

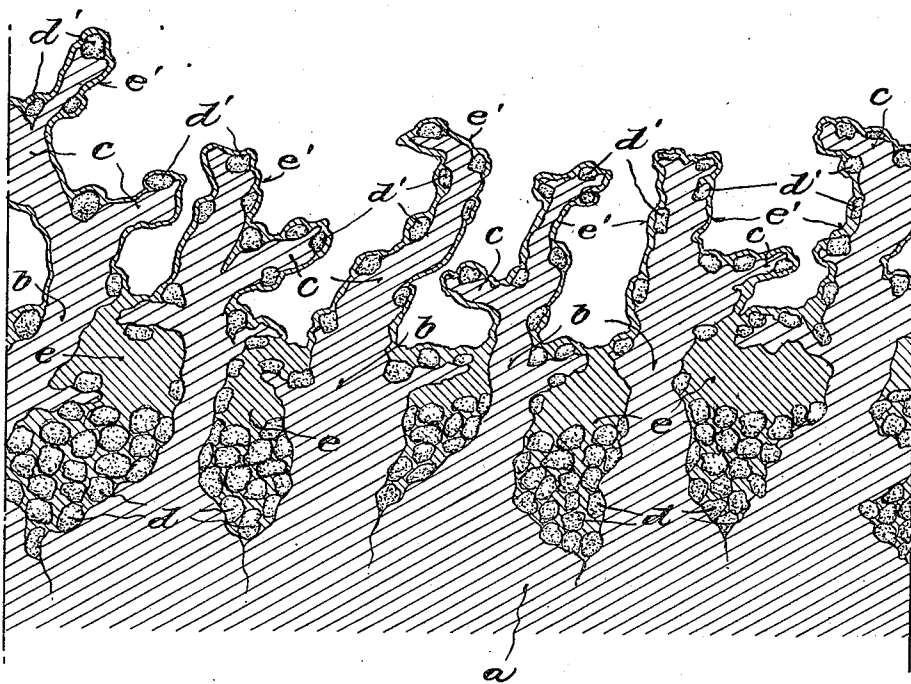
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METHOD OF RENDERING VILLOUS SURFACES NONCROCKING

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METHOD OF RENDERING VILLOUS  
SURFACES NONCROCKING

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The invention relates to a method of treating flexible materials having a villous or nap surface, and to the product resulting therefrom.

While the invention has particular utility when applied to the finishing of buffed or suede leather, it is also applicable to other materials having a napped or hairy surface, such, for example, as artificial or imitation suede leather, velvet, plush, or other pile fabrics, or material on which the nap has been raised by special processes or has been produced by the application of separate fibres such as cotton or wool flock, buffing dust, etc. to the surface of the material.

In suede leather, as is well known, it is the flesh side of the skin which is used to produce the finished surface, and this is buffed in a manner to produce a nap or villous surface comprising upstanding fibres. Such surface has a soft, velvety "feel," which is one of the desirable characteristics of this type of leather.

As is also well known in the art, it is frequently necessary to apply suitable pigments to buffed leather in order to level the color and otherwise improve the surface appearance. These pigments may be applied in either a wet or dry state and usually no binder or other means of causing them to adhere to the leather is employed. The pigments merely become embedded in the hairs or fibres.

Although the excess pigment is brushed off by suitable means, that which remains has a tendency to rub off on and smudge or discolor clothing, upholstery and similar surfaces with which it may come in contact. This well known defect of suede leather is called "crocking."

In cases where the leather is dyed but not pigmented, as above mentioned, the buffing dust itself becomes embedded in the nap, and produces objectionable smudging and discoloring of clothing and the like, in the same manner as pigments.

Dust or particles of finely divided solid matter may also become embedded in other materials having a villous surface, such as artificial leather, pile fabrics and the like, above mentioned.

It is the primary object of the present invention to provide means for locking in this dust or finely divided matter so as to prevent it from escaping or coming out or rubbing off, and to do this without disadvantageously affecting the character or appearance of the material.

