

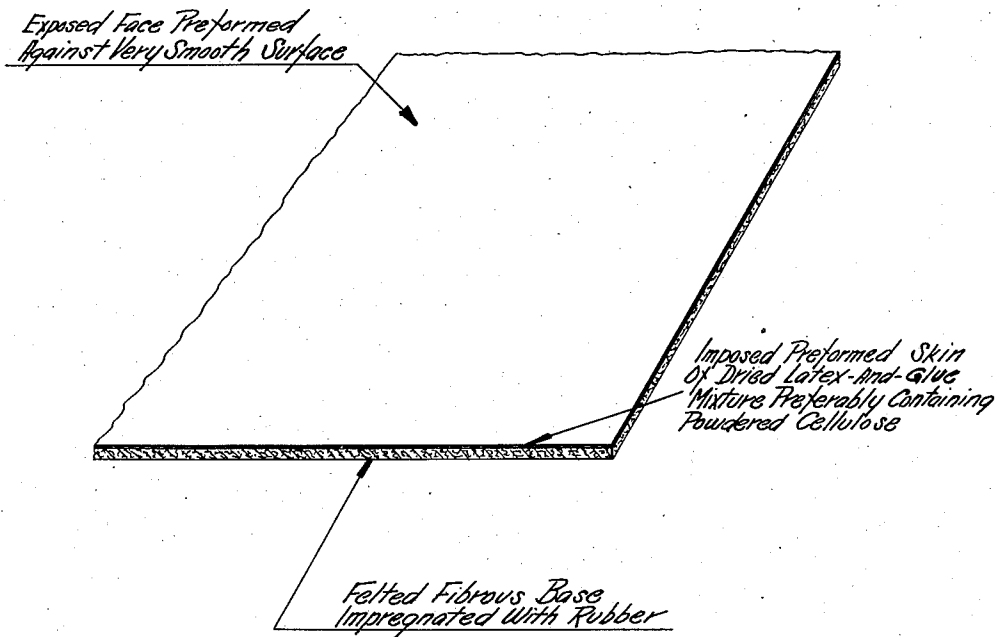
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FINISHING OF ARTIFICIAL LEATHER

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FINISHING OF ARTIFICIAL LEATHER

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This invention relates to the finishing of artificial leather, more particularly of a kind designed for use in shoe uppers or in other connections where it is important or desired that surface appearance and properties closely approach those of natural leather.

In making artificial leathers intended for use in shoe uppers and in other connections, it is now the practice to start with a porous, fibrous foundation, to impregnate the foundation with suitable latex compositions, and finally to dry the impregnated foundation so as to coagulate the rubber as a bonding phase. It has been found that fluffy, waterlaid webs fabricated on machinery of the papermaking type can thus be combined with rubber or rubber compounds into artificial leathers simulating the natural article in many important respects. It has, however, been found exceedingly difficult to finish such leathers satisfactorily, that is, to provide a surface which simulates the grain or skin side of the natural commodity in such important aspects as appearance, mechanical properties, and ability to take a leather dressing or finish properly.

We have found that we can provide the desired surface on artificial leather of the foregoing general types, if we preform a skin or pellicle from suitable compositions and combine or amalgamate the artificial leather with the preformed skin as a top sheathing. When it is desired to use a preformed skin too thin to be self-sustaining and to be handled properly, it may be deposited on a paper backing and kept thereon until it is transferred to the base of artificial leather, whereupon the paper may be removed. The skin is preferably preformed by spraying the skin-forming composition as on a gelatine-coated, so-called transfer paper. A typical skin-forming composition, such as we use, contains both latex and glue as essential components, the glue content of the skin being insolubilized or tanned either on the transfer paper or after the skin has been transferred to and combined with the artificial leather. The glue serves to toughen the skin, as well as to render it comparatively "short", by which we mean that should a small part of the skin be scuffed or lifted from the artificial leather base and then pulled, rather than causing the removal or peeling of the whole skin, it breaks after being stretched to only a comparatively inconsiderable extent. Among other important properties, the rubber component of the skin, especially when it is properly vulcanized, imparts to the skin the desired resistance to abrasion, both in the presence and absence of water. As

