Apirl 2, 1968 J. V. CALI 3,375,537

SHOES WITH MOULDED SOLES

Filed March 11, 1966

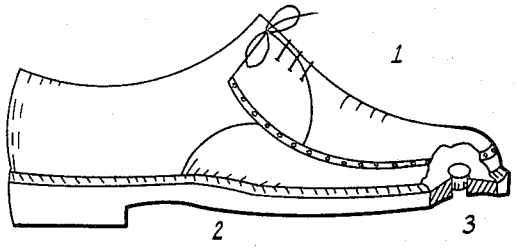

Fig. 1.

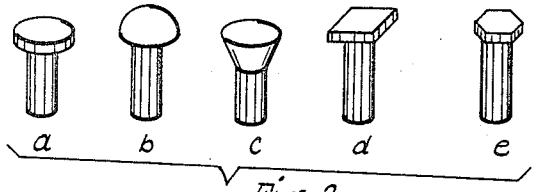

Fig. 2.

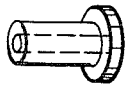

Fig. 3.

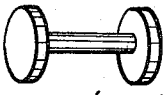

Fig. 4.

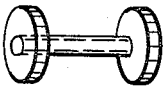

Fig. 5.

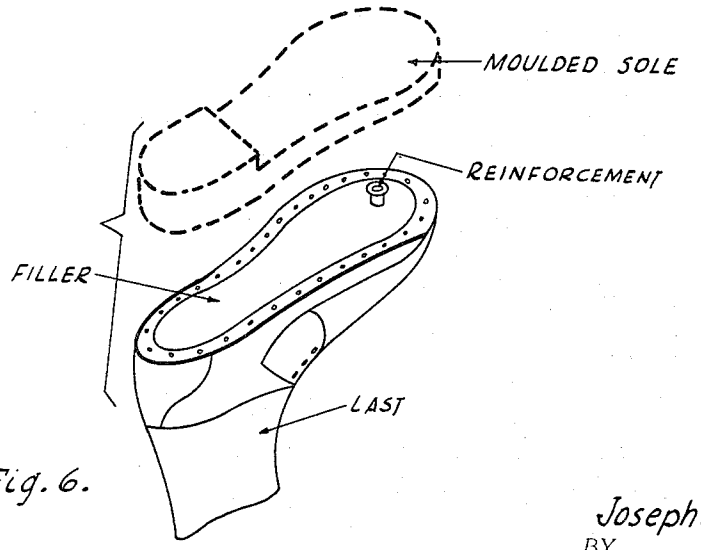

Fig. 6.

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SHOES WITH MOULDED SOLES

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ABSTRACT OF THE DISCLOSURE

A process for producing a shoe with a moulded sole that provides a shoe construction having an upper lasted shoe section and a reinforcement in the form of a shouldered rivet fixed to the upper lasted shoe section and projecting to the exterior of the shoe section. The reinforcement is located in the toe area of the shoe and a sole is injection moulded against and about the surface of the reinforcement when the sole is in the fluid-plastic state, the reinforcement being seized and submersed in the sole.

This invention relates to an improvement in the moulding of soles to lasted shoes.

The art of moulding soles onto lasted shoes with cemented bottoms is not new. A properly lasted shoe may have attached to it a moulded sole and heel in an automatic manner, through an injection moulding process. The material generally used in such moulding process is plastic polyvinyl chloride, and a sole thus moulded to a shoe is considered to be attached in a permanent manner. The process affords economical means by which shoes may be bottomed through an automatic procedure which renders the shoes ready for packing and shipping.

Experience has shown, however, that shoes heretofore made with moulded soles, exhibited a separation of the soles at the toe when the shoes were worn for some time. Thus, when the shoes were worn for a period of time, the sole would come apart from the upper portion of the shoes at the toe location, with the result that the shoes had to be discarded. The separation of the sole in this manner, is caused by the pressures, shocks, bending movements, and vibrations normally attendant upon walking. If such separation of the sole could be prevented, the life of the shoe could be prolonged, for the remaining parts of the shoe generally continue to be intact and wearable.

It is an object of this invention, therefore, to provide a shoe of moulded sole construction which will not be subject to separation of the sole from the shoe upon wear.

Other objects and advantages are set forth in greater detail in the following specification taken in conjunction with accompanying drawings in which—

FIGURE 1 is a perspective view of the moulded shoe showing the reinforcing means to prevent separation of the moulded sole from the upper shoe at the toe area.

FIGURE 2 shows variations of solid rivets used as the reinforcing means for the moulded shoe.

FIGURE 3 shows a tubular form of the reinforcing means of FIGURE 2.

FIGURE 4 shows the reinforcing means of FIGURE 1 with heads or shoulders at both ends.

FIGURE 5 shows the reinforcing means of FIGURE 4 in tubular form.

FIGURE 6 shows the step in the manufacturing process, at which point the reinforcing means has been located in place, and the moulding material is to be subsequently forced around it to form the sole of the shoe.