More specifically, the object of the invention is to provide means for eliminating crocking,

and to produce a substantially non-crocking suede or buffed leather.

To this end, the invention contemplates treating the villous surface with a thin film produced by applying a suitable liquid coating composition. In carrying out this idea, however, the problem which presents itself is to produce a film or coating of such character that it will not cause the fibres to mat or adhere to each other in groups, or produce other undesirable results. In the case of suede leather, the important thing is to avoid impairing the velvety "feel" of the goods.

The essential characteristics of such a film or coating are, therefore, that it must not substantially alter the feel of the villous surface or the flexibility of the material to which it is applied; that it must not mat the fibres together; and that it must not disadvantageously alter the color of the goods.

In order to meet the above qualifications, I find that the film or coating material must not only be exceptionally soft and pliable, when set or dry, but its adhesiveness and mechanical strength must also be very low.

Coating compositions intended for use on relatively smooth surfaces must, of necessity, possess a high degree of adhesiveness, in order to make the film stick to the surface. This is well typified by the paints, varnishes and lacquers in common use. Materials of this nature, if applied to a villous surface, would cause the fibres or hairs to mat or stick together, and hence would be wholly unsuitable for my present purpose. To be successful for use on suede leather and other villous surfaces such as described, the material must have such a low degree of adhesiveness that it will not cause the fibres to permanently adhere to each other. The film produced by the use of such a non-adhesive coating composition clings to the villous surface solely by virtue of the fact that the irregularly shaped fibres are surrounded by and/or embedded in such film, and the film is thus mechanically anchored in position.

Suitable coating compositions for the present purpose may be prepared from a wide range of materials. They may be prepared from materials heretofore deemed unsuitable for the usual coating compositions, because of lack of adhesiveness or other essential characteristics. They may also be prepared from well known coating materials by various additions and/or treatments such as would unfit them for the covering of relatively smooth surfaces.

It will therefore be understood that the materials specified in the following examples are given by way of illustration of the widely different substances that can be successfully employed, and in no sense as indicating that the invention is in any way limited to such compositions.

One class of materials which I have found suitable for use as a coating composition of the character described, for villous surfaces, is the so-called rubber substitutes or vulcanized oils. A successful coating composition may be prepared as follows:

*Example No. 1*

|                       | Parts by weight |
|-----------------------|-----------------|
| Rapeseed oil.....     | 100             |
| Sulphur chloride..... | 12½             |
| Naphtha.....          | 90              |

The sulphur chloride is first mixed with the oil and stirred, and as vulcanization proceeds and the mixture thickens, the naphtha is gradually added. When the reaction is complete, and the naphtha has all been added, a mixture results which should have a viscosity of about 2.2 (measured with an Engler viscosimeter).

To two volumes of the above concentrated mixture, I then add a relatively large amount of solvent, amounting preferably to as much as thirty volumes. This may consist entirely of additional naphtha, but is preferably a mixture of half naphtha and half carbon tetrachloride, which is less inflammable. The thus diluted liquid is then ready to apply to the suede leather or other villous surface by spraying by means of air pressure.

As another illustration, I may employ a mixture of partially vulcanized oil with drying oils. I may employ the same vulcanized oil as in Example No. 1, or I may use other vulcanizable oils such as cottonseed oil, as follows:

|                       | Parts by weight |
|-----------------------|-----------------|
| Cottonseed oil.....   | 100             |
| Sulphur chloride..... | 18              |
| Naphtha.....          | 90              |

This is then mixed with drying oils and other materials, as follows:

*Example No. 2*

|                                                   | Parts by weight |
|---------------------------------------------------|-----------------|
| Partially vulcanized oil solution (as above)..... | 20              |
| China-wood oil.....                               | 30              |
| Linseed oil.....                                  | 30              |
| Manganese dryer 6% solution.....                  | 125             |
| Solvent naphtha.....                              | 800             |

The first three items, comprising the vulcanized and drying oils, are thoroughly mixed together, the drier (which may be of the linoleate type) is dissolved in the naphtha, and the whole mixed together in an enclosed mixer.

