P. F. W. C. KRIPPENDORF.

PROCESS OF MAKING SHOES.

APPLICATION FILED JUNE 8, 1916.

1,255,892. Patented Feb. 12, 1918.

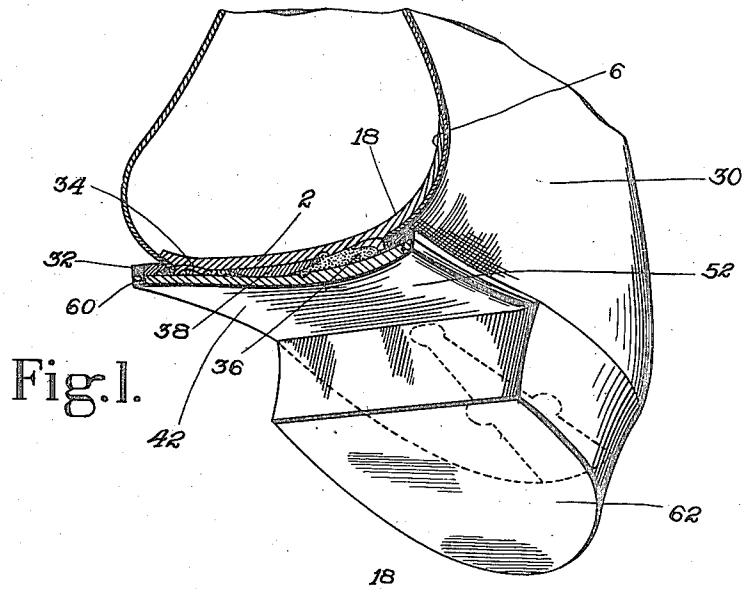


Fig. 1.

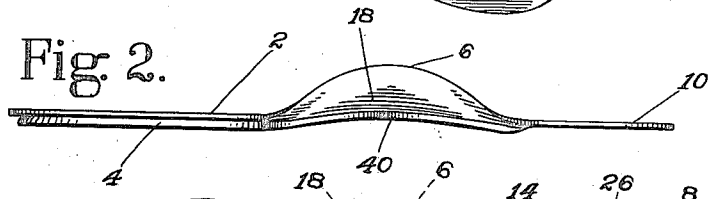


Fig. 2.

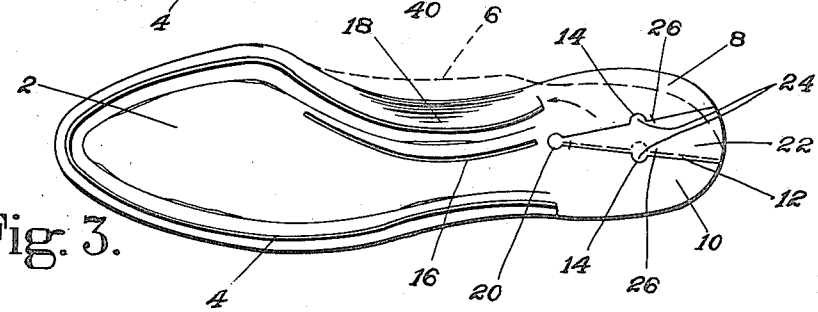


Fig. 3.

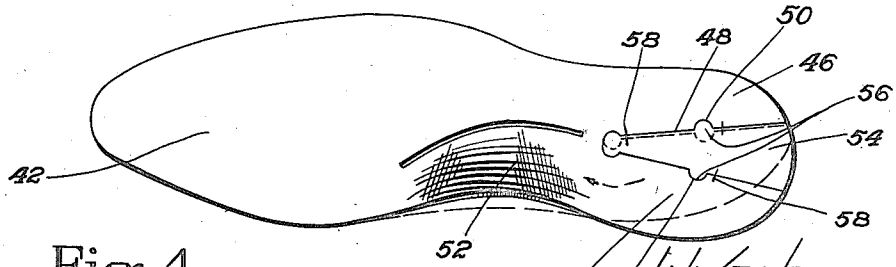


Fig. 4.

