

May 19, 1959

R. A. POLLOCK

2,887,400

SOLVENT ACTIVATABLE STIFFENER MATERIAL

Filed Dec. 20, 1957

Fig. 1

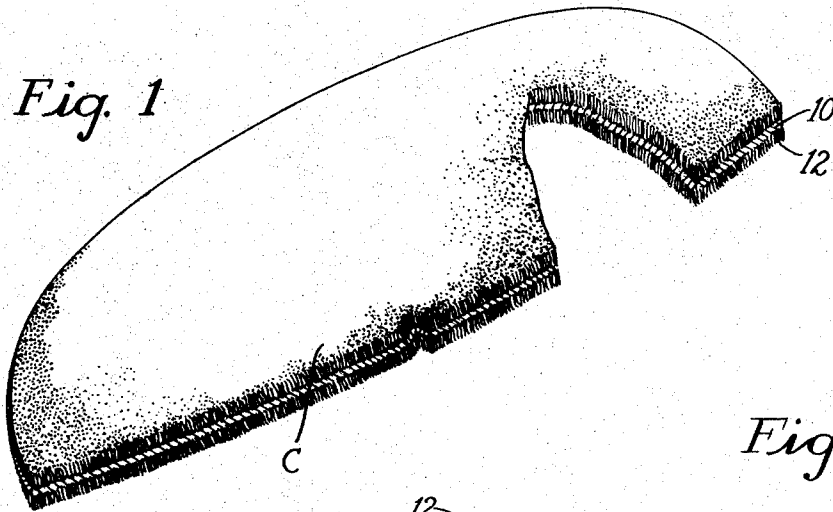


Fig. 2

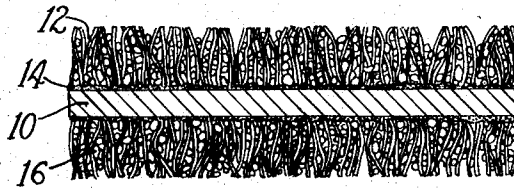
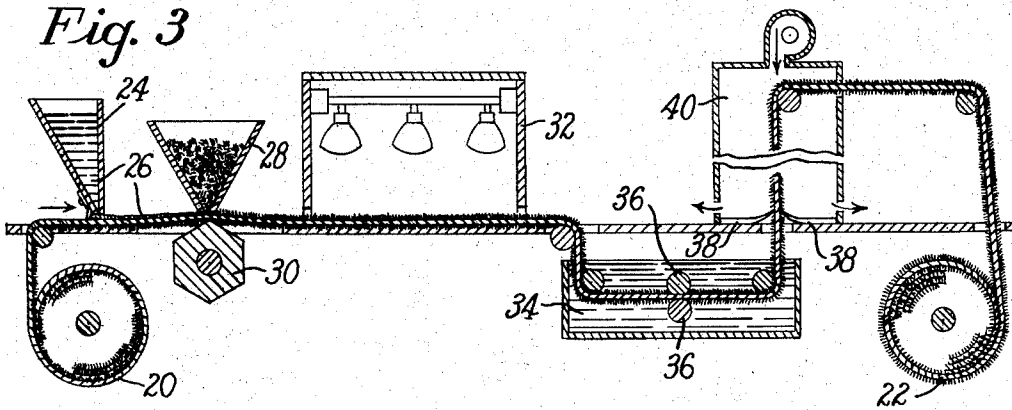


Fig. 3



Inventor

Roger A. Pollock

By his Attorney

Wm. S. S. S. S.

1

2,887,400

SOLVENT ACTIVATABLE STIFFENER MATERIAL

Roger A. Pollock, Salem, Mass., assignor to United Shoe Machinery Corporation, Flemington, N.J., a corporation of New Jersey

Application December 20, 1957, Serial No. 704,075

5 Claims. (Cl. 117—28)

This invention relates to stiffenable sheet material and more particularly to stiffenable sheet material adapted to be incorporated, in solvent activated condition, into a selected portion of a shoe upper to form a stiffening element therefor, for example, a box toe or counter. While the invention is illustrated herein as applied to the stiffening of shoe portions, it will be appreciated that the material is useful in many other applications.

Shoe toe and heel portion stiffeners are commonly used at the present time in shoemaking. Such stiffeners have usually been one of two types, either a type which is preformed and inherently rigid or a type which is designed to be treated with heat or a solvent to bring the stiffener element to an "activated" condition of temporary moldability for incorporation into the upper of a shoe. After lasting, such an activated element becomes stiff through cooling or the evaporation of solvent. In the case of the rigid type of stiffeners, the manufacturer must either carry a large inventory of sizes and styles or employ a compromise size or pattern to fit a run of lasts while relying upon the forces of pulling over and lasting to bring the stiffening elements into conformity with the last. However, such latter practice may result in ill-fitting stiffened portions because of the tendency of the stiffener to work against the conformation forcefully imparted to it.