The resulting solution is thin enough to be readily sprayed.

Instead of 30 parts each of China-wood oil and linseed oil, 60 parts of linseed oil may be used. Similarly, any other suitable drying oil may be employed by slightly varying the proportions of drier and vulcanized oil, as necessary to secure a proper balance.

It will be understood that in this example, the purpose of the vulcanized oil is to prevent the drying oils from forming a hard, adherent film. The presence of the vulcanized oil renders the film permanently soft and pliable, and relatively non-adhesive.

Still another group of substances which may be successfully employed comprise natural rubber mixed with a cellulose derivative. A rubber solution alone would be unsuitable because of its inherent stickiness, which would impart an undesirable "drag" to the villous surface, and cellulose derivative, such as nitrocellulose solutions alone would also be unsuitable because of the harsh character of the resulting film. By balancing one of these solutions against the other, I secure a liquid coating composition which is permanently soft and flexible and which, at the same time, does not result in the production of any appreciable drag. In preparing such a composition, I may use ingredients in the proportions shown below.

*Example No. 3*

|                                       | Pounds |
|---------------------------------------|--------|
| 45% ½ sec. nitro-cotton solution..... | 15     |
| Plasticized rubber.....               | 23     |
| Toluol.....                           | 640    |
| Ethyl acetate.....                    | 128    |
| Butyl acetate.....                    | 128    |

Raw rubber, such as that known as pale crepe, is used, and this is masticated for a much longer period than is customary in rubber compounding, for example, one and one-half hours, in order to reduce the viscosity of the resulting mixture.

After this ultra-mastication, the plasticized rubber is dissolved in a mixture of the three solvents, by agitation in an enclosed mixer. When the rubber is entirely in solution, thus forming a thin rubber cement, the nitro-cotton solution is added and agitation continued to insure thorough mixing. Although "½ sec." cotton is specified in the above example, the exact viscosity of the cellulose derivative may vary over wide limits without materially affecting the results, provided an equivalent amount of dry cellulose derivative is employed in every case. Equally good results may be obtained by using nitro-cotton solutions with viscosities ranging from ½ sec. to 60 sec.

The essential thing in making up this coating composition is to employ liquid mixtures which are mutual solvents of the nitro-cotton and of the rubber.

Many other solvents, such as commercial lacquer thinners, including amyl acetate, or combinations thereof with other liquids such as alcohol, may be substituted for the solvent mixture specified, provided that the least volatile ingredient is a common solvent of both rubber and the cellulose derivative, and provided also that the alcohol content is sufficiently low so that the rubber will not be "thrown out" of solution.

In order to provide additional coverage and to further level the color of the villous surface, it is often desirable to incorporate in the above coating compositions suitable pigments. These may be added in any well known manner, as, for example, by grinding into the solutions the desired quantity of pigment, preferably before final dilution with the full amount of solvents. No attempt is made to specify the precise amount of pigment that should be added, because this will depend on particular circumstances and may vary from zero to as much as the solution will hold in suspension. The pigments are, of course, of such a nature as not to interfere with the spraying of the mixture.

Not only must the liquid coating compositions employed for suede leather or other villous surfaces have relatively low viscosity and very low

adhesiveness, but the films resulting therefrom must have very slight mechanical strength. Thus, for instance, the composition set forth in Example No. 1, if applied to a smooth surface as glass or sheet metal, will produce a film, which, when dried or set, has practically no adhesiveness or mechanical strength. If such a film is rubbed with the finger, the material will roll up in "noodles," and rub off, while, if an attempt is made to lift an edge of the film, as by means of a knife blade, and strip it from the smooth surface, it will merely come to pieces in small fragments, not having sufficient strength to hold together. This characteristic of low adhesiveness and small mechanical strength is also true of the other two examples.

