

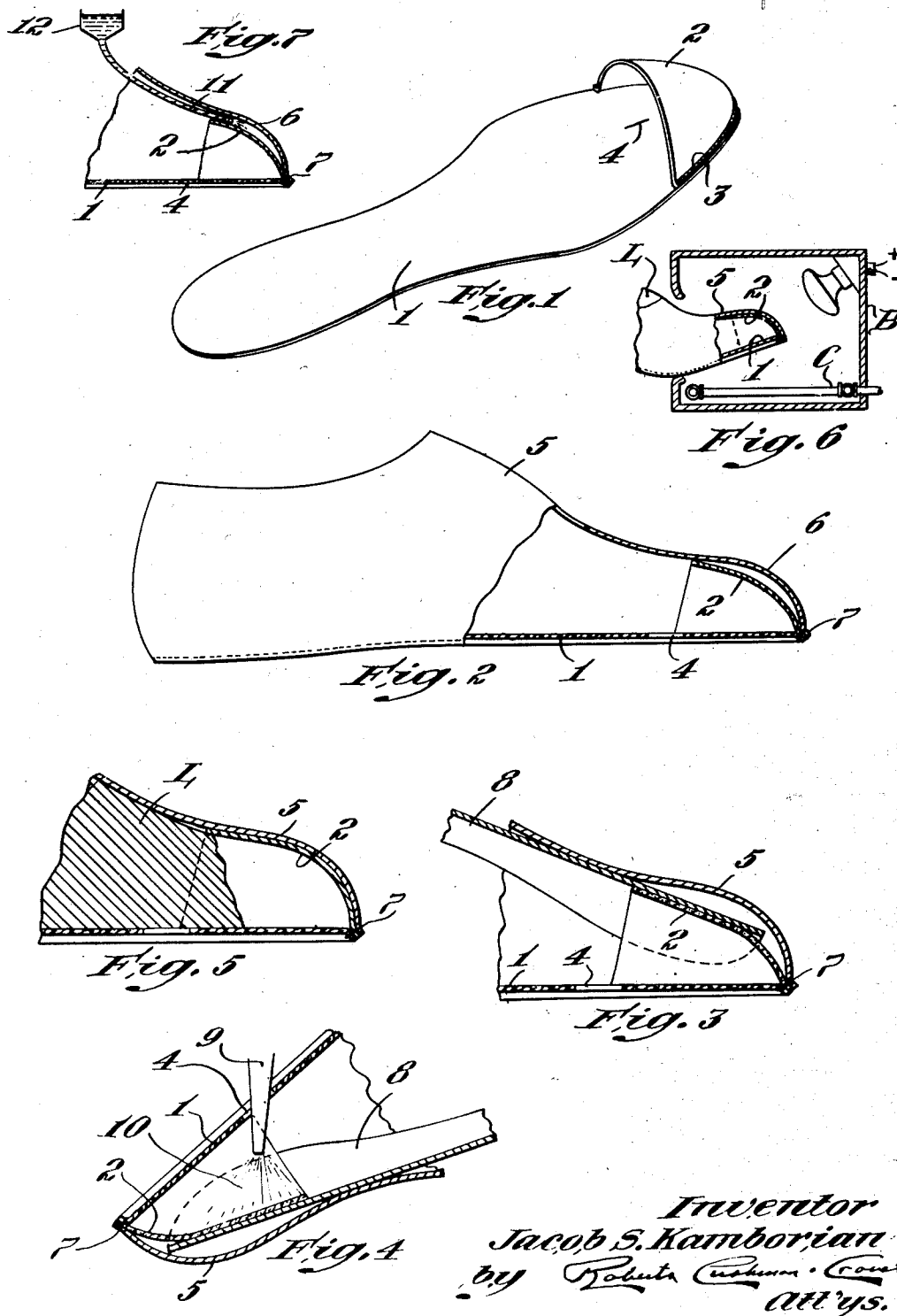
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METHOD OF STIFFENING THE TOE PORTION OF SHOES

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METHOD OF STIFFENING THE TOE
PORTION OF SHOES

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This invention pertains to footwear and more especially relates to a novel method of stiffening the toe portion of the upper of a shoe.

In making force-lasted shoes, whether of the platform or other type, it is customary to sew the edge of the sock lining or soft insole directly to the lower edge of the upper, including the forepart and toe portions of the latter. This operation is carried out before introducing the last, and as the margins of the upper and sock lining are thus permanently united, it is impossible to employ a flanged toe box and very difficult properly to locate and anchor in place any form of pre-moulded toe box or stiffener.