The heat and solvent activatable stiffener materials were designed to overcome such problems, but many of these had the disadvantage that in activated condition the material is so soft and limp as to cause the stiffener element to be difficult to manipulate in the shoemaking operations.

It is accordingly an object of the present invention to provide improved solvent activatable stiffenable sheet material from which may be cut stiffener elements for shoes, which material is adapted to be solvent activated without becoming so limp as to create difficulties in handling during shoemaking operations.

Another object of the invention is to provide an improved solvent activatable stiffenable material for such purposes which will be easy and economical to manufacture.

To these ends and in accordance with a feature of the invention, solvent-activatable stiffenable material is provided comprising a stiffly flexible layer of fibrous material, a layer of flock adhesively bonded to the fibrous layer, and, incorporated into the flock layer in discontinuous form, a stiffening plastic, such as a resin or a cellulose derivative, adapted to be coalesced through the action of a solvent into a substantially continuous film for causing the stiffenable material to become stiffened upon the evaporation of the solvent. The term "stiffly flexible" as employed herein includes materials similar to fiberboard and which are flexible enough for conforming to a shoe end portion and excludes flaccid materials such as flannel cloth. The ease and convenience of adhesively flocking the fibrous layer and of dispersing therein a stiffening resin leads to an economical material which is very convenient to use since the fibrous base

2

layer supports and facilitates manipulation of activated stiffener elements. The ultimate stiffness of the material can be conveniently controlled by varying the length of the flock employed, since this length chiefly determines the amount of the stiffening plastic in the stiffened member.

In the drawings,

Fig. 1 is an angular view, partly in section, of a counter died out of the stiffener material of the present invention;

Fig. 2 is an enlarged section of the stiffener material shown in Fig. 1; and

Fig. 3 is a diagrammatic view showing schematically a convenient procedure for manufacturing a sheet of the stiffener material shown in Figs. 1 and 2.

Referring now to the drawings, in Figs. 1 and 2, the stiffener material comprises a base layer of fibrous material 10. This material should be stiff enough to impart sufficient initial rigidity to a stiffening element so that in activated condition it may conveniently be manipulated for incorporation in a shoe upper. At the same time it should be conformable to a heel seat and not so brittle as to crack in the course of being shaped to the contour of a last. Suitable materials for this layer may include paper or fiberboard sheets having the aforesaid characteristics and which are not softened by the solvents employed for activation. I have found particularly useful for such purpose material of the type known as "Onco," which stock is said to be rubber impregnated fibrous material produced by impregnating with a rubber latex composition a web of felted cellulose fibers, preferably a soft web composed of refined wood pulp, having an alpha cellulose content upwards of about 90%, and then drying the impregnated web.

To the base layer 10, a layer of flock 12 is bonded by a flocking adhesive 14 of a type which will not be readily harmed by the activating solvent. Suitably the adhesive may be a curing type rubber base adhesive in solvent solution such as the adhesive manufactured by B. B. Chemical Co., Cambridge, Mass., designated No. 4036. The flock fibers 12 may consist of any of the flock filaments commonly employed which are adapted to hold a stiffening plastic 16 while the length of the fibers may be selected in accordance with the desired strength of the stiffening element as discussed above. I have found, for example, that viscose rayon flock fibers provide a good base for retaining either nitrocellulose or polystyrene resin. I prefer to use precision cut flock fibers to insure uniformity of the amount of the stiffening plastic 16 incorporated in the flock after the adhesive has been cured.

Suitable stiffening plastics include nitrocellulose, polystyrene and polyvinyl butyral, the latter being useful where a relatively soft box is desired. The stiffening plastic 16 is incorporated into the flock in a manner depending on the form of plastic employed. In the case of the vinyl resins where the material can be obtained in the form of a latex, the flocked base may be treated with such latex and dried to incorporate the stiffening resin in the flock in discontinuous form. In the case of nitrocellulose, the flocked base is treated with a solvent solution thereof and then immersed in water to precipitate the plastic in the flock. Fig. 2 is a section of nitrocellulose impregnated material. A section of polystyrene impregnated material would exhibit some clumping of the flock.

In use, the required stiffener element, such as a counter C (Fig. 1), is dried out of the material, activated with suitable solvent and incorporated into the shoe in accordance with the usual procedure attending the use of a solvent activatable stiffener element.