The amount of the liquid coating composition which is applied to the villous surface will, of course, vary greatly with the kind of material and the purpose for which the coating is applied. Even in the case of suede leather, the amount of coating material to use depends on the kind of leather, the amount of buffing, the amount of dust or pigment embedded in the nap, etc. By way of illustration, it may be said that the amount of coating material applied to the surface of suede leather, in carrying out the invention, may vary from .3 ounces to 2 ounces per square foot. The proper amount for any particular kind and type of surface being treated can only be determined by experiment.

The amount of liquid employed is usually sufficient to thoroughly wet the material and the liquid penetrates the nap and settles down throughout the mass of the fibres and around the dust or pigment, and when the solvents have evaporated, there remains a permanently soft, pliable film, covering and surrounding the fibres of irregular shape, and thus mechanically anchored to the material.

In order that the principle underlying the invention may be more clearly understood, reference is had to the accompanying drawing, forming part of this specification, and in which the figure is a fragmentary transverse section on a greatly enlarged scale, through the buffed side of a piece of suede leather treated in accordance with the invention.

It will be understood that this drawing, which is a highly magnified view, is intended to illustrate more or less conventionally and diagrammatically what happens when a piece of buffed or suede leather is pigmented and coated in accordance with the present invention.

In this drawing, *a* designates the portion of the main body of the leather adjacent the flesh side, while *b* designates the fibres constituting the buffed or villous surface. It will be understood that these fibres are, in fact, made up of bundles of smaller fibrils or filaments, some of which branch from the sides of the main group, as indicated at *c*, the outer ends of these branches, and also of the main group, being ragged and frayed, due to the cutting and tearing effects of the buffing operation. In other words, the surface comprising the fibre groups such as *b* and *c* is highly irregular.

To this irregular villous buffed surface is applied finely divided coloring material or pigment. The particles of such pigment are indicated at *d*. Many of these particles find their way down into the spaces and pockets adjacent the roots or bases of the fibre groups, while others become embedded in and cling to the sides or ends of the fibre groups themselves, as indicated at *d'*.

When the coating material is applied to such a buffed surface, as by spraying, some of it covers the fibre groups, enveloping the pigment particles clinging thereto, and some of it finds its way down into the crevices and pockets around the base of the fibre groups.

Thus a substantially continuous film is formed surrounding and covering the individual fibre groups and the particles of pigment which cling to or are embedded therein.

The thickness of this film adjacent the base of the fibre groups is determined by the amount of coating material which is applied. This material, however, being extremely fluent and relatively non-adhesive, tends to run down the fibre groups and collect in the crevices and pockets around the bases thereof, so that the thickness of the film *e'* which covers the outer portions of the fibre groups, remains practically constant, within limits, regardless of the amount of material applied. As indicated in the drawing, the film *e'* enclosing the outer portions of the fibre groups, remains relatively thin, while the film *e* surrounding the lower portions of the fibre groups is relatively thicker, and the thickness of this film *e* is determined by the amount of coating material which is applied.

In practice, care must be exercised to avoid applying an excessive amount of coating material such as would cause the film *e* to become too thick, and the crevices and spaces between the fibres filled up to too great an extent. In other words, in order to preserve the velvet "feel" of the material, it is necessary to refrain from building up the film *e* too high and to maintain the outer portions of the fibre groups separate from each other, and free to move about, and, owing to the thinness, softness and flexibility of the film which I use, this "feel" is not substantially impaired, even though the individual fibre groups are coated all over with the film.

It appears that in order to have a soft "feel," it is not necessarily a requirement that the ends of the fibre groups be bare, but merely that they be free from each other and flexible.

In case a little too much of the liquid coating composition is applied to the leather, so that there is a tendency for the nap to become matted, thus giving rise to a somewhat harsh feeling, it is only necessary to brush the leather lightly, after the solvent has evaporated. This results in restoring the "feel" and appearance to the leather surface, which effect is probably due to the fact that the ends of the fibres are broken loose or separated from each other.

