Sept. 23, 1952 R. B. HARRISON 2,611,726

SHOE LINING HAVING SELF-STIFFENING PROPERTIES

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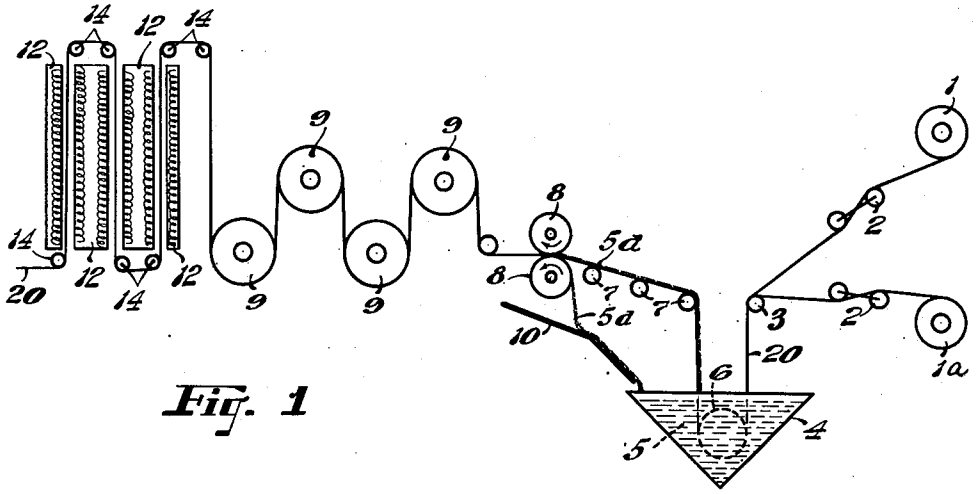


Fig. 1

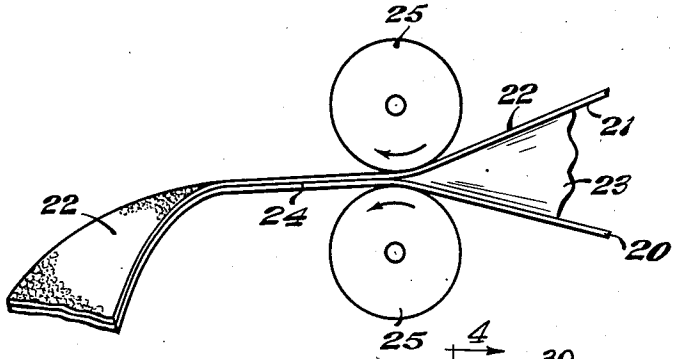


Fig. 2

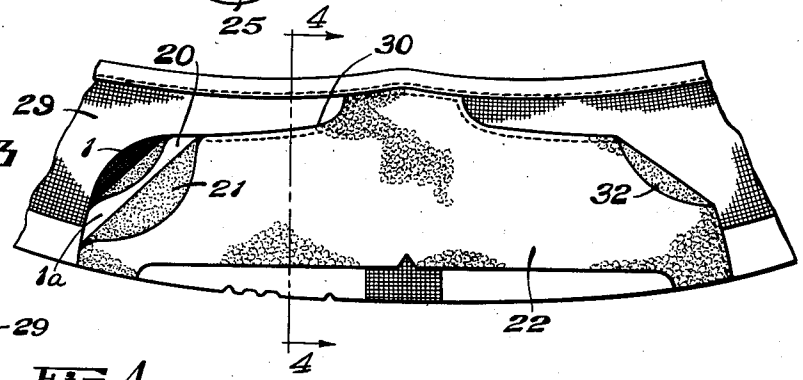


Fig. 3

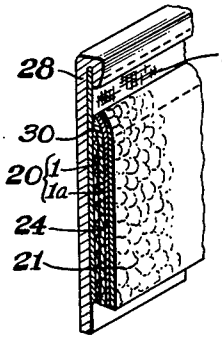


Fig. 4

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SHOE LINING HAVING SELF-STIFFENING PROPERTIES

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5 Claims. (Cl. 154—46)

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This invention consists of an improved shoe lining having stiffening properties for use in the construction of shoe uppers. More particularly it comprises a unitary structure possessing counter stiffening properties and presenting a quarter-lining surface. The improved lining is of the thermosoftening type so that it may be assembled with counter portions of upper leather or other outer integument in a heat-softened and moldable condition and molded to the contour of the last during the pulling over and heel-lasting steps of the shoemaking process.