Fig. 3 shows diagrammatically the progressive manufacture of the stiffener material of the present invention, the material moving from a supply roll 20 to a take-up roll 22 on which the finished stiffener material is rolled

up. To simplify the illustration, it is assumed that one surface of the base on the roll 20 has been flocked as hereinafter described. From the roll 20 the base material progresses for conventional flocking past a trough 24 containing flocking adhesive 26. A vibrating hopper 28 suspended over a rotating hexagonal beater bar 30 is employed to disperse the flock on the adhesive film which is thereafter cured in an infrared oven 32. The stiffening plastic, here applied in the form of a latex, is applied in a bath 34 and worked into the flock by rolls 36. Excess material is removed by doctor blades 38, and the sheet is then carried through a drying tower 40 where most of the water is removed. Thereafter, the material is wound on the take-up roll 22 in finished condition. If the plastic 16 is nitrocellulose, the sheet should pass through a water bath before entering the tower 40 to precipitate the plastic from the solvent solution into the flock.

The following examples will serve further to illustrate the invention:

Example I

A 100 yd. roll of fibrous sheet material ("Onco") was placed in a flocking machine and one side was coated with a rubber base flocking adhesive (B. B. Chemical Co. cement No. 4036). After leaving the adhesive applying station of the machine, the material was passed under a flocking trough and over a rotating hexagonal beater bar where flock of .060" precision cut viscose rayon was applied. The sheet material was then passed through a drying oven in which the adhesive was cured. The material was turned over and the other side was similarly treated to provide a base fibrous layer flocked on both sides. A solution of nitrocellulose in acetone, 50,000-75,000 centipoises viscosity, was incorporated into the flock after which the sheet was passed through a water bath to precipitate the nitrocellulose, and then dried. Counter blanks were cut from the dried material, skived, clam-shelled and molded without a flange. A number of such counters were activated in acetone and inserted into the counter pockets of uppers which were pulled over and then lasted. The finished shoes with soles and heels attached exhibited heel contours which faithfully reproduced the lines of the last while the counters were stiff and resilient. The adhesion between the upper and the activated counter was excellent.

Example II

A double flocked Onco base prepared as in Example I was treated on both sides with Monsanto #600 styrene latex to incorporate the latex in the flock and the material was then dried.

Counters cut from the dried sheet material were activated with toluol and incorporated into shoe uppers and the shoes were finished as in Example I. After evaporation of the toluol, the counter portions of the shoes were stiff and resilient with excellent adhesion.

Having thus described my invention, what I claim as

new and desire to secure by Letters Patent of the United States is:

1. As an article of manufacture, solvent activatable, stiffenable sheet material comprising a stiffly flexible layer of fibrous sheet material, a layer of flock bonded adhesively to a surface of said layer of fibrous material, and, incorporated into said layer of flock in discontinuous form, a stiffening plastic adapted to be coalesced through the action of a solvent into a substantially continuous film for causing the stiffener material to become stiffened upon the evaporation of the solvent.

2. As an article of manufacture, solvent activatable, stiffenable sheet material comprising a stiffly flexible layer of fibrous sheet material, a layer of flock bonded adhesively to each surface of said layer of fibrous material, and, incorporated into each flock layer in discontinuous form, a stiffening plastic adapted to be coalesced through the action of a solvent into a substantially continuous film for causing the stiffenable material to become stiffened upon the evaporation of the solvent.

3. As an article of manufacture, solvent activatable, stiffenable sheet material comprising a stiffly flexible layer of fibrous sheet material, a layer of flock bonded adhesively to a surface of said layer of fibrous material, and, incorporated into the flock layer in discontinuous form, a plastic cellulose derivative adapted to be coalesced through the action of a solvent into a substantially continuous film for causing the stiffenable material to become stiffened upon the evaporation of the solvent.

4. As an article of manufacture, solvent activatable, stiffenable sheet material comprising a stiffly flexible layer of fibrous sheet material, a layer of flock bonded adhesively to a surface of said layer of fibrous material, and, incorporated into the flock layer in discontinuous form, a vinyl resin adapted to be coalesced through the action of a solvent into a substantially continuous film for causing the stiffenable material to become stiffened upon the evaporation of the solvent.

5. As an article of manufacture, solvent activatable, stiffenable sheet material comprising a stiffly flexible layer of fibrous sheet material, a layer of flock bonded adhesively to a surface of said layer of fibrous material, and, incorporated into the flock layer in discontinuous form, a polystyrene resin adapted to be coalesced through the action of a solvent into a substantially continuous film for causing the stiffenable material to become stiffened upon the evaporation of the solvent.

References Cited in the file of this patent

UNITED STATES PATENTS

1,391,932	Beckwith et al.	Sept. 27, 1921
2,489,466	Schramm	Nov. 29, 1949
2,528,129	Francis	Oct. 31, 1950

FOREIGN PATENTS

454,646	Great Britain	July 19, 1935
---------	---------------------	---------------