July 29, 1947. H. SNOW 2,424,861

METHOD FOR MANUFACTURE OF IMPREGNATED FLEXIBLE FABRIC

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Fig. 1.

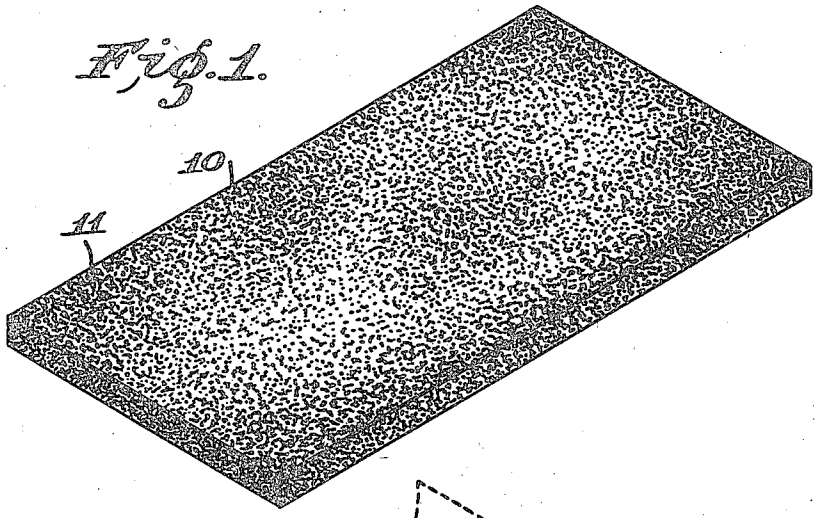


Fig. 2.

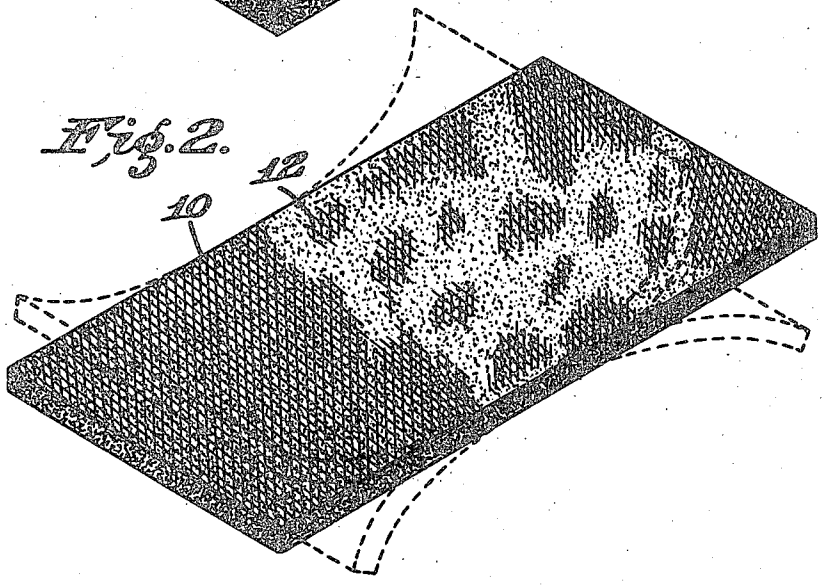
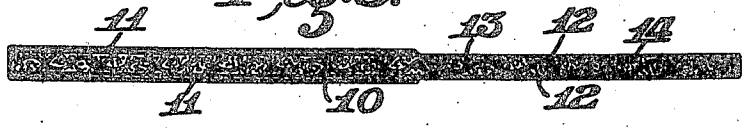


Fig. 3.



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METHOD FOR MANUFACTURE OF IMPREGNATED FLEXIBLE FABRIC

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2 Claims. (Cl. 117—11)

1

In times of emergency such as now characterize the second World War, the shortage of rubber, leather, etc., for use in various, consumer and industrial products becomes critical. Substitutes for these materials in such commodities as shoes, gaskets, luggage, harness, and various coverings, is therefore of vital importance.

The available fabrics, such as cotton fabrics, are not sufficiently resistant, in untreated form, for these purposes. If treated with resistant compositions that produce coatings, the treated product is stiff and has a hard, slick finish that makes it unsuitable for the above mentioned uses.

I have discovered that a suitable rubber and leather substitute material may be obtained by impregnating cotton or similar fabrics with a thermosetting resin or varnish, and, after drying and heating, scraping or grinding the surface of the fabric. This scraping or grinding operation removes the outer comparatively rigid crust of oxidized or polymerized resin or varnish impregnant that invariably occurs on surfaces exposed to air during the drying and heating operation. When this crust is removed a very light nap is produced on the surface of the fabric.

The resulting material is flexible and has a smooth but not slick surface. Grinding of the surface of this impregnated material gives it a slightly fuzzy effect that imparts traction or non-skid properties. This makes the material adaptable for various uses where slick coated surfaces would be entirely unsatisfactory, for example, mats and decking.

Another advantage of the fabric of my invention is that the ground, slightly napped, surface is especially adapted for gluing or cementing of the fabric to some other material or body. For example, the fabric may be used for covering the decks of ships or other types of floors and may be bonded thereto by cementing the ground surface of the fabric to the ship deck or floor.

The substantially uniform, smooth surface of the ground fabric and the flexibility of the material imparted by the grinding, provides a uniform bond, prevents voids or irregularities between the two bonded materials and thereby insures good water resistance. The exposed, or upper surface of the thus bonded fabric may be ground or unground as desired.

