

April 18, 1939.

W. HOWARD

2,154,571

SHOE STIFFENER

Filed Jan. 25, 1937

2 Sheets-Sheet 1

Fig1.

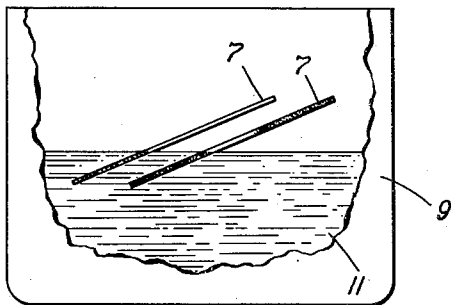


Fig2.

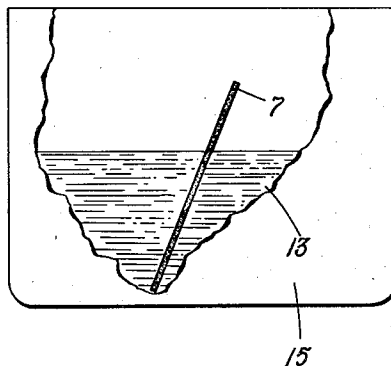


Fig3.

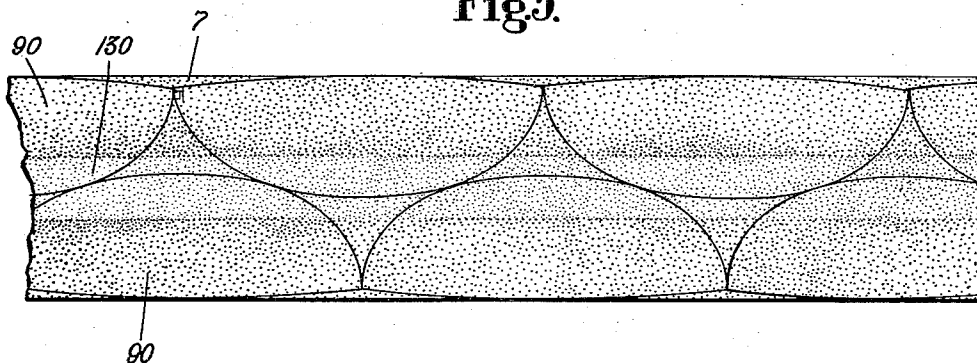


Fig4.

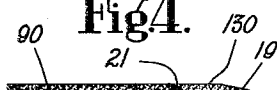
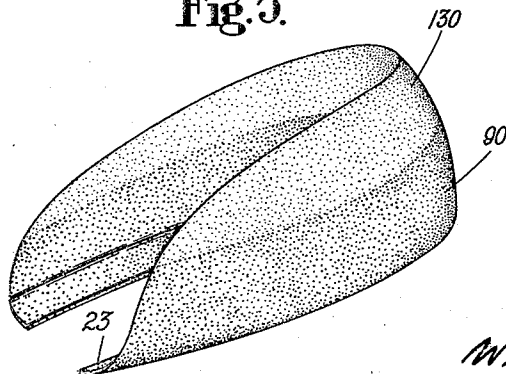


Fig5.



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Fig. 6.

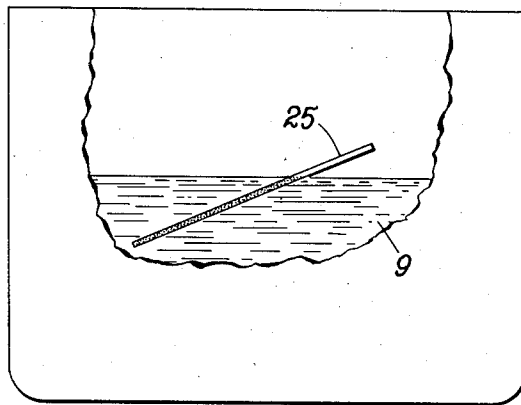
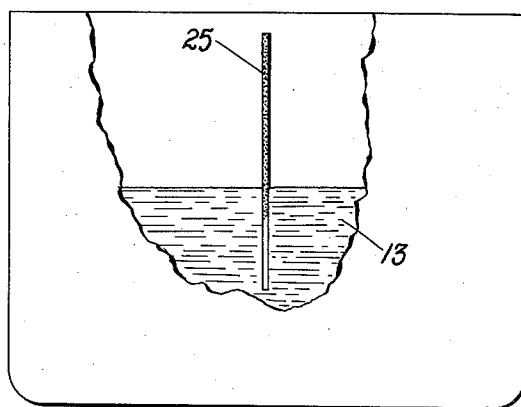


Fig. 7.



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UNITED STATES PATENT OFFICE

2,154,571

SHOE STIFFENER

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Application January 25, 1937, Serial No. 122,155

2 Claims. (Cl. 12-146)

This invention relates to shoe stiffeners and is herein illustrated as embodied in a molded counter stiffener and a method of making it.

It is desirable that shoe stiffeners should have properly located portions which are respectively hard and stiff, and tough and resilient. For example, it is desirable that a counter stiffener should have a hard, unyielding lower portion so as to give a firm support to the lower part of the quarter of a shoe upper but that the upper portion, and particularly its margin, should be somewhat flexible and resilient so as to add to the comfort of the wearer and be capable of resuming its shape if deformed. To this end, in accordance with the present invention, a selected portion of a piece of porous flexible material is impregnated with a substance capable of rendering that portion hard and stiff; and an adjacent portion is impregnated with a substance capable of rendering said adjacent portion tough and resilient, the junction between the stiffening substance and the resilient substance being oblique to the opposite faces of the material. A molded stiffener is then made from the piece thus treated. There results a shoe stiffener of a single piece impregnated in different localities with different substances of such nature that stiffness and resilience are attained respectively in the desired localities.