In accordance with FIGURE 1, the procedure involved in producing a shoe by the injection moulding process

requires first the selection of the last. Not all lasts are generally suitable, and the proper last is picked by size. The shoe must be well lasted on good wood that is uniform. The lasted-over margins should extend at least one-half of an inch so that the cement bond area is at least ⅜ of an inch. Cement or staple side lasting is acceptable.

Next the insoles are attached. These are tacked to the bottom of the last with insole tacks. After this the "assembling" procedure is carried out which involves placing the counter into the counter pocket. Back part tacking follows which consists of tacking the upper to the last, to realize straight back seams. A pull-over operation is then pursued consisting of lasting the shoe and tacking at the toe and forepart. Side lasting is performed next in which the upper is lasted and cemented to the insole at the forepart and shank areas. The heel area is then lasted by nailing the upper to the insole, followed by toe lasting in which the upper is lasted and cemented to the insole at the toe part area.

Roughing is subsequently engaged in by which the lasting allowance is roughened all around the bottom of the shoe. In order to dry and conform the leather properly to the contours of the last, the shoe is next subjected to a heat setting operation in which the shoe is put through a heat setter and dryer. This heat setter may be of the conveyor type. To prevent the hot injected plastic from activating the thermo-plastic cement used to secure the lasting allowance, sole filler is cemented and pressed onto the bottom of the shoe. The filler may cover 5/32" of the inside of the lasting allowance. The sole filler also prevents the injected plastic from flowing into the side of the shoe.

After laying a ribbon of cement all around the lasting of the shoe, a reinforcement 3 is applied to the toe area as shown in FIGURE 1. The purpose of this reinforcement is to prevent the moulded sole 2 from separating from the upper portion of the shoe upon extended wearing of the shoe, as already described. This reinforcement may be in the form of a shouldered rivet applied at the toe area. The rivet head may stand approximately 5/32" away from the insole. The form of the rivet is not limited to that shown in FIGURE 2–*a*. The head of the rivet may also be of the round head, flat head, square, or hexagonal type, as shown in FIGURE 2–*b* to FIGURE 2–*e* respectively. The reinforcement may be made of solid stock or it may be tubular as shown in FIGURE 3. The reinforcement may, further, include shoulders or heads at both ends as shown in FIGURE 4, and such design may be either of solid form or of tubular shape as shown in FIGURE 5. Furthermore, the heads of FIGURES 4 or 5 may be in any one of the forms illustrated in FIGURES 2–*a* to 2–*e* inclusively. The reinforcement may, moreover, be made of metallic or non-metallic material. It may also be made of plastics, organic, or non-organic substance.

After the reinforcement is located in place, the shoe is placed on a foot form which is inserted into an injection moulding machine. The form and shoe are then locked in place in a mold cavity. Hot plastic material in liquid form is injected, filling the mold cavity. The composition of this material may be polyvinyl chloride, a thermoplastic affording high abrasion resistance, good traction, flexibility, and resistance to cut growth. The hot plastic material activates during the cooling period, the cemented edge of the lasting allowance, and this causes the plastic sole to become laminated to the upper section of the shoe. During injection, the plastic material flows around the inserted reinforcement which serves to assure that the toe area of the sole is firmly fastened in place after the shoe has cooled.

While this invention has been described in some detail, it will be understood by those skilled in the art that varia-

tions and modifications may be made without departing from the spirit thereof or the scope of the following claims.

What is claimed is:

1. A process for producing a shoe with moulded sole comprising: selecting the last in accordance with size; stretching the shoe on good uniform wood, extending thereby the lasted-over margins; attaching the insole by tacking to the bottom of the last with insole tacks; assembling by placing the counter into the counter pocket; back part tacking by tacking the upper to said last, to realize straight back seams; applying a pull-over procedure comprising lasting said shoe and tacking at the toe and forepart; performing side lasting operation by lasting and cementing the upper to said insole at the forepart and shank areas; lasting the heel area by nailing said upper to said insole; toe lasting by lasting and cementing said upper to said insole at the toe part area; roughing the lasting allowance around the bottom of said shoe; applying a heat setting operation by putting said shoe through a heat setter and dryer; cementing and pressing a sole filler onto the bottom of said shoe, to prevent the moulding plastic for forming said sole, from flowing into the side of said shoe and activating the cement applied for securing said lasting allowance; laying a ribbon of cement all around the lasting margin of said shoe; applying a reinforcement to the toe area, to render additional strength between said upper and said moulded sole; placing said upper on a foot form and inserting into an injection moulding machine; locking in place said form and shoe in a mold cavity; and injecting hot plastic material into said mold cavity and forcing said plastic material around said reinforcement, to assure that said toe area of said sole is firmly held in place after said shoe has cooled.

2. The process of claim 1 wherein said reinforcement is in the form of a shouldered rivet.

3. The process of claim 1 wherein said reinforcement is in the form of a round headed rivet.

4. The process of claim 1 wherein said reinforcement is in the form of a flat headed rivet.

5. The process of claim 1 wherein said reinforcement is in the form of a shank joined by two heads.

6. The process of claim 1 wherein said reinforcement is in the form of a grommet.

7. The process of claim 1 wherein said reinforcement is of solid construction.

8. The process of claim 1 wherein said reinforcement is of tubular construction.

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