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MATERIAL FOR USE AS LEATHER SUBSTITUTE AND PROCESS OF MANUFACTURE

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Fig. 1.

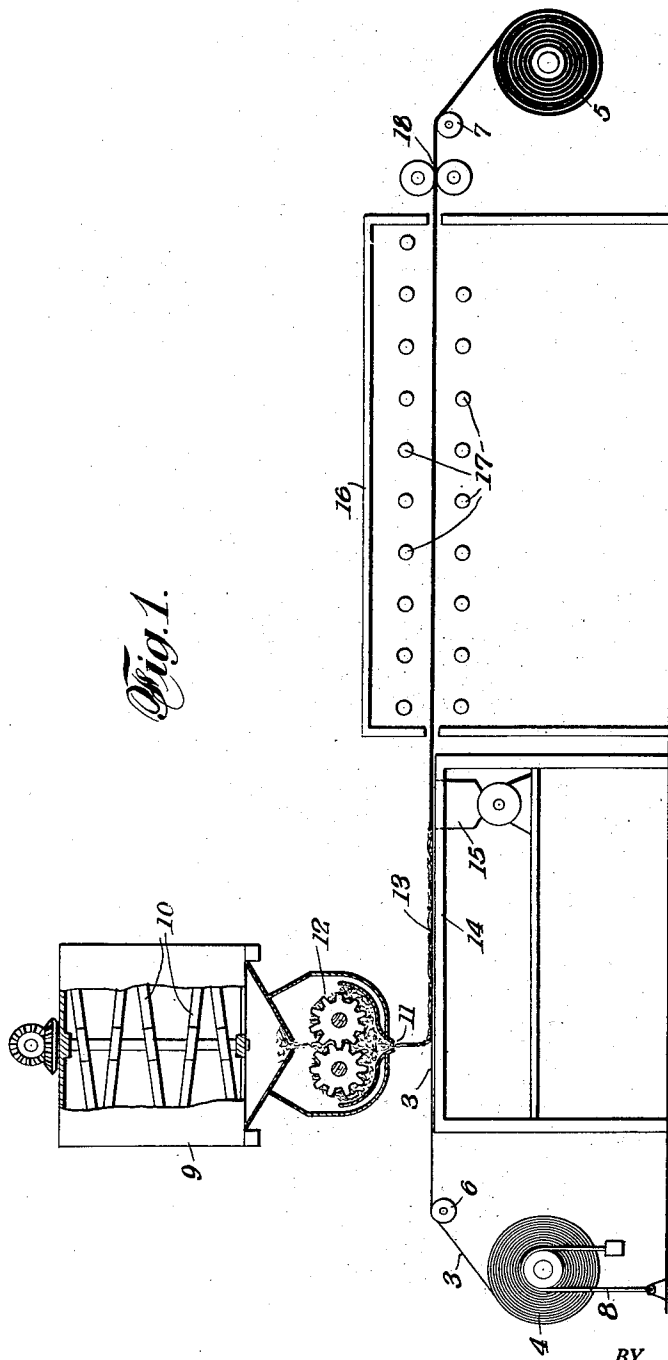


Fig. 2.



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MATERIAL FOR USE AS LEATHER SUBSTITUTE AND PROCESS OF MANUFACTURE

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7 Claims. (Cl. 91—68)

This invention relates to materials in the nature of leather substitutes and methods of manufacturing same.

5 The objects of the invention are to produce by simple, economical and practical methods materials having the desired leather-like qualities of flexibility, resiliency, durability, porosity and the like.

10 The foregoing and other desirable objects are attained by the novel features of invention hereinafter disclosed and broadly covered in the claims.

15 The drawing accompanying and forming part of the specification illustrates details of structure, apparatus for and a method of producing the invention, but as the same is primarily illustrative in character, it will be appreciated that changes and modifications may be resorted to without departure from the true spirit and broad scope of the invention.

20 Fig. 1 is a broken part sectional and somewhat diagrammatic view illustrating production of the material by a preferred mode and form of apparatus.

25 Fig. 2 is a broken sectional detail of the material on an enlarged, exaggerated scale.

30 The base of the material is a woven fabric of cotton or other suitable textile material, preferably of a sheeting weave, as indicated at 3, in Fig. 2. This material, in preparation for the process may be wound firmly on cores in rolls of 50 yards or over, such as indicated at 4, in Fig. 1.