In order to roughly illustrate the appearance of buffed leather coated in accordance with the present invention, it may be said that what happens is somewhat similar to the effect of a light sleet storm on a plot of lawn grass, or in a still more highly magnified concept, the effect of a sleet storm on a thick forest of bare trees. The essential difference is, however, that while, in the sleet storm, the application of additional material continuously increases the thickness of the coating on the twigs and branches, in the present invention the application of additional material appears not to substantially increase the thickness of the coating on the "trees" and branches, but the material collects in a layer of greater or less thickness around the bottoms or bases.

While, in the claims, I have, for simplicity, used the term "fibres," it will be understood that I mean to include either single fibres or groups of fibres as above explained.

What I claim is:

1. A new product comprising buffed leather, in the buffed surface of which finely divided solid material is embedded, said material being covered by a protecting film which surrounds the individual fibres and is thus anchored to the buffed surface, the outer portion of said fibres being substantially free and separate and said film being of such a soft, flexible, non-adhesive nature that the "velvet feel" of the leather is not substantially impaired thereby.

2. A new product comprising buffed leather having a pigment embedded therein between the fibres thereof, and having a soft, pliable film applied thereto over said pigment, and surrounding the fibres, the outer ends of said fibres remaining substantially free and separate, said film being relatively thick at the point where it surrounds the base of the fibres, and relatively thin at the point where it covers the outer ends of said fibres.

3. A flexible sheet having a villous surface, and having a soft, pliable, substantially continuous film comprising vulcanized oil surrounding and interlocked with the base of the fibres thereof, the outer ends of said fibres being substantially separate from each other.

4. A flexible sheet having a villous surface, and having a soft, pliable substantially continuous film of low adhesiveness containing a mixture of vulcanized and drying oils surrounding and interlocked with the base of the fibres thereof, the outer ends of said fibres being substantially free and un-matted.

5. As a new product, sueded leather having finely divided solid material embedded in the buffed surface thereof, and also having a soft, protecting film of low adhesiveness and slight mechanical strength enveloping said material and the individual fibres of the leather, said film containing a vulcanized oil, and the outer portions of said fibres remaining substantially free and separate.

6. As a new product, sueded leather having finely divided solid material embedded in the buffed surface thereof, and also having a non-sticky, soft, protecting film enveloping said material and the individual fibres of the leather, said film comprising a mixture of raw rubber

and a cellulose derivative, and the outer ends of said fibres remaining substantially free and separate.

7. A new article of manufacture comprising non-crocking suede leather, said leather having a pigmented, buffed surface coated with a film of soft, pliable material, such film covering the pigment and surrounding and interlocked with the fibres, and the individual fibres having coated end portions which are substantially separate from each other.

8. A flexible sheet having a villous surface in which finely divided solid material is embedded, said material being covered by a substantially continuous, soft, pliable, protecting film which surrounds and is interlocked with the bases of the fibres thereof, the end portions of said fibres being substantially free and separate from each other.

9. The method of locking in finely divided solid matter embedded in the fibres of a flexible sheet having a villous surface which comprises spraying onto said sheet a liquid coating material of such low viscosity that it flows along the fibres and collects at the base thereof, over said solid matter, thus forming, when dry, a substantially continuous film covering said solid matter and surrounding and interlocked with the bases of the fibres, and so limiting the amount of such coating material thus applied that the ends of the fibres are not caused to mat or cling together, but remain substantially free and separate.

10. The method of rendering suede leather non-crocking which comprises spraying on to the buffed surface thereof, in which finely divided solid matter is embedded, a liquid coating material of such nature that it penetrates the nap and collects around and at the base of the fibres over the finely divided solid matter embedded therein, thus forming, when dry, a film completely covering said solid matter and enveloping and interlocked with the fibres, and so limiting the amount of such coating material thus applied that the ends of the fibres are not caused to mat or cling together but remain substantially free and separate, whereby the "velvet feel" is not substantially impaired.

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