Heretofore it has been the general practice, in the construction of the counter portions of shoes, to insert a fiber counter stiffener as a distinct or unitary element between the leather or outer integument and an inner textile lining. The stiffener may be molded either separately or with the other plies of the counter pocket, but in commercial shoemaking practice a three-ply construction has generally been considered necessary and this entails fitting, tempering and assembling operations which must be carried out with accuracy in order to insure a satisfactory product. The three-ply construction which includes a fibre stiffener also necessarily results in a considerable and sometimes objectionable thickness of material which it is often difficult to shape smoothly and accurately to the last about the heel seat of the shoe. It is usually considered necessary to apply an adhesive to one or both faces of the counter stiffener to secure it adhesively to at least one of its enclosing plies and generally to both of them.

Patent No. 2,391,445, dated December 25, 1945, discloses a fiberboard counter stiffener having a resinous surface coating with an embossed pattern thereon. This unit is designed to be combined with shoe upper material and molded to form the counter portion of a shoe prior to assembling it in the shoe upper. Such procedure is not appropriate, however, for the production of shoes of more conventional styles and types.

The principal object of this invention is to provide a laminated upper lining which will serve as the quarter lining as well as the counter stiffener and which is thermosoftening and can be readily molded to the contour of the last during the pulling over and heel lasting steps. Thus an important economy is introduced into the shoemaking process both because less material is used and because the number of shoemaking operations required is correspondingly reduced. The counter portion that results from utilization of this invention in shoe construction possesses

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all the characteristics of counters of the three-ply construction both in the stiffening effect and in the quarter lining surface that is presented. Further, it has the feel of leather counter-stiffeners used in the more expensive shoes, being flexible in the top section as well as stiff and firm toward the bottom. An important advantage realized through use of my improved laminated upper lining is found in a two-ply construction which presents a more readily moldable quarter portion as well as a counter-stiffener that becomes molded to the last in a thermosoftened state, during the pulling over and heel lasting steps, and requiring no preliminary molding operation as such.

The invention also includes within its scope a composite stiffener and quarter-lining member which will become adhesively secured to the outer integument during the pulling over and heel lasting steps, thereby eliminating the separate step of cementing the conventional counter-stiffener to the upper leather.

I have discovered that these and other desirable results may be achieved by employing as the composite stiffening and quarter lining member a laminated three-ply construction comprising a foundation ply of reinforcing and supporting fabric, a ply of a conventional quarter-lining material and an intermediate ply of a normally resilient thermosoftening film-forming bonding composition which acts to bond the quarter lining to the foundation ply. Optionally the composite unit may carry on the outer surface of its foundation ply a coating of a heat-sensitive adhesive adapted to secure the composite unit to the upper leather or other outer integument at the same time the counter is molded.

The reinforcing and supporting foundation ply may be of any fibrous or textile fabric sheet. Its essential function is to form a thin and structurally strong base ply to which the quarter lining material can be permanently attached through the medium of a bonding composition. While a woven textile material, such as an Osnaberg of weight 3.65 yds. per pound may be used, it is preferable to use a material possessing greater body and greater tensile strength. A very satisfactory material comprises a two-ply lamination of single nap flannel which is formed by impregnating and bonding the flannel, nap sides together, with a polyvinyl acetate emulsion of the equivalent which, after proper controlled distribution of its solids throughout the two fabrics and subsequent dehydration, results in a tough and durably strong laminate importantly

characterized by the thermoplasticity of the continuous polyvinyl stiffening film. Thus the stiffened two-ply fabric when used as a foundation ply provides a shoe structure light in gauge and adapted to reproduce the compound curvature of the heel of a normal shoe last when the ply is softened by heat and caused by pressure or tension to conform to the last.

The quarter lining ply consists of any of the conventional quarter-lining materials available on the market as yard goods. A very satisfactory material is that sold under the trade name of "Kafsted." It consists of a flannel which has first been impregnated with latex, then surface coated with a film forming material, as pyroxylin or a vinyl compound, and thereafter given an embossed surface which resembles leather or fabric in appearance. A quarter lining ply of higher quality and cost consists in flannel which is impregnated with pyroxylin rather than latex.

The thermo-softening bonding adhesive may be any flexible, moisture-resistant film-forming composition which softens sufficiently by either moist or dry heat to conform unresistingly to the curvatures of the heel of a last under the tensions presented thereto by normal mechanical lasting practice and at temperatures commonly utilized in pre-heating shoe uppers preparatory to lasting operations and capable of being rendered adhesive by the use of such moist or dry heat or through the application of appropriate solvents, or both. This same bonding adhesive as used to attach the foundation ply to the quarter lining member can, if desired, be also used as the adhesive material on the surface of the blank opposed to the quarter lining surface, or a different adhesive of other characteristics concerned with viscosity under activation may be selectively used for this latter purpose.