in the case of the glue, the rubber content of the film may undergo vulcanizing while the skin is on the transfer paper or after transfer has been accomplished. The skin-forming composition may contain a suitable dye or pigment designed to impart the desired color to the artificial leather. We have found, however, that improved results may be secured by spraying so-called printing inks whose liquid vehicle is preferably of a non-aqueous, drying character, onto the transfer paper, and then applying the skin-forming composition thereto. On the accompanying legended drawing, we have illustrated a fragment of the product embodying our invention.

Exemplary procedures falling within the purview of our invention may be carried out in various ways, but we shall deal with specific procedures which we have practised with eminently satisfactory results. The artificial leather with which we worked was designed specifically for use in shoe uppers and was prepared by impregnating a waterlaid web of refined wood pulp with a prevulcanized latex composition containing additional vulcanizing ingredients, an anti-oxidant, and glycerine, and then drying the impregnated web at elevated temperature. An artificial leather containing any other suitable fibrous foundation and prepared through impregnation with properly compounded latices or equivalent liquid rubber compositions might, however, well be employed. The particular artificial leather with which we were working is preferably scoured on its surface, as by frictional contact with rolls covered with paper, emery cloth, or other abrasive, which removes surface blemishes therefrom. It may then be "staked", or otherwise mechanically worked so as to acquire enhanced softness, pliability, and leather-like feel, and then compacted in a press having nicely finished platens, which impart smoothness thereto. It is then covered with a preformed skin, which is prepared from a mixture of latex (either unvulcanized or vulcanized) and glue. Specifically, we may use for preforming the skin a composition whose total solids content is made up of 85% latex solids, 1.7% colloidal sulphur, 4.25% colloidal zinc oxide, 0.85% of suitable vulcanizing accelerator, 0.43% of suitable anti-oxidant, 6.3% glue or gelatine, and 1.5% of suitable water-soluble dye. Such a composition may be properly sprayed at a solids content of about 30% onto a gelatine-coated, so-called transfer paper, to form a skin or pellicle thereon. In applying the composition to the paper, we may fasten a flat sheet of the paper at its four corners, by means of rubber bands, to

four pegs, so that although the sheet is restrained from curling, it can expand and contract freely and uniformly. The composition is allowed to dry on the paper backing to form the desired skin,

5 a little latex is preferably sprayed onto the scoured surface of the artificial leather base, and the skin carried by the paper backing is stuck onto the prepared surface of the base, under mild pressure. The backing is then moistened
10 with water and peeled from the artificial leather base, leaving the preformed skin strongly adherent to the base. The skin-surfaced sheet of artificial leather is then exposed to the fumes of formaldehyde, which after some hours completely
15 insolubilizes the glue content of the skin, whereupon the artificial leather is heated to vulcanize the rubber content of the skin, as by exposure for ten minutes to an atmosphere at 220° F.

We have found that the results may be further
20 improved if the gelatine-coated transfer paper is first sprayed with a printing ink and the skin-forming composition is applied thereto. We prefer to use a printing ink containing about 20% to 25% pigment and 75% to 80% boiled linseed
25 oil, the mixture preferably being "cut" or diluted with toluol or other suitable volatile solvent, in the ratio of about 1 part of ink to about 3 parts of solvent, before the spraying operation, so as to facilitate spraying. Only about 1.0 to 1.5 grams
30 of ink solids need be deposited per square foot of paper area to yield an ink film of the desired character. Drying oils other than linseed may be used as the ink vehicle, and so, too, suitable quantities of gums, resins, and dyes may form part of
35 the ink composition, as is sometimes the case in printing inks. Since the ink is non-aqueous, it does not tend to curl or otherwise distort the gelatine-coated paper, even during the subsequent formation of the skin thereon, as the ink forms a
40 waterproof barrier between the paper backing and the aqueous, skin-forming composition. We have found that good results are obtainable whether or not the ink film has dried before the skin-forming composition is applied thereto. The
45 transfer paper carrying a primary film of ink and a surface skin can be combined directly with the artificial leather base, as hereinbefore described, but we prefer first to insolubilize the glue and to vulcanize the rubber content of the skin before
50 such combination is effected, in order to avoid the subjection of the comparatively thick artificial leather base to the action of glue-insolubilizing agents and heat. Thus, the transfer sheet may be subjected to the action of formaldehyde fumes
55 at room temperature for about fifteen to eighteen hours, and a temperature of 220° F. for about ten minutes, for the purpose of transforming the skin to the desired condition.