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UNITED STATES PATENT OFFICE.

PAUL F. W. C. KRIPPENDORF, OF LYNN, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO UNITED SHOE MACHINERY CORPORATION, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PROCESS OF MAKING SHOES.

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To all whom it may concern:

Be it known that I, PAUL F. W. C. KRIPPENDORF, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented certain Improvements in Processes of Making Shoes, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to improvements in the art of shoe making and is herein illustrated as practised in the manufacture of shoes of the welt type, although it will be apparent that some of the features of the invention are equally applicable to the manufacture of other types of shoes.

In the manufacture of the commercial or standard types of shoes the shank portion of the shoe is ordinarily constructed so as to conform more or less to the anatomical structure of the foot by arching the shank portion of the shoe longitudinally and incorporating a shank piece in the shoe to prevent the arched portion from breaking down during the wear of the shoe. Up to the present time, however, no successful attempts have been made to construct the shoe so as to conform to the recognized transverse conformation of the shank portion of the foot and the result is that the standard types of shoe not only tend to weaken and strain the foot, particularly in the arch of the foot where there is no support, but they produce an unbalanced muscular condition of the foot which prevents the various foot muscles from performing their proper functions. Although it is possible to produce a shoe which conforms to the anatomical structure of individual feet such shoes are usually made by orthopedic specialists and are suited only to custom work so that their cost, therefore, places them beyond the reach of the majority of people. This condition has consequently resulted in the extended use of removable mechanical braces or so-called "arch supports" in the standard types of shoes. These arch supports which are usually made of steel plates shaped to conform to the arched portion of the foot not only add appreciably to the initial cost of the shoe but when incorporated in the shoe render it exceedingly stiff and add unnecessary weight to the shoe and at best furnish only temporary relief for the feet. Also, unless such arch supports are especially made for the particular style of shoe they are to be worn in they destroy the appearance of the shoe and disturb the proper distribution of the pressure of the foot in the shoe and only aggravate the conditions they are intended to correct.

The present invention has for its chief object to devise a novel process by which shoes can be so manufactured as to conform more accurately to the anatomical structure of the foot, and particularly the shank portion of the foot, than the standard types of shoes heretofore produced.

A further object of the present invention is to devise a process of making shoes conforming to the anatomical structure of the foot, which process may be practised under substantially the same shoe factory conditions as those by which standard types of shoes are being manufactured and without adding materially to the cost of producing the shoe.

In accordance with these objects the novel process of the present invention comprises buckling the shank portion of a sole upwardly to form an arch corresponding substantially to the arched conformation of the shank portion of the foot and then so treating the sole as to maintain the shank portion of the sole in its arched condition. The sole so produced may then be employed in substantially the same manner as the usual type of sole to complete the shoe.

One manner in which the process of the invention may be carried out will now be described in connection with the accompanying drawings which illustrate the application of the invention to the manufacture of a shoe of the Goodyear welt type and the novel features thereof will be pointed out in the appended claims.

In the drawings:—

Figure 1 is a perspective view of the heel portion of a shoe constructed in accordance with the present invention;

Fig. 2 is a side elevation of the insole;

Fig. 3 is an inverted plan of the insole; and

Fig. 4 is a plan view of the outsole.

In carrying out the process of the present invention in one manner in which it has been successfully practised, an insole blank 2 of the usual material and form is first prepared for attachment to the shoe upper by providing a stitch receiving member on its under side, herein shown as a channel lip 4, extending from the heel breast line about the forepart of the insole. Preferably the insole blank when died out or otherwise shaped is provided with an additional area of stock 6 along its inside shank portion for the purpose of offering greater support to the inside shank of the foot in the completed shoe and also reducing the tendency of the foot to roll inwardly in the shoe.