The above described combination material, comprised when finished of quarter lining and foundation ply united by a thermo-softening bonding adhesive and having on its surface opposite to the quarter lining a thermo-softening adhesive, is subject to be cut into blanks of the desired shape by conventional methods. Such blanks are thereafter skived around their base and top edges so that the stitching employed around the top line of the blank may pass through a plurality of the fibers in order to improve stitching tear strength. In using such blanks in force-lasted shoes made under the conventional California process, scarfs around the base of the blank will be of such length so as to cause the edge of the blank to be resiliently soft in receiving the stitches required to attach it to the sock lining at all points where both become co-engaged.

In accordance with the present invention, by using the bonding composition to secure adhesively the quarter lining material in its functional relationship to the foundation ply as well as to impart some stiffness to the ultimate combination, the necessity of separately cementing a counter-stiffener to the quarter lining is obviated; and by using conventional quarter lining fabric as one of the plies of the laminated self-stiffening lining, the need of a separate ply of fabric used in conventional shoe structure is similarly eliminated. Thus the invention results in a saving of the cost of separately preparing and molding counters, the cost of assembling such counters in shoes, cementing counters in place, and the danger of misplaced stiffeners in the shoe. It also obviates the necessity of carrying large inventories of counters of different sizes and styles.

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 diagrammatic view showing schematically a convenient method of preparing the preferred foundation ply,

Fig. 2 is a diagrammatic view showing schematically the preferred method of combining the foundation ply and quarter lining material with the stiffener bonding material,

Fig. 3 is a plan view of the combined counter member showing its elements in assembled relation, and

Fig. 4 is a view in cross-section on the line **4—4** of Fig. 3 showing the plies of the upper in somewhat exaggerated thickness.

The preferred foundation ply may be conveniently prepared as shown in Fig. 1. Two rolls **1** and **1***a* of single nap flannel of the desired weight and width, e. g. about 3.90 yards per lb., 44 inches wide, are simultaneously unrolled, passing through tensioning rollers **2—2** and combining, nap sides together, at the guide roller **3**. The combined plies of flannel forming the foundation sheet **20** are then saturated with polyvinyl acetate emulsion **5** contained in a trough **4** in which is a submerged roller **6** around which pass the composite sheet **20**. From the submerged roller **6** the composite sheet passes upward and thence over the supporting guide rollers **7** to a pair of squeeze rollers **8—8** adjusted as to their relationship to remove excess emulsion **5***a* which drains back to the trough **4** by way of the apron **10** extending from under the lower roller **8** to the trough **4** and by way of the upper surface of the composite sheet **20**. The composite sheet **20** is then dried by passing around several steam heated drums **9** and finally through banks **12** of infra red lamps being guided therethrough by the rollers **14**. The rate at which the composite sheet material **20** can be produced is dependent upon the rate of drying and must be adjusted so that a dry product emerges.

The composite sheet **20** may now be combined as a foundation ply in producing the laminated self-stiffening quarter lining of this invention as shown in Fig. 2. The foundation ply **20** and quarter lining material **21** of the same width are simultaneously fed between calender rollers **25**, the quarter lining material **21** having its finished or embossed surface coating **22** on the outer side. A bank of a suitable stiffening and bonding composition **23** is maintained between the foundation ply **20** and the quarter lining material **21** at their entrance to the nip of the calender rollers **25—25** in an adhesive condition. One very satisfactory composition consists of:

Example 1

90 parts of opal wax, 10 parts of stearic acid and 60 parts of ethyl cellulose, N–200. The opal wax and stearic acid are first melted and mixed together. The ethyl cellulose is then added and heating is continued while the batch is stirred until a homogeneous viscous mass results. This composition becomes soft and pliable at about 200° F.

The bonding composition of Example 1 can be rendered adhesive by heating it to a temperature approximating 260° F.

While it is within the scope of this invention

also to render the bonding composition adhesive through the action of solvents, it is preferred to use heat and thereby avoid the time and necessity of allowing for the evaporation of solvent. By varying the relationship of the calender rollers **25**, illustrated in Fig. 1, and by using heavy flannel which absorbs greater quantities of the emulsion solids, it is possible to produce stiffer and thicker foundation plies for use in heavy footwear. Accordingly the setting of the calender rollers **25** will depend on the desired thickness of the film of bonding composition **24**, and be controlled by the desired stiffness of the laminated combination from which the self-stiffening lining of this invention is produced.

My improved counter lining as shown in Fig. 3, is died out in the required shape from the laminated sheet shown in Fig. 2. Preferably the top margin **30** of the foundation ply **20** is skived to provide for a neat assembly with the upper in the counter portion of the shoe and to facilitate the molding of the counter portion to the heel of the last during the pulling over and heel lasting steps. If it is desired to combine adhesively this counter lining with the outer integument, a coating **32** of a heat activating adhesive may be applied to the foundation ply surface. This adhesive may be the same as that described in Example 1. Satisfactory adhesives include those which will become activated at the temperature at which the counter lining itself is softened. A successful and typical adhesive composition is as follows:

Example 2

50 parts by weight gum rosin
50 parts by weight ethyl cellulose N–50
50 parts by weight stearic acid

The ingredients are combined by melting them together while stirring.

