for example by the inclusion of fibrous material, either organic or inorganic. Furthermore, flexible sheet material consisting of unspun, unwoven, textile or other fibers, either synthetic or natural or of a mixture of various materials, wherein the fibers are united and integrated by a suitable binding medium, may be employed. The selected material to form the ply 2 may be cut to the proper shape and dimensions, for instance by the employment of a die such as is customarily used in cutting leather or fabric for making shoe parts.

The plies 3 and 4 are of such material and so constructed and arranged that while they are quite flexible longitudinally of the sole element, they are substantially rigid transversely of the sole element. Wood veneer with the grain running transversely of the sole element, makes an acceptable material for the plies 3 and 4. If wood veneer be employed for this purpose it is transversely incised or slitted, as shown at 5 and 7, at a plurality of points longitudinally of the sole element, so as partially or completely to divide the respective plies 3 and 4 into a series of transversely extending ribs 6 and 8, respectively. As illustrated, the incisions 5 and 7 extend completely through the thickness of each of the plies 3 and 4, respectively, although it is within the scope of the invention to have these incisions extend but part way through the respective plies. Preferably the plies 3 and 4 are united to the ply 2 by means of suitable adhesive, for example a rubber compound or a thermoplastic or thermosetting resin, before the incisions 5 and 7 are made, care being taken in making the incisions that the ply 2 is not cut and thereby weakened.

While wood veneer is desirable for making the plies 3 and 4, other materials may be employed, for example the ribs 6 and 8 may be entirely separate strips or splints of wood which are assembled in parallel relation and adhesively united to the ply 2 with sufficient space between adjacent edges of the ribs to permit longitudinal flexing of the plies 3 and 4. Instead of wood, any other suitable material which is substantially rigid but reasonably light in weight, may be employed, for example synthetic resin having the desired rigidity; or resin reinforced with inclusions of wood or metal; or flattened tubes of plastic material; or even metal strips may be used, for instance strips of sheet metal so embossed or ribbed as to provide the desired transverse rigidity without undue weight. When wood veneer or wood strips are employed, they may, if desired, be impregnated or coated with a suitable waterproof substance, for instance an asphaltic or bituminous impregnant, a fluid synthetic resin, or an oxidizable oil. Whatever the material chosen the plies 3 and 4 should be substantially rigid transversely of the sole element, but their constituent rib-like elements 6 and 8 are so united to the longitudinally flexible ply 2 that the latter forms a hinge connection between the rib members 6 of the upper ply and the rib members 8 of the lower ply, so that while the sole element as a whole is substantially rigid transversely, it is flexible longitudinally.

Preferably the ply 2 extends outwardly beyond the edges of the upper and lower plies 3 and 4, to form the welting or attaching strip 9 which is designed to receive elements, for instance sewing stitches, staples or the like, for securing the sole element 1 to other parts of the shoe. Preferably, as illustrated in Fig. 3, strips 10 and 11, of suitable material, for instance leather, textile fabric, paper board, or a plastic, are associated with the attaching strip 9 so as to build the latter up to a thickness equaling the thickness of the ribs 6 of the upper ply 3 of the sole element. In a similar way, if desired, additional strips 12 and 13 (Fig. 3a), may be secured to the strip 9, so as to make the marginal portion of the sole element of the same thickness as the central portion of the sole element, that is to say, a thickness equaling the thickness of the combined plies 2, 3 and 4. The strips 10, 11, 12 and 13 should be of a material which may be penetrated by a sewing needle and they may be secured together and to the strip 9 by adhesive, by staples or stitches, as preferred. Instead of a plurality of strips 10 and 11, a single strip (Fig. 7) of proper thickness may be employed, if preferred.

In the modified construction illustrated in Fig. 6, the mid-ply 15 consists of an integral mass of a plastic material, for instance rubber, synthetic rubber, or a synthetic resin, and has thick marginal portions 16 which define shallow central cavities above and below the ply 15 for the reception of the transversely rigid upper and lower plies 17 and 18, each consisting of a series of transverse ribs which may be of any of the materials above referred to as proper for making the plies 3 and 4. The plies 17 and 18 are adhesively or otherwise bonded to the ply 15, the marginal portion 16 of the latter being designed to receive the attaching means by which the sole element is secured to other parts of the shoe.