Since the material of the shoe upper is, in many instances, thin and delicately colored, it is not permissible to employ a stiffener or stiffener-activating means of such character or in such a manner as to cause injury to the exposed upper material at the end of the shoe. In most instances this prevents the use of any stiffening agency which might soak into or impregnate the outer element of the upper. Likewise the application of any substantial degree of heat to the upper is not permissible. These limitations thus make it especially difficult to provide the requisite degree of stiffness at the end portion of shoes of the force-lasted type, the usual construction of which precludes the use of a flanged pre-moulded stiffener, and in which the uppers are customarily made of textile material, easily stained by many organic solvents.

One object of the present invention is to provide a practical method whereby the end portion of the upper of a shoe, in particular a shoe of the force-lasted type, may be stiffened to the desired degree. A further object is to provide a method of stiffening the toe portion of the upper of a shoe, after an insole or equivalent sole element has been permanently secured to the lower edge of the upper at its toe portion, which is equally applicable to shoes having lined or unlined uppers. A further object is to provide means for furnishing an end stiffener to the upper, after the upper has been permanently secured to an insole or sock lining and without danger of damage to the material of the upper. A further object is to provide, as a step product in the process of stiffening the end of a shoe upper, a combined insole or sock lining and an end stiffener element. Other and further objects and advantages of the invention will be pointed out in the following more detailed description wherein

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element and toe stiffener embodying features of the present invention;

Fig. 2 is a side elevation, partly in vertical section, showing the combined sole element and toe stiffener assembled with and united to the shoe upper;

Fig. 3 is a fragmentary section, on substantially the same plane as Fig. 2, showing the toe portion of the shoe, to larger scale, and indicating one of the steps of the process of the present invention;

Fig. 4 is a view similar to Fig. 3 but showing the shoe inverted and illustrating a further step in the process;

Fig. 5 is a fragmentary section, similar to Fig. 3, showing the toe stiffener as it appears at the completion of the operation;

Fig. 6 is a diagrammatic vertical section illustrative of apparatus useful in the external heat treatment of the toe end of the shoe to insure the bonding together of the toe box and upper; and

Fig. 7 is a fragmentary view generally similar to Fig. 3, illustrating a supplementary or alternative procedure.

Referring to the drawings, the numeral 1 designates a sole element, for instance the sock lining or insole of a force-lasted shoe. An end stiffener here shown as a toe box or stiffener 2 is associated with this sole element and permanently secured to the toe of the sole element by a sewed seam 3 or other appropriate fastening means. In accordance with the present invention the sole element 1 is provided near that end of the shoe which is to be stiffened, with an aperture 4, here illustrated as a normally closed slit. While a slit is preferred, since it does not substantially break the continuity of the sole element in the completed shoe, it is contemplated that an aperture of different form, for example a large perforation or the like may be employed instead of the slit.

The stiffener 2 may be made of any appropriate material in accordance with the practice to be followed in causing it to conform to the inner surface of the shoe upper and to become stiff and shape-retaining after being so conformed. For instance, the stiffener 2 may be a piece of textile fabric impregnated or coated with a substance, for example cellulose acetate, which may be made to become soft and pliable by treatment with an appropriate solvent such as acetone, but which becomes hard and shape-retaining after the solvent has evaporated. Alternatively, the toe stiffener 2 may comprise textile fabric having

Fig. 1 is a perspective view of a combined sole

a portion of its constituent threads or fibers of a material, such for example as cellulose acetate, which may be softened by a solvent and later becomes stiff and hard, thus imparting to the fabric the desired shape-retaining characteristics. Similarly, the stiffener 2 may merely be a piece of suitable textile material, felt or the like, which only becomes stiff and shape-retaining when impregnated with a stiffening agent, for instance shellac. As a further example the stiffener 2 may be of a thermoplastic material, for instance felt impregnated with an asphalt compound or with one of the thermoplastic synthetic resins, so that it becomes soft and flexible when heated but resumes or acquires a shape-retaining character after having been heated and permitted to cool. Fabric impregnated with a thermosetting synthetic resin may similarly be employed.

Having prepared the combined sock lining and stiffener 2, this assembly is associated with the shoe upper 5, which may be of any suitable type, according to the style of shoe to be made, the upper comprising the toe portion 6. The lower portion of the upper is permanently secured to the margin of the sock lining 1 by means of a sewed seam 7 or by other appropriate fastener means which permanently unites the upper to the sock lining, this permanent union extending about the forepart portion, at least, of the upper and around the toe portion of the upper.