A coating of this adhesive can be applied by any of the conventional methods, for instance brushing, roller coating or knife coating the molten material on the backing material surface of either the laminated combination in sheet form or the individual counter lining cut therefrom.

In manufacturing shoes embodying the improved counter lining of this invention ordinary shoemaking processes are used. The improved counter lining is conveniently stitched, like any lining, along its margin to the outer integument **26** of the upper which has previously been skived and edge folded to provide a finished edge and provided with a doubler **29**, all as shown in Figs. 3 and 4. The combined counter pieces are then heated to render the laminated counter lining soft and moldable, and when the foundation ply of the counter lining carries a coating of heat activating adhesive, to activate the adhesive. Heating may conveniently be done in heaters similar to conventional box toe steamers or in adaptations thereof. The counter pieces are then assembled on the last as parts of the stitched upper of the shoe and the upper is pulled over and lasted in the conventional manner, thereby conforming the softened counter portion to the contour of the heel end of the last and securing adhesively the outer integument to the counter lining. When the upper cools the laminated lining stiffens and imparts to the counter the fine lines of the last.

In the pulling over operation the lower margin of the laminated quarter lining conforms not

only to the side walls of the last, but under favorable conditions to a very desirable extent is drawn in over the last bottom. When the heel seat lasting stage of shoemaking is reached, the counter portion of the upper is again heated and the foundation ply lining re-softened to ideal lasting temperature. Accordingly, the whole quarter portion of the shoe is conformed accurately to the contour of the last without further attention than is required to carry out the usual heel seat lasting step.

In addition to very substantial savings in shoemaking costs, the improved counter lining of my invention materially improves the appearance of the inside of the counter portion of the shoe, imparting to it a smooth and clean effect and providing a sharp and distinct peripheral line between the sock lining and the upright walls of the upper.

A further advantage flows from the effect of the heat upon the exterior leather of the upper in causing the leather to shrink tightly and smoothly to the stiffening member, thereby eliminating the need for ironing such exterior heel portions of the upper as is usually done in a high percentage of shoe production.

Having thus disclosed my invention and described in detail a preferred method in which it can be carried out, I claim as new and desire to secure by Letters Patent:

1. A laminated unitary shoe lining moldable under heat and pressure, having self-stiffening properties and comprising a foundation ply of woven textile material impregnated with a stiffening compound, a ply of quarter lining material, and an intermediate ply of thermo-softening film-forming bonding material adapted to combine adhesively the foundation ply and the quarter lining ply, and having a film of a heat-activatable adhesive compound on the outer surface of the foundation ply adapted to become adhesively activated and to secure the laminated lining combination to the outer integument of the upper of the shoe when heated and subjected to pressure in the pulling over and heel lasting steps of the shoemaking process.

2. A laminated unitary shoe lining moldable under heat and pressure having self-stiffening properties and comprising a foundation ply of two or more sheets of woven fabric impregnated and bonded together with a thermosoftening adhesive material, a ply of textile quarter lining fabric, and an intermediate ply of thermosoftening film-forming bonding composition adapted to unite adhesively the foundation ply and the quarter lining fabric.

3. A laminated quarter lining moldable under heat and pressure having self-stiffening properties and comprising a foundation ply, a ply of woven fabric impregnated with a stiffening composition and having an embossed surface coat of a thermoplastic film-forming material, and an intermediate ply of thermosoftening film-forming bonding material adapted to unite adhesively the foundation ply.

4. A laminated quarter lining moldable under heat and pressure having self-stiffening properties and comprising a foundation ply of two sheets of flannel disposed nap-to-nap, impregnated and bonded together with a thermosoftening stiffening compound, a ply of fabric impregnated with a stiffening compound and having an embossed surface coat of a flexible film-forming composition, and an intermediate ply of a thermosoftening film-forming bonding composi-

tion adapted to unite adhesively the foundation ply and the fabric ply.

5. A laminated quarter lining moldable under heat and pressure having self-stiffening properties and comprising a foundation ply of a plurality of sheets of flannel impregnated and bonded together with polyvinyl acetate, a ply of textile fabric impregnated with a rubber latex and having an embossed surface coating, an intermediate ply of a composition consisting of opal wax, ethyl cellulose and stearic acid adapted to unite adhesively the foundation ply and the embossed ply, and having a film of a composition consisting of gum rosin, ethyl cellulose and stearic acid on the outer surface of the foundation ply adapted to become adhesively activated and to secure the

laminated combination to the outer integument of the upper of the shoe when softened during the pulling over and heel lasting steps of the shoemaking process.

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