June 4, 1963 F. BAUMANN ET AL 3,091,872

SHANK AND HEEL SEAT MEMBER FOR FOOTWEAR

Filed July 11, 1960 2 Sheets-Sheet 1

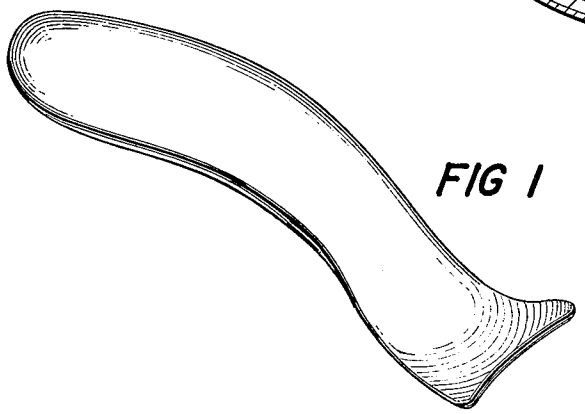


FIG 1

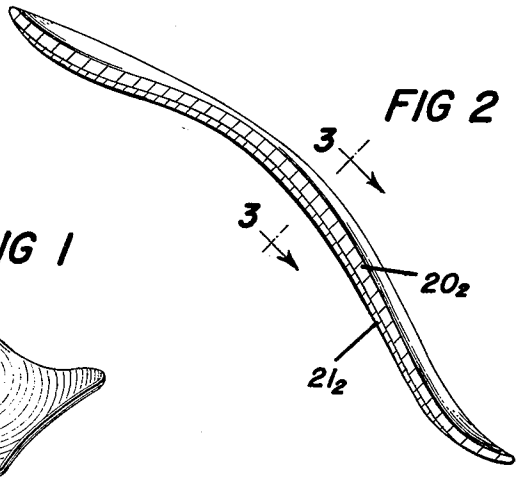


FIG 2

FIG 9

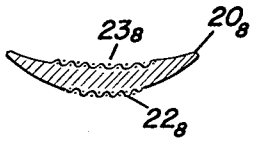


FIG 4

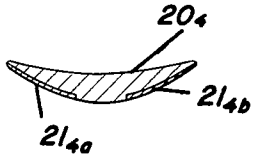


FIG 3

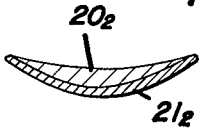


FIG 5

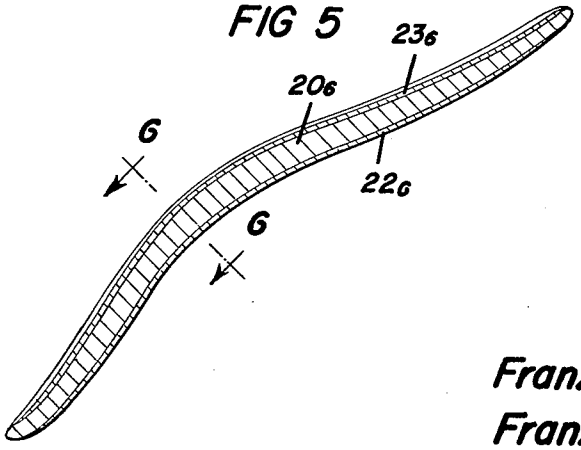
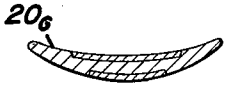


FIG 6



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SHANK AND HEEL SEAT MEMBER FOR FOOTWEAR