In Fig. 4, the sole element of the present invention is shown as constituting the outer sole of a Goodyear-welt type shoe. This shoe comprises the upper U, the inner sole S, and the welt W. The sole element of the present invention is united to the welt W by stitches 19, passing through the strips 9, 10 and 11, the lower ply of the sole element, comprising the ribs 8, being exposed and constituting the tread surface of the outer sole.

In Fig. 5 the sole element of the present invention is shown as constituting the inner sole of a shoe of McKay type. This shoe comprises the upper U which is united to the marginal portion of the sole element of the present invention, by stitches 20 which in this instance are also shown as extending through the outer sole 21, so as to unite the latter to the inner sole and upper.

In Fig. 7 a further modification is illustrated wherein the ply 2 does not extend out to the edges of the plies 3 and 4, thus leaving a marginal chan-

nel which receives a tongue 27 integral with a welt strip 28 of leather or the like, the body of the welt strip being substantially flush at its upper side with the upper surface of the ply 3. Preferably the marginal portion of the ply 4 is beveled at 28 and the body of the welt at its under side is flush with the outer edge of the ply 4. This beveling of the ply 4 facilitates the attachment of an outer sole.

In Fig. 8 there is a single ply 2× of wood or equivalent stiff material slitted transversely to make it flexible lengthwise of the sole element, this ply being completely embedded in a body 17ª of flexible water-impervious material, for instance rubber or synthetic resin, which forms upper and lower plies between which the ply 2× is arranged, this body 17ª of material also comprising the integral marginal portions 16ª for the reception of fastener elements.

The sole element of the present invention has herein been illustrated as employed in the making of various types of shoe, but it is to be understood that it is not limited in its utility to the particular use herein specifically suggested, but is of broad utility in the manufacture of footwear of any desired type, and in which it may be employed to take the place of any of the usual sole elements employed in footwear manufacture.

I claim:

1. A sole element for use in footwear, said sole element comprising a ply of a material which is flexible both longitudinally and transversely of the sole element, and at least one ply which is relatively flexible lengthwise of the sole element but which is relatively rigid transversely thereof, the first-named ply having an integral extension projecting beyond the edge of the other ply to constitute an attaching strip by means of which the sole element may be secured to other parts of a shoe.

2. A sole element for use in footwear, said sole element comprising a mid-ply of a material which is flexible in all directions, and upper and lower plies each flexible longitudinally of the sole element but which are substantially rigid transversely of the sole element, and means uniting the several plies.

3. A sole element for use in footwear, said sole element comprising a mid-ply of tough flexible material, and upper and lower plies each flexible lengthwise of the sole element but substantially rigid transversely of the sole element, the mid-ply extending outwardly beyond the margins of the upper and lower plies to constitute an attaching strip, and means permanently uniting the several plies.

4. A sole element for use in footwear, said sole element comprising a ply of strong textile material and at least one ply of wood, the latter ply having transversely extending lines of weakness thereby to permit it to flex readily in a longitudinal direction, but being stiff transversely of the sole element, the textile ply projecting beyond the edge of the wood ply to provide an attaching strip, and means permanently uniting said plies.

5. A sole element for use in footwear, said sole element comprising a mid-ply of textile material which is flexible in all directions, and upper and lower plies of wood, each of the upper and lower plies having transversely extending incisions thereby making said plies flexible longitudinally of the sole element, said wood plies being substantially rigid transversely of the sole element, and means permanently uniting the several plies.

6. A multi-ply sole element for use in footwear, said sole element comprising a relatively thin ply of tough material, flexible both longitudinally and transversely of the sole element, and at least one relatively thicker ply, said latter ply being flexible lengthwise of the sole element, but being substantially rigid transversely of the sole element, the first-named ply having an integral marginal portion which projects beyond the edges of the transversely rigid ply, and a strip of material of a thickness substantially equaling the latter ply superimposed upon said projecting marginal portion of the first ply and united to the latter.

