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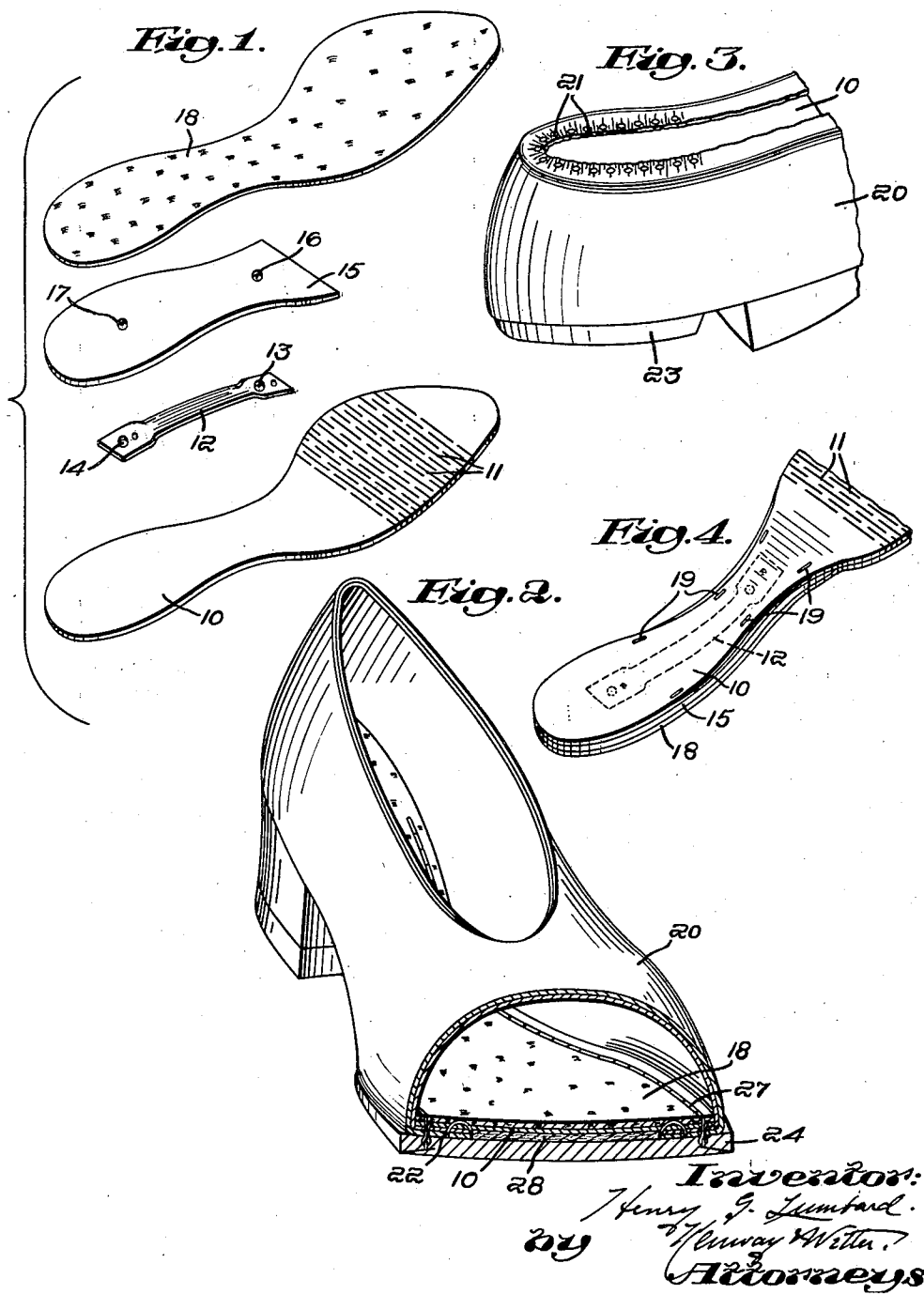
H. G. LUMBARD