According to the present invention the shank portion of the shoe is so constructed as to conform substantially to the anatomical structure of the shank portion of the foot and to provide proper support for this part of the foot. As herein shown this is accomplished by buckling or displacing the stock in the shank portion of the insole 2 upwardly to form an arch corresponding substantially to the arched or lateral and transverse conformation of the shank portion of the foot it is to support and then treating the sole in such manner as to maintain the shank portion of the insole in its arched condition independently of other parts of the shoe which may be secured to it. The word "buckle" is herein used to define the condition produced at the shank portion of the sole caused by relative displacement of other portions of the sole.

The illustrated preferred manner of buckling the insole in the shank comprises separating the heel end of the insole into inside and outside or right and left parts 8 and 10, respectively, by a "buttonhole" cut 12 extending approximately centrally of the heel end of the insole from approximately the heel breast line to its rear edge. Preferably the cut 12 also provides notches 14 in the members 8 and 10. The underside or flesh side of the insole is then scored as at 16 which scoring extends from approximately the forward end of the cut 12, along a line extending centrally, through the shank substantially parallel to the inside channel 4 to approximately the ball or tread line of the insole. The inside member 8 is now moved laterally in the direction of the arrow, Fig. 3, into a position shown in full lines, Fig. 3, so as to create a fullness of stock along the inside shank of the insole which is displaced or buckled upwardly and forms an arch 18 the height of which is to correspond to the transverse convex curvature of the shank of the particular size of foot it is to support.

The amount of fullness created along the inside shank of the insole depends somewhat upon the location of the cut 12 and particularly the forward end or the perforation 20 forming part of the cut and it has been found in practice to be preferable to locate the perforation 20 approximately centrally of either side of the insole at the breast line in which event the outside portion of the insole is not affected by the buckling of the material at the inside shank and therefore provides a substantially level supporting surface for the outside shank portion of the foot. The scoring of the under side of the insole also tends to confine the buckled portion of the insole to the inside shank and to cause the stock to arch progressively from the flat outside shank portion of the insole.

In order "to lock" or retain the shank portion 18 of the insole in its conformed position a V-shaped locking wedge 22, having projections 24 corresponding to the notches 14 of the members 8 and 10 and of such size as to be received between the members 8 and 10 in their separated positions, which it is desired to maintain is interposed therebetween. The wedge locking member 22 is secured in position between the members 8 and 10 by staples 26 in addition to the interlocking notches 14 and projections 24. It will thus be seen that the buckled stock forming the arch 18 of the insole is independently and permanently locked or maintained in arched position and cannot break down under normal conditions. At the same time, however, the arch provides a yielding and resilient support for the entire arched portion of the foot. Under ordinary conditions it will be found that a single height and curvature of arch will accommodate feet of several sizes and different styles of shoes.

The last with which this insole is used is similar to an ordinary commercial last except that the shank portion of the last is somewhat deeper and corresponds more closely to that of a normal foot. The shoe upper 30 which is cut and prepared in the usual manner is now assembled together with the insole upon the last, the arched portion 18 of the insole fitting into and conforming to the reduced shank portion of the last and the extra portion 6 of the insole which has been reduced to a feather edge being conformed to the inside face of the last. The heel end of the insole, or more accurately, the offset member 8 is now trimmed to the shape of the heel end of the last and the shoe then lasted in the usual manner. The inside portion of the heel end of the insole may also be shaped to compensate for the displacement of this portion of the sole when the insole blank is first shaped or died out. After the shoe has been lasted the upper 30 and the welt 32 are secured through the channel 4 to the insole 2 by stitches 34 and the shoe then inseam trimmed. The usual shoe filler 36 is then applied to the shoe bottom and, if desired, a resilient shank 38 secured in position. It has been found, how-

ever, that the use of a shank is not essential to prevent the longitudianl arch of the shoe from breaking down, particularly when heavy stock is used for the insole since the buckling of the stock in the shank also creates an opposed longitudinally extending arch in the shank of the insole as indicated at 40, Fig. 2, which arch is also locked against breaking down owing to the opposed transverse arch which is locked in position.