35 The apparatus illustrated, comprises means for advancing the fabric under tension, supply means for depositing fiber loaded adhesive on the fabric, a suction device for drawing the adhesive and fibers into the fabric and means for drying, unifying and smoothing the assembled structure.

40 The feeding and tensioning is accomplished in the illustration by a constant speed take-up roll 5, drawing the fabric over suitable guide rolls 6, 7, and regulatable brake means 8, acting on the core of the supply roll 4.

45 The adhesive solution, laden with fibrous material is supplied from a mixing hopper indicated at 9, and shown as having a paddle mixer 10, and as feeding through a slot 11, a length corresponding to the width of the fabric and regulated in width to the thickness of film desired, positive pressure feed through this slot being preferable and being indicated by the co-acting feed rolls at 12.

50 The saturating fiber laden film laid on the traveling fabric is indicated at 13, passing over a

frame or table 14, supporting a suction box 15. By such means, the solution, which has a tendency to penetrate the fabric by gravity alone is assisted and positively caused to saturate the woven fabric. In this action, the fibers are also brought more or less on end and intertwined with the fibers of the fabric.

5 The cement forced from the surface fiber film and into the fabric base may be only that amount required to saturate the base sufficiently to prevent the base from raveling under the wear to which the material is to be subjected. The solution of rubber in this cement film may be made sufficiently thin so that it will penetrate the fabric base by gravity alone or with the aid of some heat. It is however, less hazardous and more economical to employ a limited and regulated suction draft by the means such as indicated.

20 The preferred saturating adhesive is a rubber compound containing vulcanizing materials and dissolved in naphtha. This adhesive may be dissolved or dispersed in any suitable medium other than naphtha and it is within the spirit of the invention that the rubber compounding be of any of the usual properties known in the art, of any color, mineral or organic, firm or soft, tacky or dry, heavily or lightly loaded and it may be heavily loaded with cotton or other fibrous materials.

30 While a suitable product may be obtained with a mixture of three parts cotton fibers to one part of lightly compounded rubber milled together and dissolved in naphtha to a proper constituency, it is found preferable to use a lightly compounded rubber, such as smoked sheets, zinc oxide, 10%, color 5%, sulphur 2%, accelerator and anti-oxidant 2% dissolved in naphtha to yield a thin, almost watery solution to which is added three times the weight of the rubber compound in weight of cotton fibers. Another satisfactory adhesive is an aqueous solution of vulcanized and/or vulcanizable compounded latex.

40 The fibers used greatly influence the characteristics and qualities of the final product. A desirable product having advantages particularly in the ease of manufacture is obtained by using cotton fibers of not less than $\frac{1}{8}$ " and not more than $\frac{3}{4}$ of an inch in length. Such fibers are readily incorporated uniformly in the rubber solution and the mixture flows from the hopper in a smooth even film. A further advantage of this type of material is the utilization of the waste from cotton combing machines, which separate these lengths of fibers, as inferior for other usage.

This use of such by-product fibers has in effect created a new art.

From the suction applying apparatus, the material passes on into a drying chamber indicated at 16, suitable for removing the solvent of the rubber solution and equipped, if desired, with means for recovering the solvent for reuse. This drier may be equipped with steam coils, such as indicated at 17.

As the drying proceeds, bonding is effected within the base, within the surface layer of matted rubber filmed fibers and between the fabric base and the surface layer.

A specific action taking place during the foregoing procedure is that with the solution partially flowing into the base and the natural flexing of the resilient cotton fibers, accompanied by escape of the gases of naphtha there is produced a myriad of air pockets, voids or cells throughout the fibrous surface, so that it becomes a mass of arched like rubber filmed fibers, separated sufficiently to provide a porous, cushiony, soft, bonded structure, which is strong, firm and wear resistant. These fibers, drawn more or less into the base layer firmly anchor the surface layer thereto and with the bonding action, constitute the material a unified structure.

The operations may be repeated on one or both sides of the fabric.

The surface may be smoothed by pressing the material between smoothing rolls, as indicated at 18, regulated as to pressure and located to act on the material while it is under tension, as at the end of the drier, before reaching the wind-up roll. As this pressure determines to some extent the character of the final product, care should be exercised, where a spongy condition of surface layer is required, to prevent over-consolidation and elimination of the air cells. For another type of leather substitute, the fabric may be subjected to heavy calendering pressure or pressure sufficient to consolidate the fibrous surface layer or layers with the base to form a dense, compact and firm material, suitable for use as an inner sole in shoes.