Filed July 11, 1960 2 Sheets-Sheet 2

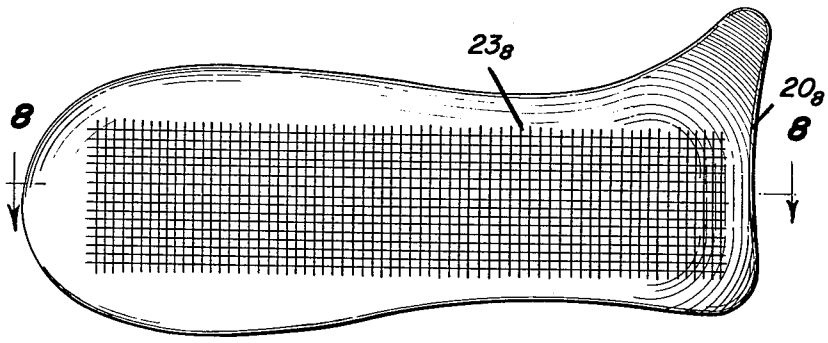

FIG 7

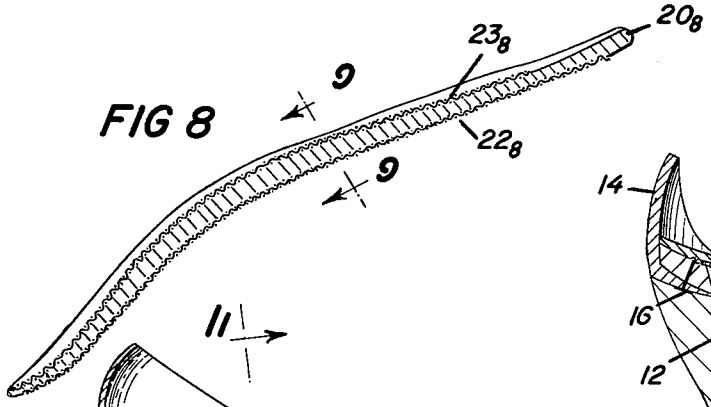

FIG 8

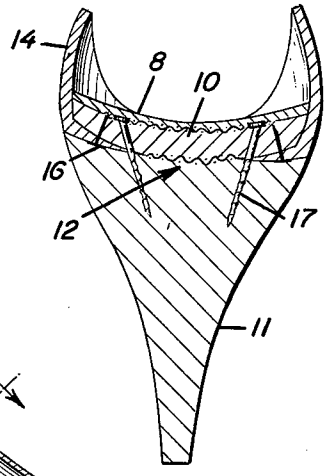

FIG 11

FIG 10

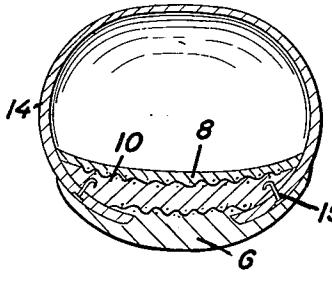

FIG 12

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SHANK AND HEEL SEAT MEMBER FOR FOOTWEAR

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Filed July 11, 1960, Ser. No. 42,175
3 Claims. (Cl. 36—76)

This invention relates to shoes, and more particularly to a shank for shoes which is particularly adapted to use with machines for stapling uppers to shanks.

In the design of shoe soles an important consideration is that the rear portion of the sole extending from the heel to the beginning of the fore-foot must be as rigid as possible and only very slightly resilient. The rigidity of the rear portion of the sole is conventionally obtained by means of card board pieces and shank members of steel or wood. These rigid members are fitted between the usual insole and the outer sole, and the remaining empty spaces are filled with a filler. Assembling of shoe soles having such rigid members is cumbersome and increases the cost of production of the shoe. Moreover, unless a metal shank is used, the rigidity of the sole is not always sufficient. When using steel shanks it may occur that the front end of the shank, which transmits the weight of the person wearing the shoe to the street through the outer sole, damages the outer sole. Also the weight of the shoe is considerably increased by such stiffening members.

In our copending application Serial No. 766,226, filed October 9, 1958, now abandoned, there is described a rigid shank and heel seat member formed of a synthetic plastic material, such as a thermoplastic or thermosetting resinous material, which may or may not be reinforced with glass fibers impregnated in the plastic, the shank and heel seat member being shaped to fit the arched shape of the shank portion of the shoe exactly so as to eliminate the use of any further stiffening members or separate shank pieces.

Because of the necessity of making these shanks of relatively hard and rigid plastic material so that they provide the necessary support when incorporated in a shoe, however, these particular shanks are not particularly suitable to use in shoe manufacturing processes in which the uppers of the shoes are stapled to the shank during the lasting operation. The hardness of the plastic shank, necessary to give it sufficient rigidity, prevents the staples from properly penetrating the shank and holding the upper in place.

It is therefore an object of the present invention to provide a shank and heel seat member of a synthetic plastic material which, while it has the requisite hardness and rigidity to perform properly in the shoe, nevertheless can be penetrated by staples.