As herein illustrated, the outsole blank 42 which is of the usual construction is also buckled along its inside shank in a similar manner to the insole so as to provide an arch conforming to the arch of the insole and adapted to reinforce said arch. Accordingly, the heel end of the outsole 42 is separated into inside and outside members 44 and 46, respectively, by a buttonhole cut 48 extending from approximately the heel breast line of the outsole to its rear edge.

This cut is preferably located in substantially the same relative position on the heel end of the outsole as the cut 12 of the insole so that an arch having similar proportions to the arch formed on the insole will be formed on the outsole. Notches 50 are also preferably cut in the members 44 and 46. The member 44 is now moved laterally in the direction of the arrow, Fig. 4 to buckle the inside shank portion 52 of the outsole upwardly to form an arch adapted to fit in under the arch 18 of the insole to reinforce it and relieve the upper securing stitches along the inside shank of the insole from the strain caused by flexing the shoe in walking. The arch 52 of the outsole is also independently and permanently locked in its formed position by inserting a similar wedge-shaped locking member 54 between the member 46 and the offset member 44 in their relative positions and securing it in said position to the members by projections 56 which interlock with the notches 50 and by staples 58 as in the insole. The heel end of the outsole is now trimmed to shape and the outsole secured to the welt by stitches 60. A heel 62 is now attached to the shoe, the heel covering the portion of the outsole which is split as shown in Fig. 1 and the shoe then completed in the usual manner. Since the forward end of the cut 48 at the heel end of the outsole terminates at approximately the front edge of the heel, the arch 52 of the outsole will not extend on to the heel seat so that a substantially level surface is provided for the attachment of the heel and a heel of the usual kind may be employed.

The completed shoe conforms to the anatomical structure of the foot throughout both the longitudinal and the transverse curvatures of the foot in the shank. The shank of the shoe at the outside is comparatively low and level to afford substantial support for the outside shank portion of the foot and the inside shank of the shoe is gradually curved upwardly from the outside shank so as to conform to the transverse conformation of the shank of the foot and provides adequate support throughout the entire shank portion of the foot. The buckling of the stock at the inside shank of the insole also creates a longitudinally disposed arch formation which increases progressively from the outside shank as does the corresponding formation of the foot.

By constructing a shoe in the manner herein described it will be apparent that the weight of the body will be distributed uniformly over those parts of the foot that are designed to sustain this weight, the correct balance of the foot will be maintained and the normal functions of the various muscles of the foot will be restored. The "locked" formation of the soles whereby they are prevented from breaking down relieves the strain on the shoe upper and the stitches along the shank so that a stronger and more serviceable shoe is produced. Moreover, shoes made by this process are exceedingly flexible and are especially adapted to correct the abnormalities of the foot and restore it to its normal condition without rendering the shoe uncomfortable until such abnormalities have been corrected.

It will be further noted that the process of the present invention necessitates substantially no changes in the usual factory methods by which the standard types of shoes are manufactured and does not materially increase the cost of manufacturing such shoes. Also, the appearance of the shoe produced by said method is not materially different from the commercial types of shoes.

Having described my invention, I claim as new and desire to secure by Letters Patent of the United States:—

1. That improvement in the art of shoe making which comprises buckling the shank portion of a sole upwardly to form an arch corresponding substantially to the arched conformation of the foot and locking it in arched position, assembling the sole and an upper upon a last, and then attaching the upper to the sole.

2. That improvement in the process of making shoes which comprises buckling the shank portion of a sole upwardly to form an arch corresponding substantially to the arched conformation of the shank portion of the foot, treating the sole to maintain the shank portion of the sole in its arched condition, assembling the sole and an upper upon a last, and then attaching the upper to the sole.

3. That improvement in the art of shoe making which comprises buckling the shank portion of an insole upwardly to form an

arch corresponding substantially to the arched conformation of the foot and locking it in arched position, assembling the insole and an upper upon a last, attaching the upper to the insole, arching the outsole in the shank to the arched conformation of the insole, and then attaching the outsole to the shoe.