In accomplishing a transfer of the preformed
60 skin to the base of artificial leather, we prefer to use an hydraulic press having a yielding bed and a highly polished platen heated to a temperature of about 200° to 210° F., at which temperature a tenacious bonding of the skin to the
65 artificial leather base is promoted. The artificial leather is placed in the press and the transfer sheet is superposed thereon, with the preformed skin lying next to the artificial leather surface and the plain paper face lying next to the hot
70 platen. The platen is brought down on the superposed sheets to exert a pressure of about 40 to 50 pounds per square inch, and this pressure is maintained for about two or more minutes. The combined sheets are removed from the press, allowed to cool, and the paper ply is wetted with

water and removed as ordinarily. The artificial leather has thus acquired a properly colored skin or a skin carrying a film of ink. In either event, the usual water finish, clear or slightly dyed, may be swabbed directly onto the surface, as is done
5 in the finishing of natural leather. The finish may, for example, be an aqueous mixture containing casein, blood albumin, and formaldehyde.

The results obtained by the practice of our invention are very gratifying, in that the finished
10 article resembles natural leather, more particularly of the calf variety, very closely. The preformed skin or ink film, having been dried against a very smooth surface, presents a remarkably uniform and homogeneous appearance, which persists even after the leather dressing or finish is applied. Heretofore, it was high impossible to
15 produce artificial leather whose surface was free from visible pits or other surface blemishes, which were rendered all the more conspicuous by the
20 leather dressing or finish.

If desired, the skin-forming composition which we employ may contain powdered cellulose, e. g., chemical wood pulp or the like, mechanically reduced, as in a ball mill, to a particle size preferably less than about 200 mesh. The function of
25 the pulverulent cellulose is to form pores in the skin, as well as to improve its feel and the adhesion of the leather finish thereto. It is not, however, an indispensable ingredient in the skin-forming composition. If desired, the transfer
30 paper may be embossed prior to the application of the ink and/or skin-forming composition thereto, so as to impart the desired embossed effect to the surface of the artificial leather on which
35 the preformed skin and, if desired, ink film is imposed.

