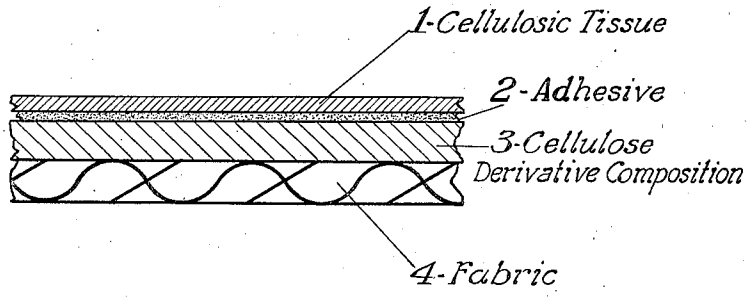
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COMPOSITE SHEET MATERIAL

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## COMPOSITE SHEET MATERIAL

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This invention relates to a composite sheet material and more particularly to a composite sheet material for use as a substitute for leather where feel, toughness and flexibility are desirable or necessary.

Most of the present types of coated fabrics used as substitutes for leather do not possess the dryness of feel possessed by genuine leather. The finishes in the present practice are produced by applying to the surface of a coated flexible base material a composition similar in nature to the base coating. The feel is thus made somewhat drier so as to more nearly approach the surface fuel and appearance of genuine leather. The surface finish of most of such materials is, however, not satisfactory in many respects and does not meet all the requirements usually imposed on such material. If a particularly dry and leather-like finish is desired, it is usually found that to obtain such the pliability of the sheet material becomes inferior to that of leather. In other words, it is difficult to retain the pliability of the material when a surface feel of proper dryness is secured. The usual finishes on coated fabrics do not possess the same properties which are desirable and necessary such as, for example, printing with lithographic ink, a certain degree of water absorbency and the general feel of smoothness and softness.

This invention has as an object the provision of a composite sheet material to serve as a leather substitute having the appearance and surface feel of leather.

A further object of the invention is the provision of a leather substitute having improved sound absorbing properties, a surface adapted to absorbing moisture to an extended degree, and a surface more readily printable than the usual coated fabric, particularly the cellulose derivative coated fabrics.

A still further object of this invention is the provision of a composite sheet material to serve as a leather substitute which has improved aging qualities.

These objects are accomplished in the present invention by applying to a suitable woven or non-woven, fibrous, flexible base material a suitable coating composition, applying to this coating one or more layers of a fibrous cellulosic tissue material by first wetting the tissue sheet in a composition which will soften the surface of the underlying coating or the underlying adhesive coated tissue, to provide a suitable bond for the tissue sheet material to the base or to other tissue sheets previously applied.

In the drawing the single figure is a diagrammatic section showing the cellulosic tissue on the surface as 1, and the adhesive as 2 which cements the tissue to the cellulose derivative coating 3 on the base fabric 4.

The invention in its preferred form is carried out according to the following procedure:

A suitable fabric either of the woven or non-woven type is coated with a plurality of coats of a cellulose derivative composition by any of the commonly known methods for applying such coating compositions. The amount of coating which is applied to the base fabric is governed largely by the weight of the finished material which it is desired to produce. After suitably drying the coating composition thus applied, there is applied one or more layers of a crepe tissue sheet which has previously been wetted with a suitable composition having a softening or plasticizing action on the cellulose derivative composition coated base. The creped cellulosic tissue material is impregnated with the composition so as to produce an adequate bond to the base film, or to previously applied sheets of creped cellulosic tissue material. The application of such composition to the creped cellulosic tissue material may be conveniently carried out by passing the sheet through a container in which the composition is placed. Such compositions may, for example, be a mixture of cellulose derivative solvents or a low concentration dispersion of cellulose derivative itself, for example, cellulose nitrate, in suitable organic solvents.

If desired, coloring matter, either dyestuffs or pigments, may be added to such adhesive compositions in order to impart color to the finished sheet as applied. The bonding of the tissue sheets to the coated base material may be accomplished in any one of a number of ways, for example, by pressing the wet sheets against the coated surface by means of squeeze rollers, or after laying the wet sheet on the coated surface, passing the combined material under a round edge doctor knife, or merely by pressing in a suitable press. Various modifications of this operation will readily suggest themselves to those skilled in the art. Where a plurality of layers of tissue sheet material are applied, an intermediate coating of a cellulose derivative coating composition is preferably applied between the various layers of the tissue sheets in order to provide a surface to which subsequent sheets may be anchored. When a sufficient number of layers of tissue sheet material have been applied, which is usually determined by the desired weight and "hand" in the finished material, a surface coating may be applied in order to partially waterproof the surface or to provide further decoration. Material thus prepared may be embossed by means well known in the art, or printed, abraded, brushed, or napped. The abrading brushing, or napping operations produce a surface similar in appearance and feel to natural suede or chamois.