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SHOEMAKING

Filed Aug. 5, 1943

2 Sheets-Sheet 1



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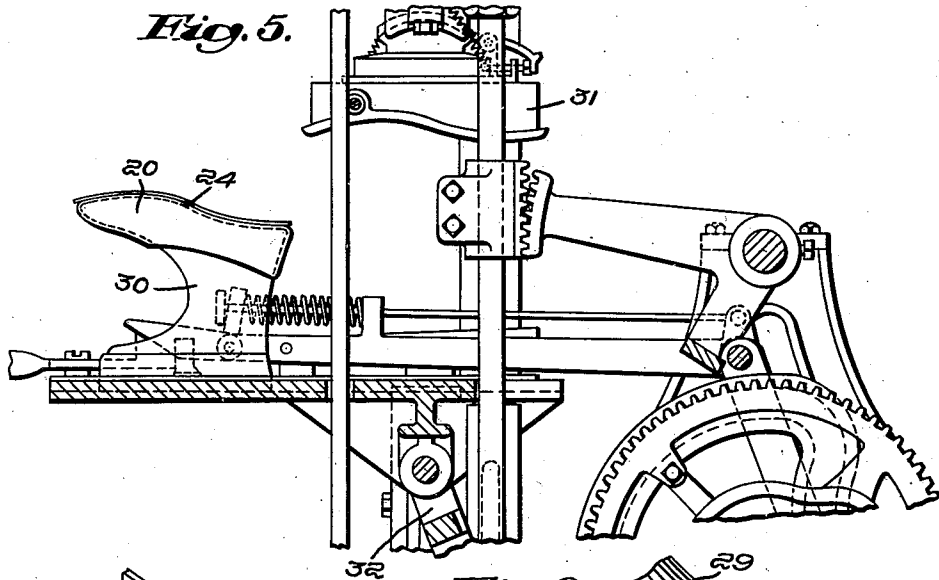
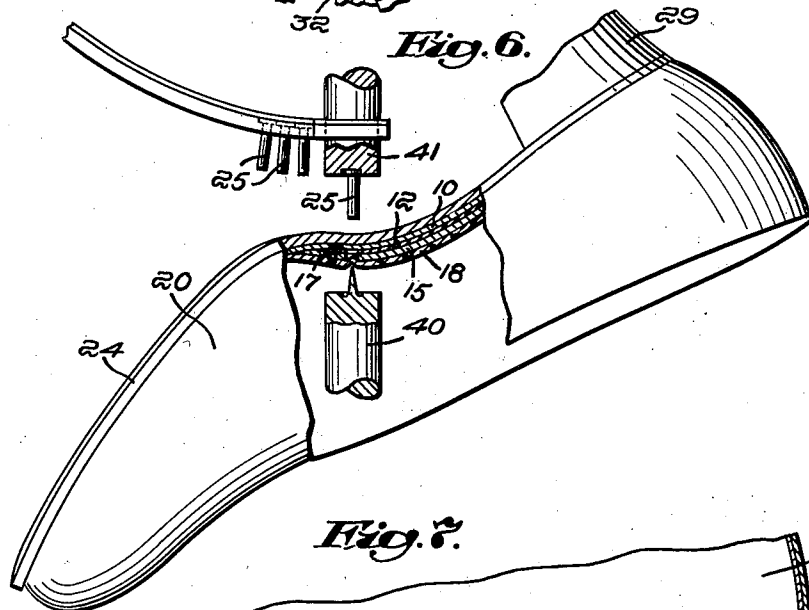
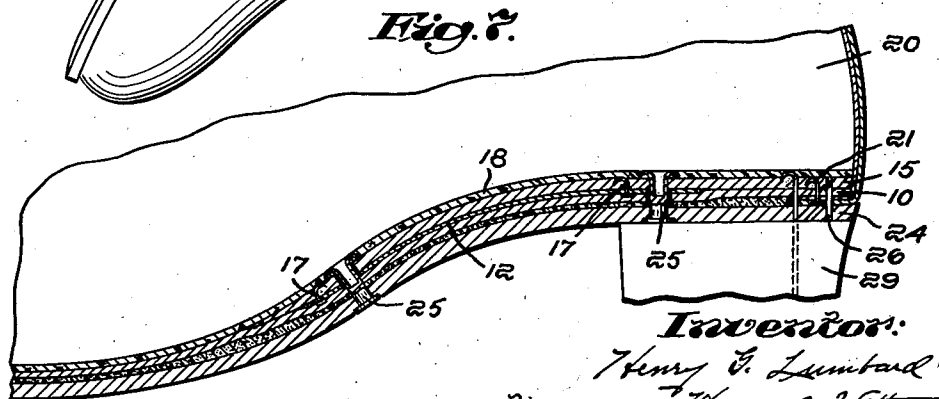
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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SHOEMAKING