When reference is made to the "shoe upper" it is to be understood that the upper may be a lined or an unlined upper according to the type of shoe to be made, and when herein reference is made to the "inner surface or inside" of the upper, it is to be understood that this surface would be the inside surface of the inner element of the upper, whether lined or unlined.

Since the activation of the stiffener 2, so that it will ultimately become stiff and shape-retaining, requires its treatment with an activating medium, such as above referred to, it is requisite to protect the inner surface of the upper from this activating medium during the application of the latter to the stiffener 2. For this purpose, protective means is introduced, in accordance with the present invention, between the inner surface of the upper and the stiffener 2 during the initial stages, at least, of the stiffening operation. Thus, having assembled the upper and sock lining and united them, as described, and before the introduction of the last, a shielding device 8 is introduced through the top of the upper so as to extend between the stiffener 2 and the inner surface of the upper. This shielding device, as here illustrated, is in the nature of a stiff horn of sheet metal or the like, of curved transverse section and being so introduced that the stiffener 2 lies within the cavity of this transversely curved shielding member 8. The shielding member is pushed down into the shoe upper as far as it will go, thus separating the stiffener 2 from the inside surface of the upper and protecting the upper from any activating medium which may be employed in treating the stiffener.

Either before or after the introduction of the shielding member 8 the assembly is inverted, as shown in Fig. 4, so as to bring the slit 4 in the sock lining into convenient position for the introduction through this slit or aperture, of a delivery element 9 for the activating medium. As illustrated, this delivery element 9 is a nozzle through which an activating medium 10, for example a spray of a solvent material, may be directed against the inner surface of the stiffener

2. Thus if, as above suggested, the stiffener 2 comprise a material such as cellulose acetate, which is softened by treatment with acetone, the spray 10 may be a spray of acetone which softens the stiffener member 2 so that it becomes pliable and soft. If on the other hand the stiffener 2 be a material which must have a stiffening agent applied to or incorporated in it, the spray 10, in that instance, may, for example, be shellac or a similar substance which becomes hard and stiff when it dries. Again if the stiffener element 2 comprise a thermoplastic or thermosetting material, the jet issuing from the delivery nozzle 9 may be hot air, steam, or other hot vapor or gas, or, instead of the nozzle 9, a heating element, for instance an infrared bulb, may be introduced through the slit 4, so as to heat the material of the stiffener 2 to the desired degree.

Whatever activating medium be employed, when the stiffener 2 has been properly activated, the delivery element 9 is withdrawn, the shield 8 is removed from the shoe upper and, before the stiffener 2 has stiffened, a last L is introduced into the upper so as to tension the upper and so as to force the stiffener 2 into firm engagement with the inner surface of the end portion 5 of the upper, thus conforming the stiffener to the upper at its end portion and to the contour of the end portion of the last. The last is allowed to remain in the upper sufficiently long to insure the firm setting of the stiffener 2 so that it will retain the shape imparted to it by the last.

Instead of or in addition to the application of the stiffening agent to the inside surface of the toe stiffener 2, it is sometimes desirable to introduce the stiffening agent (whether an actual stiffening medium, cement, or an activating medium for stiffening material initially contained in the member 2) between the member 2 and the upper, or the upper lining, if such be employed. Thus, it is sometimes desirable to introduce a cement of the pyroxylin type for the purpose of increasing the stiffness of the toe box beyond its normal stiffness or to bond the toe box very firmly to the upper, in particular along the upper margin of the toe box. For this purpose, an appliance such as illustrated at 11 (Fig. 7) may be employed. This appliance comprises a thin, stiff delivery tube, or applicator, preferably curved longitudinally to facilitate the introduction of its tip between the upper edge of the toe box and the shoe upper and which is rigid enough for ready handling and guidance, and which is connected at its rear end to a reservoir 12 for the fluid medium employed. The flow of the fluid medium through the tubular applicator 11 may be induced solely by gravity, but preferably by the application of pressure (for instance compressed air or by a mechanical piston or the like acting on the upper surface of the fluid in the reservoir).

In operation the applicator tube 11 is introduced through the top of the shoe upper and its delivery end or tip is pushed between the upper and the upper edge of the box 2. The tip is then moved about so as to deliver the treating medium at the desired points. The treating medium is caused to flow either by gravity or by applied pressure, as desired and in liquid form or as a spray. By the use of this thin, small applicator tube it is possible to deposit the treating medium at any point or points desired between the assembled box and upper, for example it may be deposited as a plurality of separate spots along

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the upper edge of the box so as to bind the upper edge very firmly to the upper.