Other and further objects of the present invention will become apparent from the following specification and claims, taken together with the accompanying drawings, in which:

FIG. 1 is a perspective view of the shank and heel seat member according to the present invention;

FIG. 2 is a longitudinal sectional view of an embodiment of the shank and heel seat member according to the present invention;

FIG. 3 is a sectional view taken along line 3—3 of FIG. 2;

FIG. 4 is a sectional view similar to FIG. 3 of a modified embodiment of the shank and heel seat member according to the present invention;

FIG. 5 is a longitudinal sectional view of a modification of the shank and heel seat member according to the present invention;

FIG. 6 is a sectional view taken along line 6—6 of FIG. 5;

FIG. 7 is a view of a further modified embodiment of the shank and heel seat member according to the present invention;

FIG. 8 is a longitudinal sectional view taken along line 8—8 of FIG. 7;

FIG. 9 is a sectional view taken along line 9—9 of FIG. 8;

FIG. 10 is a sectional view of a shoe with the shank according to the present invention incorporated therein;

FIG. 11 is a sectional view taken along line 11—11 of FIG. 10; and

FIG. 12 is a sectional view taken along line 12—12 of FIG. 10.

The shank and heel seat member according to the invention extends in a direction along the length of the shoe into which it is to be placed, preferably from the heel to the beginning of a flexible ball portion, the material of the shank and heel seat member having the same shape and contour as the shape of the finished footwear in the portion corresponding to the shank and heel portion to the beginning of the forefoot of the shoe.

FIGS. 10–12 show a sole and heel assembly for a woman's shoe made with a shank and heel seat member according to this invention. The sole comprises an outer sole member 6, and insole including a flexible forepart or ball portion 9 and a rigid shank and heel seat member 10 extending from the end of the ball portion to the heel seat of the heel 11, and a sock lining 8. The forepart or ball portion 9 of the insole is made of any of the usual materials such as leather, cork or other flexible material. The part 9 of the insole is attached to the rigid shank and heel seat member 10.

The upper 14 is lasted to the shank portion of the shank heel seat member 10 by shank lasting staples 15 and is lasted to the heel portion by tacks 16.

The seat face of the heel 11 of the shoe is dished to provide a recess 12 and the heel portion of the shank and heel seat member 10 overlies this recess with the edge of the upper between the shank and heel seat member 10 and the heel 11.

Preferably, the front end of the shank and heel seat member 10 of resinous material is attached by means of adhesive to the flexible ball portion 9. Then the composite insole is fixed to the outer sole 6 by adhesive or other conventional means and to the heel 11 by the usual screws or heel attaching nails 17.

The general shape of the shank and heel seat member is as shown in FIG. 1, it being curved in the longitudinal direction to conform to the shank of the shoe, and being dished in the transverse direction to conform to the shape of the bottom of the foot.

In the embodiment shown in FIGS. 2 and 3, the shank and heel seat member comprises a body 20_2 which is comprised of a hard plastic material which is sufficiently rigid to withstand the bending stresses imposed on the member in normal use. Embedded in the bottom surface of the body 20_2 is a strip of material 21_2 which provides an area on the bottom of the body 20_2 into which staples from a staple driving apparatus, such as is used in stapling uppers to lasts, can be driven. This strip of material 21_2 extends substantially the entire length of the shank and heel seat member. As seen in FIG. 3, it occupies the entire area of the bottom surface of the body 20_2.

Inasmuch as the staples in conventional shoe manufacturing operations are driven into only a comparatively small area on the bottom of the shank and heel seat member, only those areas need be such that they will receive staples. The embodiment as shown in FIG. 4 has two relatively narrow strips 21_{4a} and 21_{4b} of material embedded in the bottom of body 20_4 along the side edges

thereof, the material providing two areas on the bottom of the body 20_4 into which staples can be driven.

The body of the embodiments of FIGS. 2–4, designated by reference numeral **20** with an appropriate subscript, is of a hard plastic, such as a thermosetting polyester resin, such as Polylite 8027. This resin can be reenforced with a mat of glass fibers which are embedded in the body of the shank and heel seat member. The material which forms the strips or cover, designated by reference numeral **21** with an appropriate subscript, can be any one of a plurality of substances. It can, for example, be a softer plastic, such as polystyrene, or a braided glass fiber fabric or a cotton fabric impregnated with polystyrene. It can also be a natural or manufactured fibrous material, such as leather, leather board, or fibre board such as is commonly used in the shoe industry. The only essential limitation on the nature of the material is that it must be softer than the hard plastic of the body **20** and sufficiently soft to take the staples.

In order to make a shank in which the body is of a hard thermosetting plastic, a fiber glass mat is placed in a mold and a liquid polyester is poured into the mold. Then a layer of a softer plastic with a thickness of from 1/20 to 1/16" is added to the mold. This layer can also be a fibrous material impregnated with a softer plastic. For example, a braided glass fiber strip may be placed in a layer of polystyrene. The entire assembly is then pressed and molded at a temperaaure of approximately 140° C. for a period of from ½ to 1 minute.