Henry G. Lombard, Auburn, Maine

Application August 5, 1943, Serial No. 497,465

5 Claims. (Cl. 12-142)

This invention relates to shoemaking and in one aspect comprises an improved process in accordance with which a particularly stiff and solid shank structure is secured in the shoe. In another aspect it comprises a prefabricated composite insole unit ready for incorporation in the shoe bottom and adapted to be riveted to the outsole in such fashion as to bring about the improved rigid shank structure sought.

While my invention may be advantageously applied to any shoe manufactured with an insole, for purpose of illustration it will be disclosed in its application to the manufacture of shoes by the Littleway process wherein its advantages are somewhat emphasized and appear with particular significance.

For many years the industry has sought for a practical shoemaking process imparting rigid shank structure to the shoe, but always without complete success. One reason for the current popularity for the wedge type of shoe is the rigidity of the shank which it provides the wearer, but the wedge style is cumbersome in appearance and not at all suited for many styles of shoe and so is limited to a relatively narrow field, whereas the process of my invention may be advantageously employed in the manufacture of welt, Compo or McKay shoes in addition to those made by the Littleway process.

The outstanding feature of my invention consists in a novel treatment of the steel shank piece or shank stiffener, in accordance with which both ends of this member are positively anchored to both the outsole and the insole with a resulting truss effect which gives rigidity to the whole shank portion of the shoe. It has been the practice heretofore to secure the rear end of the steel shank stiffener more or less permanently in the shoe, and to leave the forward end free to move forwardly as the shank tends to straighten under the weight of the wearer, or to tack the forward end of the shank stiffener to the insole or to an inserted cover piece. The results are the same in both cases since a tack is entirely inadequate to hold the forward end of the shank stiffener in place for any substantial period of wear. Accordingly as the shoe is worn, the forward end of the shank stiffener works back and forth freeing itself more and more from the surrounding elements of the shoe bottom and digging a channel for itself which not only permits flexing in the whole shank structure of the shoe but often eventually breaks through the shoe bottom to destroy the shoe.

Attempts have also been made to give the shank

of a shoe rigidity by employing a steel shank stiffener riveted in place at an intermediate point or points in its length, thus leaving both ends of the shank stiffener free to move slightly. The resulting structure however, is mechanically incorrect since the shank stiffener is weakened at its center, just where it is subjected to the greatest stress in wear and a serious tendency to breakage is thus introduced.

In accordance with an important feature of the present invention, the steel shank stiffener is perforated adjacent to both of its ends, and may if desired be associated with a stiff fibre cover piece which is also perforated in alignment with the perforations of the shank stiffener. The shank stiffener, with a cover lightly attached, is assembled with a full length insole blank, and the cover piece is arranged to overlie the steel shank stiffener, being disposed between it and the foot of the wearer. The steel shank stiffener is located between the cover strip and the insole blank, although where the insole itself is formed from a composite strip the rear stiff fibre portion of the insole itself may serve as the cover piece for the steel shank stiffener. The insole unit may be completed by cementing to its inner face a cushion ply, preferably a full length blank of cork composition, which is cemented to the insole throughout the forepart of the unit and attached to the fibre cover piece throughout the shank and heel seat portion of the unit.

The insole unit components thus assembled and accurately located and attached are now preferably subjected to a shank molding operation which imparts to the unit the exact longitudinal and transverse curvature desired in the shoe bottom. It will be noted that the insole unit presents a continuous cushion face and that the perforations in the fibre cover piece are smoothly covered by this layer. The insole unit is now completed and ready for incorporation in the shoe bottom, although at that stage its components lack the positive fastening means which they eventually receive in the finished shoe.