4. That improvement in the art of shoe making which comprises buckling the shank portion of an insole upwardly to form an arch corresponding substantially to the arched conformation of the foot and locking it in arched position, assembling the insole and an upper upon a last, attaching the upper to the insole, arching the outsole in the shank to the arched conformation of the insole and permanently locking it in arched position, and then attaching the outsole to the shoe.

5. That improvement in the process of making shoes which comprises buckling the shank portion of an insole upwardly to form an arch corresponding substantially to the arched conformation of the foot and locking it in arched position, assembling the insole and an upper upon a last, attaching the upper to the insole, and then attaching an outsole to the shoe.

6. That improvement in the process of making shoes which comprises displacing a part of the heel end of a sole laterally to cause the inside shank portion of the sole to buckle upwardly and form an arch corresponding substantially to the arched conformation of the shank portion of the foot, fastening the offset part of the heel end of the sole in its offset position, assembling the sole and an upper upon a last, and then attaching the upper to the sole.

7. That improvement in the process of making shoes which comprises separating the heel end of a sole from approximately the heel breast line to its rear edge into inside and outside members, moving the inside member laterally to cause the inside shank portion of the sole to buckle upwardly and form an arch corresponding substantially to the arched conformation of the shank portion of the foot, securing the laterally offset member relatively to the outside member to maintain the shank portion of the sole in its arched condition, assembling the sole and an upper upon a last, and then attaching the upper to the sole.

8. That improvement in the process of making shoes which comprises displacing a part of the heel end of an insole laterally to cause the inside shank portion of the insole to buckle upwardly and form an arch corresponding substantially to the arched conformation of the shank portion of the foot, securing the displaced part of the heel end of the insole in its offset position, trimming the heel end of the insole to the desired shape, assembling the insole and an upper upon a last, displacing a part of the heel end of an outsole laterally to cause the shank portion of the outsole to conform to the arched conformation of the insole, securing the displaced part of the outsole in its offset position, and then attaching the outsole to the shoe.

9. That improvement in the process of making shoes which comprises separating the heel end of the insole from approximately the heel breast line to its rear edge into inside and outside members, scoring the under side of the insole along a line extending centrally through the shank portion substantially parallel to the inside edge of the shank and from approximately the heel breast line to the ball line, moving the inside member laterally to cause the inside shank portion of the insole to buckle upwardly and form an arch corresponding substantially to the arched conformation of the shank portion of the foot, securing the laterally offset member relatively to the outside member to lock the arched portion of the insole in its assumed position, assembling the insole and an upper upon a last, attaching the upper to the insole, separating the heel end of an outsole from approximately the heel breast line to its rear edge into inside and outside members, scoring the upper side of the outsole along a line extending centrally through the shank portion substantially parallel to the inside edge of the shank and from approximately the heel breast line to the ball line, moving the inside member laterally to cause the inside shank portion of the outsole to buckle upwardly and form an arch corresponding to the arch of the insole, and then attaching the outsole to the shoe.

10. That improvement in the art of shoe making which comprises providing an insole with upper securing means, separating the heel end of the insole into inside and outside members, moving the inside member laterally to cause the inside shank portion of the insole to buckle upwardly and form an arch corresponding substantially to the arched conformation of the shank portion of the foot, securing the offset member relatively to the outside member thus locking the arched portion in its assumed position, assembling the insole and an upper upon a last, securing a welt and the upper to the insole, separating the heel end of an outsole from approximately the heel breast line to its rear edge into inside and outside members, moving the inside member of the heel end of the outsole laterally to cause the inside shank portion of the outsole to buckle upwardly and form an arch corresponding to the arched portion of the insole, securing the offset portion of the outsole relatively

to the outside portion thereof, attaching the outsole to the welt and applying a heel to the shoe.