To further illustrate the invention, the following examples are given but it is not intended to limit the invention thereto:

*Example 1*

To a fabric having a sheeting weave and weighing 4 ounces per square yard with a count of 56 in the warp direction and 44 in the woof direction is applied a cellulose derivative coating of the following composition:

| | Parts by weight |
|---|---|
| Cellulose nitrate | 16 |
| Castor oil | 26 |
| Pigment | 10 |
| Toluol | 87.8 |
| Alcohol | 27.9 |
| Ethyl acetate | 27.9 |

This composition may be applied to the woven fabric base by any of the means known to those skilled in the art of coated fabrics. To the fabric is applied such an amount of coating as to yield a film weighing approximately 6 ounces per yard. To this coated fabric is applied a layer of cellulosic tissue sheet material which has previously been wet with a composition consisting of ethyl alcohol 50% and ethyl acetate 50%. The cellulosic tissue material is known as 11.5 to 12.5 single ply creped tissue and is more fully described hereinafter. The wet cellulosic tissue material is pressed on the coated fabric by means of a squeeze roller and the composite sheet material passed into a drying chamber to remove the volatile material.

*Example 2*

To a suitable fabric such as a sateen weave material weighing approximately 8.35 ounces per square yard and having a count of 96 x 60 is applied a coating composition as described in Example 1, in an amount so that the film produced will weigh approximately 10 ounces per square yard. After this coating is suitably dried, a layer of the cellulosic tissue material which has been impregnated with a composition comprising:

| | Per cent |
|---|---|
| Cellulose nitrate | 3.4 |
| Ethyl acetate | 48.3 |
| Ethyl alcohol | 48.3 |

is applied. After the material is thoroughly dried, a thin coating is applied to the tissue layer by means of a doctor knife, of a composition comprising:

| | Per cent |
|---|---|
| Cellulose nitrate | 10.9 |
| Ethyl acetate | 39.0 |
| Ethyl alcohol | 39.0 |
| Castor oil | 9.9 |
| Tricresyl phosphate | 1.2 |

and the material thoroughly dried. Following this, another sheet of the creped cellulosic tissue material wet with the same adhesive as described above is applied and the composite sheet material suitably dried. To this surface is then applied a wash of an organic solvent composition comprising acetone 26.0%, ethyl acetate 24% and ethyl alcohol 50%. The application of this final wash produces a firm bond between the impregnated tissue and the cellulose nitrate anchorage coating on the laminated tissue sheets.

*Example 3*

If desired, the dry cellulose material tissue sheet or sheets may be applied in conjunction with the coating composition which is normally applied to the woven or unwoven fabric base material. In this instance when approximately the desired quantity of the cellulose derivative coating composition has been applied and finally dried, a further film of the same composition is applied and the dried cellulosic tissue adhesive placed on the wet surface of the coated base. The material is then subjected to final drying. A single or plurality of cellulosic material tissue sheets may be applied in this manner.

*Example 4*

A modification of Example 3 consists in using in place of the regular coating composition applied to the woven or unwoven fabric base, an adhesive of the following composition:

| | Per cent |
|---|---|
| Cellulose nitrate | 0.5 |
| Ethyl acetate | 31.9 |
| Ethyl alcohol | 31.9 |
| Toluol | 33.01 |
| Dibutyl phthalate | 1.01 |
| Ceresin wax | 0.66 |
| Paraffin oil | 0.50 |
| Dye | 0.52 |

For the base material to be coated, any woven or unwoven textile may be used. For example, woven textiles such as sheeting weaves or twill weaves, as drills, sateens and moleskins may be used. Further, non-woven textile materials as felts prepared from animal or vegetable fibers may serve as a basis for the coating composition. Use of such bases is commonly known in the coated fabric art. Transparent cellulose derivative films such as a cellulose acetate, cellulose nitrate or regenerated cellulose may also be used as bases in the construction of the product either with or without base coating. As coating compositions to be applied to the flexible base in addition to the cellulose derivative compositions noted, others containing synthetic resins, casein, oils, etc., are applicable.

For the cellulose tissue sheet material a product such as is designated in the paper trade as a definite pound single crepe tissue has been found to be preferable. The poundage designation with respect to this type of material refers to the weight of 500 sheets 24 x 36" in size. This is a conventional ream in the paper trade. Material weighing from 11.5 to 36 pounds per 500 sheets 24 x 36" in size as indicated above, has been found to be satisfactory in the practice of the invention. For certain modifications, a fiber sheet known in the paper trade as impregnating stock, which may vary in thickness from .001 to .040" or greater, may also be used.

Further the cellulosic material tissue sheets may be impregnated or treated with various materials to impart special properties such as waterproofness or fireproofness. They may be, if desired, colored to correspond with the color or shade of the base material to which the laminations are finally applied.

In addition to the solvent or mixture of solvents for the film on the flexible base, dilute dispersions of cellulose derivatives as well as suitable compositions of natural or synthetic resins may be employed as the adhesive for the cellulosic material tissue sheets. Further, as an adhesive, may be used thermoplastic adhesive compositions. Such compositions are applied to the film on the coated base material and dried and the cellulosic material tissue sheet combined by means of heat

and pressure. Either a single sheet or a plurality of tissue sheets may be applied in this manner.