We have mentioned the fact that we preferably employ so-called transfer papers as the backing on which a skin of the proper composition is preformed, along with an underlying film of so-called
40 printing ink, if desired. Such a backing serves to sustain the preformed skin and, if desired, film of printing ink, until these preformed layers are transferred to the properly prepared base of artificial leather. As the transfer paper, we prefer to use, as already indicated, the usual gelatine-coated transfer paper or its equivalent. The gelatine coating serves as an insulating layer between
45 the paper backing and the skin, and, if desired, film of printing ink deposited on the layer for transfer purposes. The coating of gelatine, capable of being softened by water, permits the removal of the paper backing after the desired transfer has been effected, upon wetting of the paper, without
50 disturbing or injuring the transferred skin and/or ink film. Any other suitably coated transfer papers, e. g., papers coated with dextrine paste or similar water-soluble material, are serviceable as the backing or sustaining layer on which
55 the skin and, if desired, ink film are preformed. In using the expression "transfer paper" in the appended claims, we mean a paper which is prepared for transfer purpose and accordingly contains an insulating layer of gelatine, dextrine
60 paste, or the like, functioning as an insulator and permitting subsequent removal of the paper backing from the article to which a transfer of the skin and, if desired, ink film deposited thereon has been made. In depositing the skin-forming
65 composition and so, too, the printing ink on the transfer paper, we may adopt any suitable mode of application, but, as already stated, we prefer to effect deposition by spraying. Thus, the spraying of printing ink is conducive to a preformed
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film which when transferred to the artificial leather base lends "character" to the finished article. We have observed, for example, that when we finish artificial leathers in accordance with our invention, by using a sprayed, preformed film to produce a finished article simulating black calfskin, the finished surface, rather than having a dead black, painted appearance or a glazed appearance like patent leather or oil cloth, has a surprisingly natural or life-like appearance, and that the film has a fine grain akin to that occurring on the grain side of natural leather. This grain-like structure is perhaps caused by the air entrained in the sprayed film, or by the imperfect coverage effected by spraying. Although not completely substantiated by us, we believe that the ink when dried against the gelatine film adsorbs the latter so that when the transfer paper is peeled off from the artificial leather, a minute film of gelatine remains on the ink, even though the ink surface may be washed in running water as is usually done after transfer papers are removed in ordinary transfer work. The adsorbed gelatine, we believe, assists in lending to the ink film a characteristic grain-like appearance, highly valuable in the manufacture of artificial leather. Whether the foregoing belief is right or not, it is true that we have thus far obtained our best results by spraying the ink directly onto the transfer paper.

It is preferable to effect both the insolubilization of the glue content and the vulcanization of the rubber content of the performed skin while it is still being sustained by the thin backing of transfer paper. It is, however, possible, as already indicated, to accomplish this after the skin has been transferred to the artificial leather base. It might further be mentioned that the glue content of the skin could be left therein in a water-soluble condition, and/or the rubber content of the skin left therein in unvulcanized condition, but the best characteristics are developed in the preformed skin only after the steps of insolubilization and vulcanization have been performed. As to the matter of finishing the artificial leather base to the desired color, a preformed film of ink or the addition of dyes or pigments to the skin-forming composition may be relied upon to furnish the desired coloring effect. The formation of a distinct film of printing ink

has already been emphasized as being by far the preferable expedient, although this may be coupled with a simultaneous use of dyes or pigments in the skin-forming composition to afford maximum depth of coloration in the finished artificial leather.

While we have indicated that we prefer to form the skin from a mixture of latex and glue, the glue may be omitted or replaced by other suitable compounding ingredients without departing from the scope of the present invention. Similarly, although we prefer to use a printing ink with an oil base, any other suitable type of dressing may be applied to the transfer paper before the skin coat is formed on it.

We claim:

1. A method which comprises spraying a non-aqueous printing ink on a transfer paper to form a film thereon, spraying a latex-and-glue mixture on said film to deposit a skin thereon, drying said film and skin, insolubilizing the glue content and vulcanizing the rubber content of said skin, superposing said preformed skin and film under heat and pressure while carried by said paper backing on a rubber-impregnated fibrous foundation to cause a bonding of said skin and film to said foundation, and removing said paper backing.

2. An artificial leather comprising a layer of felted fibrous material impregnated with a vulcanized residuum of rubber latex and having a coating of glue and latex mixture united thereto and forming a smooth and homogeneous surface.

3. A method which comprises impregnating a felted fibrous web with latex, superposing under heat and pressure on said felted impregnated fibrous foundation a preformed skin of a dry latex and glue mixture carried by a backing of transfer paper to cause a bonding of said skin to said foundation and removing said paper backing, thereby covering the surface blemishes of said foundation by said skin.

4. An artificial leather comprising a layer of felted fibrous material impregnated with rubber, said rubber impregnated felted fibrous material foundation having a coating of a latex and glue mixture united thereto and forming a smooth and homogeneous surface.

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