The applicator tube 11 may be of circular transverse section, but is preferably flattened so as to have a horizontally elongate transverse section, thus to facilitate its introduction between the edge of the toe box and the upper.

If the stiffener medium be adhesive in its nature, whether thermosetting or thermoplastic, it may be desirable to expose the toe portion of the shoe, after the introduction of the last, to externally applied heat, for instance by placing it in a steam box where it is heated by dry or moist steam, or by exposing it to some other heat source, for instance an infrared lamp, and to maintain such temperature treatment for a sufficient time to insure the amalgamation of the toe box and vamp by the adhesive stiffening medium. Thus as illustrated in Fig. 6, the toe end of the shoe, after the last has been introduced into it, as described with respect to Fig. 5, is housed in a box B having therein steam coils C and the infrared lamp L. These heat sources may be used concomitantly or alternatively, and are illustrative, by way of example, of any suitable means for the heat treatment of the toe end of the shoe whereby to cause the adhesive stiffening medium to bond together the toe box and upper.

Preferably, the stiffener 2 is initially of such a character that its lower margin, at least, is easily penetrable by a sewing machine needle so that it is readily secured to the sock lining 1 by a stitching or like operation. With this in view, if the stiffener 2 is normally stiff, its marginal portion may be left soft or temporarily softened, prior to stitching.

Since the stiffener 2 is secured to the sock lining by the stitching 3, it is firmly anchored in position, although it has no retaining flange underlying the insole or sock lining, and thus when it has been conformed to the end portion of the last and has permanently set, it remains securely in position during the life of the shoe.

Usually the stiffener 2 will be normally of somewhat less dimensions when applied to the sock lining than in the finished shoe, the material of which it is made being capable of stretching to some degree, particularly after activation by the chosen activating medium, and thus it stretches in response to the introduction of the last and becomes smoothly conformed to the last without tendency to wrinkle. While a toe stiffener has been chosen for specific illustration, it is obvious that a heel stiffener may be similarly provided, and while a desirable embodiment of the invention has been illustrated and described by way of example, it is to be understood that the invention is broadly inclusive of any and all modifications falling within the scope of the appended claims.

I claim:

1. That method of stiffening the end of a shoe upper which comprises as steps assembling and uniting a sole element and an end stiffener, providing a shoe upper, permanently uniting the lower edge of the upper to the margin of the sole element, introducing a protective device between the inner surface of the upper and the end stiffener, applying an activating agent to the inner surface of the stiffener, withdrawing the protective device, and introducing the last into the upper.

2. That method of stiffening the end of a shoe upper which comprises as steps providing a sole

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element having an aperture in its end portion, providing an end stiffener of stretchable material and slightly less in dimensions than is required in the completed shoe, assembling and uniting the sole element and stiffener, providing a shoe upper, permanently uniting the lower edge of the upper to the margin of the sole element, introducing a shield between the stiffener and the inner surface of the upper, introducing a stiffener activating agent through the aperture in the sole element and applying said agent to the inner surface of the stiffener, withdrawing the shield, and introducing the last into the upper.

3. That method of stiffening the toe end of a shoe upper which comprises as steps providing a toe stiffener and a sock lining, the latter having a slit in its toe end portion, the margin at least of the toe stiffener being soft and penetrable by a sewing needle, uniting the margin of the stiffener to the toe portion of the sock lining by a sewed seam, providing an upper, permanently uniting the lower edge of the upper to the sock lining, introducing a shield between the stiffener and the inner surface of the upper, introducing through the slit in the sock lining a delivery element for a stiffener-activating agent, delivering the activating agent against the inner surface of the stiffener, withdrawing the delivery element and shield, and pressing the stiffener into contact with the inner surface of the upper and holding it in contact therewith until the stiffener has set.

4. That method of stiffening the end of a shoe upper which comprises as steps providing an end stiffener and a sock lining, the latter having an aperture in its end portion, uniting the margin of the stiffener to the edge of the end portion of the sock lining, providing an upper, permanently uniting the lower edge of the upper to the margin of the sock lining, introducing a shield between the stiffener and the inner surface of the upper, introducing a nozzle through the aperture in the sock lining, delivering a stiffening medium through the nozzle against the inner surface of the stiffener, withdrawing the nozzle and shield, and holding the stiffener in contact with the inner surface of the upper until the stiffening medium has set.