In removing the outer, surface coating of resin or varnish from the fabric by grinding or scraping, as described above, a slight amount of the cotton or other fabric is also ground or scraped off. This tends to remove the normal unevenness of the woven fabric surface, and produces the

2

above described, smooth, uniform surface. In the usual case only a small portion of the fabric threads will be removed in this manner, so that the body of the fabric is not deleteriously affected. Furthermore, the impregnating resin or varnish that permeates the fabric serves to hold the woven matrix intact.

The term "thermosetting" is used herein in a generic and non-limiting sense to cover generally compositions that are normally cured, or changed to a final stable form, by drying and heating, with or without the presence of air.

Any of the usual thermosetting resins or varnishes, oil modified or not, may be used in preparing the material of my invention. Illustrative but non-limiting examples are the thermosetting phenolic-aldehyde and urea-aldehyde synthetic resins, e. g., phenol formaldehyde and urea-formaldehyde, and combinations of such resins with drying oils, and heat resisting, baking varnishes. It is important that the impregnating compositions form upon curing or hardening by heat, polymerization, or oxidation, a non-sticky coating that is removable by scraping or grinding and will leave the type of surface mentioned above.

The fabric may be impregnated with the thermosetting material by immersion in a cold or heated solution of the composition and with or without vacuum. The impregnated fabric is then heated to set the thermosetting composition which permeates throughout the fabric so as to bond the mass solidly and form a slick, hard, inflexible coating thereon; which coating is subsequently removed by the methods of my invention described more in detail below.

Cotton fabrics are advantageously used in view of the availability of such material but fabrics of other vegetable, organic, fibers such as hemp, ramie, jute, flax, sisal, etc., may be used if desired.

Other features of the product of my invention and method of manufacture will be more clearly understood now from the following detailed description of the figures in the accompanying drawing, in which:

Fig. 1 is an isometric view of a slab of fabric that has been pretreated and coated in accordance with the invention;

Fig. 2 is a similar view of the same slab after the coating has been removed from the top and bottom surfaces thereof; and

Fig. 3 is a longitudinal section of the slab with a portion of the top and bottom surface coating

removed and the rest of the coating remaining thereon.

Referring now to the drawings in detail and first more particularly to Figs. 1, 2 and 3, the numeral 10 designates a slab of fabric that has been impregnated with the hereinabove described treating material. As thus treated the slab has the aforesaid hardened and comparatively stiff surface coating as indicated by the heavy, dark, stippling and designated by the numeral 11 (see Fig. 1).

After the top and bottom surface coating 11 is removed by a scraping or grinding process these surfaces of the impregnated body of the fabric will be exposed as indicated in Fig. 2 and designated by the numeral 12. The scraped or ground surface is conventionally represented by the crossed hatching lines, indicative of the original fabric, and the light stippling, indicative of the material with which the fabric is impregnated.

In the uses for which the treated fabric is intended the coating may or may not be removed from the edge surfaces of the produced sheet, slab or strip of material. As shown in Fig. 2 the edge coating is left on the slab.

In the longitudinal section of the slab 10 as illustrated in Fig. 3, approximately one-half of the coating 11 is removed from the top and bottom surfaces. The section of the fabric itself is represented conventionally by the diagonally crossed sinuous line 13 and the impregnating material by the light stippling 14.

Different types of grinding machines may be utilized in removing the surface coating from the treated fabric. So, too, the removal of the coating may be either from one surface at a time by separate operations on one and the same or a different machine, or from opposite surfaces at one and the same time on a double grinder type of machine.

Due to the relative stiffness and inflexibility or at least limited flexibility of the impregnated fabric prior to the surface-grinding of one or both faces thereof, pieces of comparatively short lengths are fed into and removed from the grinding machines in a substantially straight, flattened, form. However, in pieces of considerable length, particularly when in narrow strips, the same may be coiled. In this case, of course, due to the inherent stiffness of the material, the coiling of a strip, prior to the surface-grinding operation thereon, will not be tight, but rather loose. However, after one surface has been ground, the material is quite pliable and can be wound tighter.

So, too, after both faces are ground, the material is still more pliable.

Various modifications and changes other than herein shown and described may be made within

the purview of the invention as defined in the appended claims. Reference is made to copending application Serial No. 530,648, filed April 12, 1944, now Patent 2,402,689, issued June 25, 1946, and copending application Serial No. 602,426, filed June 29, 1945, for a further disclosure of the surface-abrading treatment employed according to the present invention.

I claim:

1. A method of producing a flexible, water and wear-resistant leather-substitute product comprising impregnating and coating a woven textile fabric with a varnish of an oil modified thermosetting resin which produces upon curing a hard, inflexible, non-sticky crust on the surface of the fabric, curing said resinous material, and then surface-abrading the so treated fabric to remove said surface crust and to level down the ridges on the exterior surface of the woven fabric, and thus produce a substantially level, smooth, slightly napped, product, which is markedly more flexible than the impregnated and cured product before abrading.

2. A method of producing a flexible, water and wear-resistant, leather-substitute product comprising impregnating a woven textile fabric with a varnish of an oil modified thermosetting resin which forms upon curing a hard, inflexible, non-sticky crust on the surface of the fabric, curing the resin impregnant in situ by heating the impregnated fabric, and then surface-abrading the impregnated fabric to remove the surface crust formed during curing and level down the ridges on the exterior surface of the woven fabric, and thus produce a substantially level, smooth, slightly napped, product, which is markedly more flexible than the impregnated and cured product before abrading.

HOWARD SNOW.

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