11. That improvement in the process of making shoes which comprises providing an insole having its inside shank portion projecting laterally, separating the heel end of the insole from approximately the heel breast line to its rear edge into inside and outside members, providing a stitch receiving member upon the under face of the insole, scoring the under face of the insole from approximately the heel breast line to the ball line along a line substantially parallel to the inside edge of the insole, moving the inside member laterally to cause the shank portion of the insole inside of the scoring to buckle upwardly and form an arch corresponding substantially to the arched conformation of the shank portion of the foot, inserting a locking member between the offset and the outside members thereby locking the arched portion of the insole in its assumed position, assembling the insole and an upper upon a last, attaching a welt and the upper to the stitch receiving member of the insole, separating the heel end of an outsole from approximately the heel breast line to its rear edge into inside and outside members, moving the inside portion laterally to cause the inside shank portion of the outsole to buckle upwardly and form an arch corresponding to the arch of the insole, inserting a locking member between the offset and the outside members of the outsole, attaching the outsole to the welt, and applying a heel to the shoe.

12. That improvement in the process of making soles which comprises buckling the shank portion of a sole upwardly to form an arch corresponding substantially to the arched conformation of the foot, and then locking the buckled portion of the sole in its arched condition.

13. That improvement in the process of making soles which comprises buckling the shank portion of a sole upwardly to form an arch corresponding substantially to the arched conformation of the foot, and then treating the sole to maintain the shank portion of the sole in its arched condition.

14. That improvement in the process of making soles which comprises separating the heel end of the insole into inside and outside members, displacing the inside member laterally to cause the inside shank portion of the sole to buckle upwardly and form an arch corresponding substantially to the arched conformation of the shank portion of the foot, and then securing the offset member relatively to the outside member.

15. That improvement in the process of making soles which comprises separating the heel end of a sole from approximately the heel breast line to its rear edge, moving the inside member laterally to cause the inside shank portion of the sole to buckle upwardly and form an arch corresponding substantially to the arched conformation of the shank portion of the foot, inserting a locking member between the offset member and the outside member of the heel end of the sole in the relative positions it is desired to maintain, and then securing said locking member to both of said members.

16. That improvement in the process of making an insole which comprises providing an insole having upper securing means, separating the heel end of the insole from approximately the heel breast line to its rear edge into inside and outside members, scoring the under side of the insole along a line extending substantially parallel to the inside edge of the insole to approximately the ball line, displacing the inside member laterally to cause the inside shank portion of the insole to buckle upwardly and form an arch corresponding substantially to the arched conformation of the shank portion of the foot, inserting a locking piece between the opposed edges of the inside and outside members to retain the arched portion in its assumed position, and then securing the locking member to the insole.

17. That improvement in the process of making insoles which comprises providing an insole blank having an additional area of stock extending along its inside shank portion, providing the under face of the insole with upper securing means, separating the heel end of the insole from approximately the heel breast line to its rear edge into inside and outside members, displacing the inside member laterally to cause the inside shank portion of the insole to buckle upwardly and form an arch corresponding substantially to the arched conformation of the shank portion of the foot, inserting a locking piece between the opposed edges of the inside and outside members to retain the arched portion in its assumed position, and then securing the locking member to the insole.

18. That improvement in the process of making insoles which comprises separating the heel end of the insole by a buttonhole cut extending from approximately the heel breast line to its rear edge into inside and outside members, the forward end of said cut being located at approximately the heel breast line and both members of said inside and outside members having notches cut therein, moving the inside member laterally to cause the inside shank portion of the insole to buckle upwardly and form an arch corresponding substantially to the arched conformation of the shank portion of the foot, providing a wedge-shaped locking

member of sufficient size to maintain the displaced member in said position relatively to the other member when interposed therebetween, and having projections on either of its sides to coöperate with the notches in the inside and outside members, inserting said locking member between said inside and outside members, the projections on said wedge member interlocking with the notches of the inside and outside members, and then securing the wedge member to said outside member by staples.

In testimony whereof I have signed my name to this specification.

PAUL F. W. C. KRIPPENDORF.