When the prefabricated insole unit is employed in the manufacture of Littleway or McKay type shoes the steps of lasting, heel-seat tacking and upper trimming may be carried out as usual and without the necessity of any modification from regular practice or the employment of any special machinery. The outsole is now laid, the last removed, the sole stitched and the shoe bottom subjected to direct pressure molding or leveling. Subsequently the heel seat may be fastened by fibre pegs or any other suitable means.

The next step of the process is to insert a rivet through the heel portion of the outsole, the rear end of the steel shank stiffener and the other components of the insole. The proper location for this rivet may be determined by feeling pressure upon the inner surface of the cushion layer, for example, by moving the pilot of the rivet setting machine back and forth with light pressure upon the insole the underlying aperture in the cover piece may be detected and the proper location for the rivet thus determined. This rivet, of course, will be located to the rear of the heel breast line where it will be later concealed by the attached heel. The rivet at the forward end of the shank stiffener, may, if desired, be inserted at this time, but I prefer ordinarily to defer that final step until the shoe has been otherwise finished and carried to the packing room.

The shoe is relasted and given its final shape upon the last and after this has been done, and all the fine lines of shoemaking brought out with the greatest possible emphasis the last is pulled and the final rivet is inserted through the forward end of the shank. Thus all parts of the shoe bottom are positively secured in the exact location determined for them with so much accuracy and a positive truss structure is introduced into the shank portion of the shoe, not only providing a longitudinally rigid shank but one very resistant to twisting.

These and other features of the invention will be best understood and appreciated from the following description of a preferred embodiment thereof selected for purposes of illustration and shown in the accompanying drawings in which,

Fig. 1 is a view in perspective of the component parts of the insole unit shown in exploded relation,

Fig. 2 is a view in perspective of a shoe of the Littleway type including the insole unit of my invention, a portion of the shoe being shown in cross section,

Fig. 3 is a view in perspective suggestive of the heel seat lasting operation,

Fig. 4 is a view in perspective of a completed insole unit,

Fig. 5 is a fragmentary view in side elevation suggestive of the sole leveling or molding step,

Fig. 6 is a fragmentary view in side elevation suggestive of the step of inserting the final rivet, and

Fig. 7 is a view of the shoe bottom in longitudinal section.

The component parts of my novel insole unit in its preferred form are shown in Fig. 1. These comprise a full length insole blank 10 which may be of leather or any fibrous composition suitable for insole material. As shown herein, the forepart of the insole blank is transversely slashed in the manner characteristic of the "Lumflex" insole. The steel shank stiffener 12 is furnished by the manufacturer curved both longitudinally and transversely and in accordance with my invention is provided with an aperture 13 at its forward end and a corresponding aperture 14 at its rear end. Tack holes are also provided in the shank stiffener adjacent to each of its apertures. The cover piece 15 may be formed of stiff fibre corresponding in outline to the shank and heel seat portions of the insole and, during the process to be described, is provided with spaced apertures 16 and 17. The cushion ply 18 may comprise a full length blank of cork composition co-extensive in area with the insole blank 10.

In assembling these parts the steel shank stiffener 12 is first secured by tacks to the cover piece 15 with the convex face of the shank stiffener next to the outer or lower face of the cover piece. The perforations 16 and 17 are now formed in the cover piece by punching through the perforations 13 and 14 already present in the shank stiffener. The insole blank 10 is now stapled to the cover piece by staples 19 thus enclosing the steel shank stiffener beneath it. Finally the cushion ply 18 is cemented to the inner face of the cover piece 15 throughout its shank and heel seat portions and is cemented to the insole blank 10 throughout its forepart.

The four components thus assembled are now subjected to the shank molding operation by which they are all conformed to each other and to the steel shank stiffener and given the longitudinal and transverse curvature desired in the shoe bottom. The insole unit completed and ready for use is shown in this condition in Fig. 4 of the drawings. It may be manufactured entirely in the stock fitting room of the factory and come to the lasting room as a finished article, accurate in size and shape and including the concealed shank stiffener 12 lightly held in place for manufacturing purposes by tacks. The perforations in the shank stiffener and the cover 15 are concealed by the insole blank 10 and the cushion ply 18 respectively.