5. That method of stiffening the end of a shoe upper which comprises as steps providing a sock lining having an aperture in its end portion, providing a stiffener including within its substance a medium which, after heat treatment, becomes hard and stiff, uniting the margin of the stiffener to the edge of the end portion of the sock lining, providing an upper, permanently uniting the lower edge of the upper to the margin of the sock lining, introducing a shield between the stiffener and the inner surface of the upper, introducing through the aperture in the sock lining heating means operative to heat the stiffener, heating the stiffener to the requisite degree to cause it to become hard and stiff as a result of the heat treatment, withdrawing the heat-applying means and the shield and introducing a last into the upper thereby to force the stiffener into firm and conforming contact with the inner surface of the upper, and leaving the last within the shoe until the stiffener has permanently set.

6. That method of stiffening the end of the upper of a force-lasted shoe which comprises as steps providing a normally soft stiffener having incorporated in its substance a stiffening material which is inherently capable of becoming stiff

and shape-retaining, providing a sock lining having an aperture in its end portion, assembling and uniting the stiffener and sock lining, providing an upper, permanently uniting the lower portion of the upper to the margin of the sock lining, introducing a protective device between the inner surface of the upper and the stiffener, introducing through the opening in the sock lining an activating agency for the stiffening medium in the stiffener, and holding the stiffener in contact with the inner surface of the upper until the stiffening medium has set.

7. That method of stiffening the toe end of the upper of a force-lasted shoe which comprises as steps providing a toe stiffener inherently capable of becoming shape-retaining after treatment with an appropriate activating medium, providing a sock lining having an aperture in its toe end portion, permanently uniting the sock lining and toe stiffener, providing an upper, permanently uniting the lower edge of the upper to the margin of the sock lining, providing a stiff horn of sheet metal, curved in transverse section, introducing said horn between the inner surface of the upper and the toe stiffener, introducing treating means through the aperture in the sock lining so as to activate the toe stiffener, removing the horn, conforming the stiffener to the inner surface of the toe portion of the shoe upper, and maintaining said conformity until the toe stiffener has become shape-retaining.

8. That method of stiffening the end of a shoe upper which comprises as steps providing a sole element having an aperture in its toe end, providing an end stiffener of stretchable material slightly less in dimensions than is required in the completed shoe, assembling and uniting the sole element and stiffener, providing a shoe upper, permanently uniting the lower edge of the upper to the margin of the sole element, introducing a shield between the stiffener and the inner surface of the upper, introducing a thermoplastic, adhesive stiffening medium through the aperture in the sole element and applying said medium to the inner surface of the stiffener, withdrawing the shield, introducing a last into the upper, thereby to force the stiffener into firm contact with the inner surface of the upper and subjecting the toe portion of the shoe to externally applied heat thereby to bond together the upper and stiffener.

9. That method of stiffening the end of a shoe upper which comprises as steps providing an end stiffener and a sock lining, the latter having an aperture in its end portion, uniting the margin of the stiffener to the edge of the end portion of the sock lining, providing an upper, permanently uniting the lower edge of the upper to the margin of the sock lining, introducing a shield between the stiffener and the inner surface of the upper, introducing a nozzle through the aperture in the

sock lining, delivering an adhesive medium through the nozzle against the inner surface of the stiffener, withdrawing the nozzle and shield, and holding the stiffener in close contact with the inner surface of the upper while subjecting the toe portion of the shoe to externally applied heat thereby to amalgamate the upper and stiffener.

10. That method of stiffening the end of a shoe upper which comprises as steps providing an end stiffener and a sock lining, the latter having an aperture in its end portion, uniting the margin of the stiffener to the edge of the end portion of the sock lining, providing an upper, permanently uniting the lower edge of the upper to the margin of the sock lining, introducing a shield between the stiffener and the inner surface of the upper, introducing a thermosetting, adhesive stiffening medium through the aperture in the sock lining and applying it to the inner surface of the stiffener, holding the stiffener in close contact with the inner surface of the upper, and subjecting the toe portion of the shoe to externally applied heat thereby to bond the upper and stiffener and maintain such heat treatment until the adhesive has set.

11. That method of adhesively bonding a toe box and the upper of a shoe, the upper being already permanently united to the toe box and to a sole member by marginal fastening means, which comprises introducing the tip of a tubular applicator between the rear edge of the toe box and the upper of the shoe, and delivering fluid adhesive through the applicator into the space between the box and upper, and subjecting the box and upper to pressure.

12. That method of stiffening the toe portion of a shoe having an upper and a toe box which have been permanently united along their margins to a sole member, which comprises introducing the tip of a tubular applicator between the rear edge of the toe box and the upper, and discharging a stiffening agent through the applicator so as to coat portions at least of the upper surface of the toe box.

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