7. A multi-ply sole element for use in footwear, said sole element comprising a relatively thin ply of tough material, readily penetrable by a sewing needle and which is flexible both longitudinally and transversely of the sole element, and at least one ply comprising a series of ribs each substantially rigid transversely of the sole element, and means uniting each rib to the first ply, the ribs being relatively movable whereby said second ply is flexible longitudinally of the sole element, and a marginal attaching strip of a material which is readily penetrable by a sewing needle and a portion at least of which is in the plane of said first named ply.

8. A sole element for use in footwear, said sole element comprising upper and lower plies each consisting of a series of transversely extending ribs, each substantially rigid transversely of the sole element but which are relatively movable, and a ply of material which is flexible both longitudinally and transversely of the sole element and which is attached to each of said ribs thereby constituting hinge means uniting the ribs, the marginal portion of said flexible ply extending beyond the ends of the ribs to constitute an attaching strip.

9. A sole element for use in footwear, said sole element comprising upper and lower plies each consisting of a series of transversely extending ribs, each substantially rigid transversely of the sole element, but which are relatively movable, and a ply of material which is flexible both longitudinally and transversely of the sole element, and which is attached to each of said ribs thereby constituting hinge means uniting the ribs, the sole element having a marginal attaching strip which is of the full thickness of the sole element, a portion at least of said marginal attaching strip being integral with the flexible ply.

10. A sole element for use in footwear, said sole element comprising upper and lower plies each consisting of a series of transversely extending ribs, each substantially rigid transversely of the sole element but which are relatively movable, and a ply of material which is flexible both longitudinally and transversely of the sole element, and which is attached to each of said ribs thereby constituting hinge means uniting the ribs, the sole element having a marginal attaching strip which is of the full thickness of the sole element and which forms an integral extension of the flexible ply.

11. A sole element for use in footwear, said sole element comprising a mid-ply of a material which is flexible both longitudinally and transversely of the sole element, said ply having a marginal rim which is thicker than its central portion thereby providing shallow cavities in its upper and lower surfaces, and a series of transversely extending ribs disposed in each of said cavities, each rib being of a thickness equaling the depth of the cavity in which it is disposed, and being substantially rigid transversely of the sole element, each rib

being adhesively united to said mid-ply, the latter constituting hinge means flexibly uniting the several ribs whereby the sole element is permitted to flex longitudinally.

12. A sole element for use in footwear, said sole element comprising a mid-ply of textile fabric, and upper and lower plies of wood veneer, and each wood ply having a plurality of transverse incisions such as to make the ply flexible longitudinally of the sole element, and adhesive uniting the several plies, the textile ply projecting outwardly beyond the edges of the veneer plies, and strips of material united to said projecting portion of the textile ply thereby to provide the sole element with margins of a thickness equaling the combined thickness of its several constituent plies.

13. A sole element for use in footwear, said sole element comprising a mid-ply of textile fabric, and upper and lower plies of wood veneer, the wood plies having the grain of the wood extending transversely of the sole element, and each wood ply having a plurality of transverse incisions such as to make the ply flexible longtudinally of the sole element, and adhesive uniting the several plies, the textile ply projecting outwardly beyond the edges of the veneer plies, and material, easily penetrable by a sewing needle, united to said projecting portion of the textile ply, said material being of a thickness equaling the wood veneer plies.

14. A sole element for use in footwear comprising an intermediate thin strong and flexible ply disposed between two outer transversely stiff but longitudinally flexible plies, the intermediate ply being of less superficial area than the outer plies thereby providing a channel between the margins of the latter and a flexible welt strip having a body portion approximating the thickness of the combined plies and having a tongue which fits within said marginal channel, and means uniting the several plies and the welt strip.

15. A sole element for use in footwear, said sole element comprising at least one ply of flexible material, another ply comprising a series of transversely rigid ribs, and a flexible marginal attaching strip, said strip being integral with said flexible ply which extends throughout the entire width of the sole and on one face of which are secured said ribs, said flexible ply constituting hinge means flexibly uniting the ribs.

GILBERT SUPPLE.