Because of the close resemblance of the feel and general appearance to genuine leather of the material produced according to this invention, it is particularly desirable for use in the manufacture of pocketbooks, handbags, belts and similar accessories. The material finds further use as a bookbinding material, wall covering, shoe parts such as quarterlinings and socklinings particularly because of its moisture absorbency and resiliency and as a general upholstery material. Because of the unusually desirable properties of this material, other and varied uses will suggest themselves to those skilled in the art.

Material produced according to the invention has a feel and appearance more closely resembling that of genuine leather, than material made according to present practices. Most material made at present lacks the necessary dryness to give a surface feel similar to genuine leather. This disadvantage has been substantially overcome with the present invention without any sacrifice in softness or flexibility of the finished product. The product possesses a further advantage over the material made according to the present state of the art, an exceptionally high exudation temperature, that is, a retention of dry feel when the material is subjected to high temperature. A further advantage of the material is its multi-ply construction. The creped surface makes it particularly applicable to further embossing operations which is highly desirable when the product is to be used as a cinema screen. The material possesses, also, an advantage over other materials used at present for bookbinding purposes in that it can be satisfactorily printed with ordinary lithographer's ink and also stamped with metallic foils without any special treatment.

It is apparent that many widely different embodiments of this invention may be made without departing from the spirit and scope thereof; and, therefore, it is not intended to be limited except as indicated in the appended claims.

We claim:

1. Process for the manufacture of sheet material comprising applying to a fibrous base a cellulose derivative coating composition, drying to remove volatile material, applying a suitable volatile organic solvent to the surface of said cellulose derivative coating composition, superimposing thereon a soft, pliable, absorbent tissue sheet of fibrous cellulosic material, pressing to secure proper bond to the cellulose derivative film and drying.

2. Process of claim 1 in which the cellulose derivative of the coating composition is cellulose nitrate.

3. Process for the manufacture of sheet material comprising applying to a fibrous base a cellulose derivative composition, drying to remove volatile material, applying thereto a soft, pliable, absorbent tissue sheet of fibrous cellulosic material which has previously been saturated with a softening medium for the cellulose derivative film, subjecting to pressure and drying.

4. The process of claim 3 in which a plurality of fibrous cellulosic tissue sheets is applied to the coated fibrous base with intermediate layers of a cellulose derivative composition between said tissue sheets.

5. Pliable, leather-like, composite sheet material comprising a fabric base having applied to at least one surface thereof a cellulose derivative composition and superimposed thereon a sheet of a soft, pliable, absorbent, fibrous cellulosic tissue, said tissue being adhered to the cellulose derivative film by means of a suitable adhesive.

6. The product of claim 5 in which a plurality of fibrous cellulosic tissue sheets are adhered to the cellulose derivative film with intermediate layers of a cellulose derivative composition.

7. The process of making a pliable, composite sheet material which comprises bringing together under pressure a fibrous base coated with a cellulose derivative composition which has been dried thereon, a soft, pliable, absorbent tissue sheet of fibrous cellulosic material and a composition for causing the cellulose derivative coating to adhere to the said cellulosic tissue sheet, and drying the resultant material.

8. The process of making a pliable, leather-like, composite sheet material which comprises bringing together under pressure a fibrous base material coated with a cellulose nitrate composition which has been dried thereon, a soft, pliable, absorbent crepe tissue sheet of fibrous cellulosic material and a composition for causing the cellulose nitrate coating to adhere to the said tissue sheet comprising a softening agent for the cellulose nitrate coating, and drying the resultant composite material.

9. The process of making a pliable, leather-like, composite sheet material which comprises applying a thin layer of a cellulose nitrate coating composition to a closely woven base fabric in amount sufficient to yield a film weighing approximately 6 to about 10 ounces per square yard, drying said coating and applying thereto a soft, pliable, absorbent crepe tissue sheet of fibrous cellulose weighing about 11.5 to about 36 pounds per 500 sheets 24 x 36 inches in size and saturated with a softening medium for the cellulose nitrate composition film comprising ethyl alcohol and ethyl acetate, subjecting the resultant composite material to pressure, and drying said material.

10. A pliable, leather-like, composite sheet material comprising a closely woven fabric base having on one surface thereof a thin layer of a dried cellulose nitrate coating composition in amount sufficient to yield a film weighing approximately 6 to about 10 ounces per square yard and a dry, soft, pliable, absorbent crepe tissue sheet of fibrous cellulose weighing about 11.5 to about 36 pounds per 500 sheets 24 x 36 inches in size adhesively joined to the cellulose nitrate layer by treatment under pressure with a solvent softener for cellulose nitrate and drying, the resultant composite product being pliable and having the appearance of a laminated material with a cloth back and a soft absorbent surface with a dry leather-like feel.

11. Flexible tough pliable composite sheet material having a surface feel like leather comprising a closely woven fabric base united through a cellulose derivative coating composition to a sheet of soft pliable absorbent fibrous cellulose tissue.

12. The product of claim 11 when the cellulose derivative coating composition before removal of volatile constituents consists of

| | Parts by weight |
|---|---|
| Cellulose nitrate | 16 |
| Castor oil | 26 |
| Pigment | 10 |
| Toluol | 87.8 |
| Alcohol | 27.9 |
| Ethyl acetate | 27.9 |

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