The insole unit is now tacked to the last bottom and the lasting operation carried out by any convenient or well known procedure. The position of the insole on the last 23 is indicated in Fig. 3. In this figure the heel-seat tacks 21 are also shown which are characteristic of the heel-seat tacking operation. In lasting a Littleway shoe as herein illustrated fine wire staples 22 are driven in such a manner that, after passing through the upper into the insole, their points are reversed in direction and do not penetrate the surface of the insole beneath the wearer's foot. These lasting staples 22 are shown in Fig. 2 of the drawings.

Thereafter the usual operations on the bottom of the lasted shoe are carried out, and the outsole 24 is laid and temporarily attached by cement. The last is now withdrawn from the shoe and the outsole 24 is stitched as herein shown by a lock stitch seam 27 which on the tread face of the outsole 25 is concealed in a channel. The stitching firmly encloses the steel shank stiffener longitudinally between the outsole and the assembled insole of which the stiff shank cover plays a strong part. The stitched shoe is now placed upon an iron form 30 of a direct pressure leveler as suggested in Fig. 5. Advantage is taken of the jacking of the shoe at this point to lay down the cemented channel flap of the outsole. The shoe in this condition is moved rearwardly into line with and beneath an upper form 31 and then subjected to very heavy direct molding pressure by action of toggle links 32 one of which is shown in Fig. 5. This molding operation imparts to the shoe bottom the exact contour and the fine lines of shoemaking desired in high grade shoes. It forms permanently and once for all the constituent parts of the shank which now includes the outsole in addition to the composite insole unit.

Upon being removed from the leveling machine in this condition the shoe, still in inverted position, is presented to a rivet setting machine as suggested in Fig. 6. The shoe is moved about with the cushion layer 18 of the insole lightly

pressed upon the pilot of the upsetting die 40 of the machine, and through the yielding of the material of the cushion the operator may thus easily detect the concealed perforation in the shank cover piece 15 at the rear end of the shank. When this has been detected the rivet setting machine is operated and a rivet 25 is driven through the outsole 24 passing through the insole 10, the perforation 14 in the shank stiffener, the perforation 17 in the cover, and its inner end is clenched by the upsetting die in the yielding material of the cushion layer 18. A rivet may be also inserted at this time in the forward end of the shank stiffener, but I prefer to delay this step until later in the shoemaking process.

The shoe is then relasted so as to retain its shape and prevent subsequent making room operations disturbing the configuration of the shank. The heel seat is now fastened and for this operation I prefer to use paper fibre pegs 26 as indicated in Fig. 7. These are driven through the outsole and glued in place in a horse-shoe shaped pattern just outside the lasting tacks 21. In addition to securing the heel seat, these pegs, of course, pass through the heel-seat portions of the cover 15 and the insole 10 providing additional securing means about the rear end of the shank stiffener 12.

The heel 29 is now attached and the heel nails provide another set of fastenings uniting the outsole to the insole unit and still further securing the rear end of the steel shank stiffener against any possible displacement. The heel completely covers and conceals the head of the rear rivet 25. Finally the last is removed in the packing room of the factory. It is at this point in the manufacture of the shoe that the second rivet 25 may most advantageously be inserted through the forward end of the shank stiffener. This step is carried out as already explained, by first detecting the concealed aperture in the insole or in the cover piece 15 and then inserting the rivet through the outsole and the components of the insole unit and clenching its inner end in the cushion layer 18 of the insole. The insertion of the second rivet 25 in the forward end of the shank stiffener in the manner above explained rigidly fixes the shank stiffener in the exact position in which it has been molded by the preceding shoemaking operations, that is to say, the shoe is given its most precise artistic shape and then the shank portion is frozen in that condition by the formation of a truss in which the opposite ends of the curved shank stiffener are tied together by the full strength of the insole unit and the outsole material. A shoe manufactured in this manner is very noticeably firmer and more rigid in its shank portion than a shoe of any construction heretofore known, not only longitudinally but also in that torsional twisting or winding is largely prevented.