The next step when the material is to be used as undressed leather, or is to receive a surface dressing that does not require vulcanization, is to vulcanize the saturating adhesive, excepting in the case where vulcanized latex has been used as the impregnating or saturating adhesive. When a vulcanizable rubber compounded coating is to be applied as a surface dressing, the natural method is to reserve vulcanization until after such coating has been applied. The use of vapor cures to effect vulcanization obviates the necessity of including vulcanizing materials in the compounding of the rubber adhesive and such use is within the scope of this invention. The vulcanized product at this stage is useful as undressed leather.

When the product is to be used as dressed leather, the material is coated as indicated at 19, in Fig. 2, by methods similar to those used in dressing leather or in coating ordinary artificial leather, involving the application of successive coatings of rubber, pyroxylin, or oil, modified, compounded and applied according to accepted practices. This coated product may be embossed, printed upon or otherwise treated.

The final product is characterized by features making it suitable as a substitute for certain kinds of leather. The central base is not weakened by napping or other processing as in certain known substitutes for leather, but on the

contrary, this base is strengthened, reinforced and made more resistant to tearing and raveling by the impregnation with the pliable elastic adhesive and the incorporation of the surface layer fibers therewith. These fibers are indicated to some extent at 20, in Fig. 2, and in this view, also the voids or cells are illustrated at 21. The "pearl" or clothly appearance of the base is concealed by the applied fibrous surface and which combined as disclosed, results in many of the attributes of real leather. The appearance is like the flesh side of leather, but it may be embossed to create the effect of the grain side of leather. The structure is of a fibrous nature, porous, flexible, plump, permeable to perspiration and sufficiently permeable to anchor leather or other dressings or coatings.

While the atmospheric pressure made available by the application of suction to the reverse side of the fabric is ordinarily sufficient to set the rubber compound and fibers into the tensioned woven fabric, causing the fibers, as well as the solution to more or less penetrate the fabric, it is within the contemplation of the invention that in addition to, or in place of applied suction, positive pressure, greater than atmospheric may be employed to properly combine a fiber laden compound with the base fabric.

What is claimed is:

1. The herein disclosed process of manufacturing material suitable for use as a leather substitute, comprising filming a layer of fiber laden rubber compound on one face of a fabric base, applying suction to the opposite face of said fabric base with sufficient force to draw the fibers and rubber compound into the interstices of the fabric base, drying and pressing.

2. The herein disclosed process of manufacturing material suitable for use as a leather substitute, comprising advancing a woven fabric base under tension, filming a layer of fiber laden rubber compound on one face of said tensioned woven fabric base, applying suction to the opposite face under sufficient force to draw the fibers and compound into the interstices of the fibrous base, drying and pressing under tension.

3. The herein disclosed process of manufacturing material suitable for use as a leather substitute, comprising advancing a woven fabric base under tension, filming a layer of fiber laden vulcanizable rubber compound on one face of said tensioned woven fabric base, applying suction to the opposite face under sufficient force to draw the fibers and compound into the interstices of the fibrous base, drying, pressing under tension and vulcanizing.

4. The herein disclosed process of manufacturing material suitable for use as a leather substitute, comprising filming a layer of rubber compound laden with the waste cotton fibers of a cotton combing machine onto a fabric base, applying suction to the opposite face of said fabric base and with sufficient force to set said compound and fibers in the base structure, drying and pressing.

5. The herein disclosed process of manufacturing material suitable for use as a leather substitute, comprising tensioning a fabric base, filming a layer of fiber laden rubber compound thereon, applying suction to the opposite face of said fabric base with sufficient force to draw said compound and fibers into the interstices of the tensioned fabric base, drying and pressing sufficiently only to smooth the product and

to mat the fibers in arched formation with voids throughout the same.

5 6. The herein disclosed process of manufacturing material suitable for use as a leather substitute, comprising tensioning a fabric base, film-
ing a layer of fiber laden rubber compound thereon, applying suction to the opposite face of said fabric base with sufficient force to draw
10 said compound and fibers into the interstices of the tensioned fabric base, drying and pressing with heavy calendering pressure sufficient to consolidate the material in a dense solid mass.

7. The herein disclosed process of manufacturing material suitable for use as a leather substitute, which comprises tensioning a woven fabric, applying to the tensioned fabric a rubber adhesive containing fibers, applying fluid under
5 pressure to force said rubber adhesive and fibers into the interstices of the tensioned fabric, drying, pressing under tension and vulcanizing.

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