Referring to the accompanying drawings,

Fig. 1 is an elevation of a receptacle containing a stiffening substance in solution, one wall of the receptacle being broken away to show a strip of porous flexible material in process of having first one margin and then the opposite margin along the side edges of the strip immersed;

Fig. 2 is a similar view showing the middle portion of the same strip being immersed in a resilient substance in solution;

Fig. 3 is a plan of the same strip, after it has been impregnated in the manner illustrated in Figs. 1 and 2, showing how stiffener blanks may be died-out of it;

Fig. 4 is a section through one of the blanks after its upper margin has been skived;

Fig. 5 is a perspective of a finished molded counter;

Fig. 6 is an elevation similar to Fig. 1 but showing a counter blank having its lower portion immersed in a stiffening substance in solution; and

Fig. 7 is an elevation similar to Fig. 2 showing the upper portion of the blank being immersed in a resilient substance in solution.

As illustrated in Figs. 1 and 2, a strip of porous flexible material 7 such for example as kraft paper having a width somewhat less than the combined height of two counter stiffeners has its opposite lengthwise-extending margins impregnated with a solution of a stiffening substance and its middle portion impregnated with a solution of resilient substance. As shown in Fig. 1, first one margin and then the other margin is immersed in a solution of a stiffening substance 9 contained in a receptacle 11 until the immersed margin in each case is thoroughly impregnated. The solution may, for example, be as follows:

	Parts by weight
Cumar resin	16.2
Celluloid	15.2
Castor oil	3
Acetone	65.6

In order that there shall be no abrupt line of demarcation between the hard stiff lower portion of the finished counter stiffener and the flexible resilient upper portion, the immersions of the margins are carried out as shown in Fig. 1 with the strip inclined to the surface of the solution. The stiffening substance which remains in the strip after the strip has dried by evaporation of the solvent acetone is sufficiently thermoplastic so that molding under heat may later be carried out. The middle portion of the dried strip is now impregnated with a substance which will render it tough and resilient. To this end, a solution of rubber, or rubberlike material such as neoprene, may conveniently be employed. As shown in Fig. 2, the middle portion of the strip is immersed in an aqueous dispersion 13 of rubber, such as vulcanizable rubber latex, which is contained in a receptacle 15 and the strip may be dried somewhat. The opposite margins of the strip are at this stage impregnated with stiffening substance, the portion thus impregnated being indicated at 90, and the middle portion is impregnated with the resilient substance, the portion thus impregnated being indicated at 130. It should be understood that the terms "solvent" and "solution" have been used above in a general sense as embracing respectively swelling or dispersing agents for colloids and the condition attained by the use of such agents.

The blanks are died-out of the impregnated strip 7 in the manner shown in Fig. 3 so that the lower portions of the blanks are impregnated with the stiffening substance and the upper portions with the resilient substance. The blanks

thus prepared are thoroughly dried and seasoned to remove all of the water, to vulcanize the rubber and to remove the last traces of solvent, after which they are skived along their upper margins as shown at 19 in Fig. 4, and then molded under heat to produce the finished stiffener shown in Fig. 5. Due to the immersion of the strip at an angle to the surface of the solution or dope 9, the junction between the stiffening substance and the resilient substance, as indicated at 21, is oblique to the opposite faces of the blank. The lower portion of each stiffener, including the inturned flange 23, is very hard and stiff, due to the presence of the stiffening substance; and the upper portion is flexible and resilient, due to the presence of the resilient substance, the oblique joint 21 ensuring that the change in flexibility from the lower portion to the upper portion shall be gradual and not abrupt.

Figs. 6 and 7 illustrate a slightly different procedure employed in making a blank like that of Fig. 4. According to this procedure, a counter stiffener blank 25 of proper outline and made of kraft paper or other suitable material has its lower portion immersed in the solution 9 of stiffening substance, the blank being maintained at an angle to the surface of the solution as shown in Fig. 6. After having been dried, the upper portion of the blank is immersed in the solution of rubber 13. The blank is then further dried and seasoned and thereafter has its upper margin skived. Such a blank has the appearance in cross section of the blank shown in Fig. 4 and may be molded to produce a finished stiffener such as is shown in Fig. 5.

Although a particular stiffener and particular

procedures of making it have been set forth, it should be understood that the invention is not limited in the scope of its application to the particular article and procedures which have been shown and described.

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

1. The method of making a molded counter stiffener which comprises impregnating a selected portion of a piece of porous flexible sheet material with a solution of a thermoplastic stiffening substance by immersing said portion in the solution while maintaining the sheet material in an inclined position with respect to the surface of the solution, impregnating an adjacent portion of the sheet material with a resilient substance, drying the material, and then molding the thermoplastic blank into a counter stiffener by heat and pressure.

2. The method of making molded counter stiffeners which comprises providing a strip of porous flexible sheet material of a width somewhat less than the combined height of two stiffeners and impregnated at its opposite margins with a stiffening substance and at its middle portion with a resilient substance, the junction between the stiffening substance and the resilient substance being oblique to the opposite faces of the strip, cutting blanks from the strip thus impregnated in such manner that the lower portion of each blank is impregnated with the stiffening substance and the upper portion with the resilient substance, and skiving the blanks and molding them into shape.

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