Among the various modifications of the process which come within the scope of the present invention are two which will be specifically mentioned. If it is desired to cut the insole blanks from a composite sheet having a stiff fibre zone for the heel-seat portion, a separate fibre cover piece for the steel shank stiffener may be omitted since the stiff integral heel seat portion of the insole thus provided will be adequate for the stiffness required in the heel seat. Further, while it is usual to employ a tempered steel shank stiffener it may be found advantageous in some circumstances to employ an untempered shank stiff-

ener and to leave its final formation, at least partly to the operation of the molds to the direct pressure leveling machine. In this case the insertion of the second of the two rivets will anchor the shank stiffener in the shape imparted to it by the molds of the machine.

It will be noted that the process above disclosed may be carried out using lasts without iron bottoms, since no tacks are driven that require to be clenched against the last. When the steel shank stiffener is placed above the insole on the inverted shoe bottom an iron last bottom is required for clenching tacks driven through the forward end of the shank, but this step is obviated by the process of my invention and the necessity of the more expensive iron-bottom lasts avoided.

While I prefer to employ a full-length cushion layer in the insole unit the employment of a sock lining or any other covering ply would be within the scope of my invention. Many advantages of my invention are also secured by riveting or otherwise fastening the forward end of the steel shank stiffener as above disclosed while relying upon the enclosing parts of the shoe bottom for holding its rear end.

In addition to the general advantages above discussed I find that squeaking is largely if not entirely eliminated in shoes made in accordance with my invention, and this is true whether the sole is fastened by cement, welt or McKay processes, as well as by stitches of the Littleway process.

The prefabricated insole unit herein disclosed is the subject-matter of my divisional application Ser. No. 580,543, filed March 2, 1945.

Having thus disclosed my invention and described an illustrative embodiment and procedure, I claim as new and desire to secure by Letters Patent:

1. The process of shoemaking comprising the steps of lasting an upper to an insole having an inner cushion ply and a concealed steel shank stiffener perforated at its forward end and a concealed fibre cover shaped to fill the heel seat of the shoe and to which the rear end of the shank stiffener is attached, heel-seat nailing thereby anchoring the rear end of the shank stiffener in the shoe bottom, removing the last, lock-stitching an outsole in the shoe bottom, molding the shoe bottom to conform with the contour of said shank stiffener, and finally inserting a rivet through the outsole, the insole and the perforation of the shank stiffener thus anchoring the forward end of the shank stiffener in the shoe bottom.

2. The process of shoemaking comprising the steps of lasting an upper to an insole having an inner cushion ply and an attached steel shank stiffener perforated adjacent to both of its ends, fastening the rear end of the shank stiffener in the heel seat of the shoe bottom, removing the last, securing an outsole in the shoe bottom by a lock-stitch seam, molding the shoe bottom by direct pressure between metal forms, and then inserting a rivet through the outsole and the forward perforation of the shank stiffener and sinking its clinched inner end in the cushion ply of the insole.

3. The process of shoemaking comprising the steps of lasting an upper to an insole having an inner cushion ply and an attached steel shank stiffener perforated at both its ends, attaching an outsole to the shoe bottom, removing the last, permanently fastening the rear end of the shank

stiffener in the heel seat of the shoe and the front end of the shank stiffener in the shank of the shoe by locating the perforations in the concealed shank stiffener by feeling pressure on the cushion ply of the insole, and inserting rivets through the entire shoe bottom with their clinched ends sunk in said cushion ply.

4. The process of shoemaking comprising the steps of lasting an upper to an insole having an inner cushion ply, a shank cover and a concealed metal shank stiffener perforated at both its ends and fastened to the shank cover, removing the last, securing an outsole in the shoe bottom by a lock-stitch seam, molding the shank portion of the shoe bottom together with the enclosed shank stiffener, locating the perforations in the concealed shank stiffener by feeling pressure on the

cushion ply of the insole, and anchoring both ends of the shank stiffener in its molded shape by inserting rivets from outside the outsole and clinching them in the cushion layer of the insole.

5. The process of shoemaking comprising the steps of lasting an upper to an insole unit having two plies, one of which is flexible, enclosing a steel shank stiffener perforated at both ends, laying an outsole on the lasted shoe bottom, removing the last and stitching the outsole to the insole, inserting a rivet through the outsole and the rear perforation of the shank stiffener, inserting the last and finishing the bottom, and then withdrawing the last a second time and inserting a rivet through the outsole and the forward perforation of the shank stiffener.

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