Alternatively, strips of soft material such as fiberboard or cotton fabric are stapled to a mat of glass fibers and the assembly is then placed in a mold, covered with a liquid polyester and pressed and molded at a temperature of about 140° C. for a period of about ½ to 1 minute.

In the embodiment shown in FIGS. 5 and 6, the shank and heel seat member comprises a body 20_6 of a somewhat softer plastic material than the plastic material which is used in the embodiments of FIGS. 1–4, and into which staples can easily be driven. This softer plastic needs reinforcing strips 22_6 and 23_6 which can be of braided or woven fabric of natural or artificial fibers or metal. For example, there can be used interwoven strands of braided glass fibers. The material of the strips is impregnated with the plastic of the body 20_6, which may be a polystyrene, and when the plastic hardens, the strips act as a reenforcing means for the shank and heel seat member. They provide a stiffness and rigidity which is absent when the entire shank is made of a plastic such as polystyrene. Moreover, since the plastic is somewhat softer than the fiberglass reenforced polyester shank and heel seat member, the staples are relatively easily driven into it.

The embodiment of FIGS. 7–9 is similar to that of FIGS. 5 and 6, the material of the strips 22_8 and 23_8 being wire mesh or woven wire screen. As with the woven fiber material of the strips of the embodiment of FIGS. 5 and 6, the wire screen acts as a reenforcement. As seen in FIG. 9, the wire mesh strip 22_8 is narrower than strip 23_8, so that relatively wide edge areas of plastic are left exposed along the bottom of the shank body 20_8 to receive staples.

The molding of the shank and heel seat members of the embodiments of FIGS. 5–9 is similar to that of the other embodiments. The woven strip on one surface is placed in the mold, the plastic poured in and then the other reenforcing strip placed on the top surface. The assembly is then cured in the manner usual for the plastic.

The shank and heel seat members of the present invention may also be produced by injection molding.

The embodiments of the shank and heel seat member as shown in FIGS. 5–9, while they are made of somewhat softer plastic than those of FIGS. 1–4, are nevertheless just as satisfactory from a stability standpoint. The reenforcement strips provide the necessary rigidity which is provided by the hardness of the plastic in the embodiments of FIGS. 1–5.

This stability is particularly important in view of the fact that a shank and heel seat member according to the present invention can be softened in order to conform it to a particular last when it is to be incorporated into a shoe. The differences between individual lasts, which is well known in the shoe industry, make it essential that a provision be made for conforming the shanks to the lasts. Despite the softness of the shank and heel seat members of the embodiments of FIGS. 5–9, however, they are extremely stable after they are rehardened, due to the presence therein of the reenforcements.

There has thus been provided a shank and heel seat member which can be produced in a single operation by a molding operation and out of plastic material, yet which is conformable to the last for the shoe in which it is to be incorporated. It is very rigid, both before and after the conforming to the last, yet staples can be driven into it and are retained therein. The use of the shank and heel seat member according to the present invention eliminates the necessity to use any other insole elements, such as a metal shank, fillers, etc.

It is thought that the invention and its advantages will be understood from the foregoing description and it is apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing its material advantages, the forms hereinbefore described and illustrated in the drawings being merely preferred embodiments thereof.

What we claim is:

1. A shank and heel seat member for an insole for footwear, said member consisting essentially of a shaped substantially rigid thermoplastic portion, the thermoplastic being sufficiently soft to receive and retain lasting staples and tacks, said thermoplastic portion being adapted to extend along the length of the footwear from the heel to the beginning of a flexible ball member, said thermoplastic portion having the same shape and contour as the shape of the finished footwear in the portion corresponding to the shank and heel portion to the beginning of the forefoot, and a reenforcement extending along the central portion of both the top and bottom surfaces of said thermoplastic portion, said reenforcement being strands of substantially inextensible material embedded in said thermoplastic, a portion of said strands extending in the axial direction of the member and the remainder of said strands extending laterally of the member, said strands forming a screen-like mesh.

2. A shank and heel seat member as claimed in claim 1 in which the reenforcement on the bottom surface of said thermoplastic portion is substantially less in width than the width of said shank and heel seat member, whereby lasting staples and tacks can be driven into the thermoplastic portion along the outside edges of the bottom thereof without interference from the reenforcement member extending along the bottom of the thermoplastic portion.

3. A shank and heel seat member as claimed in claim 1 in which said strands in each reenforcement are metal wire and are interwoven into a screen.

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