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J. D. McBURNEY ET AL.

LEATHER SUBSTITUTE

Filed June 24, 1926

Fig. 1

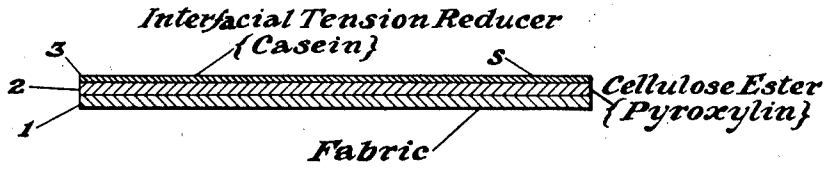
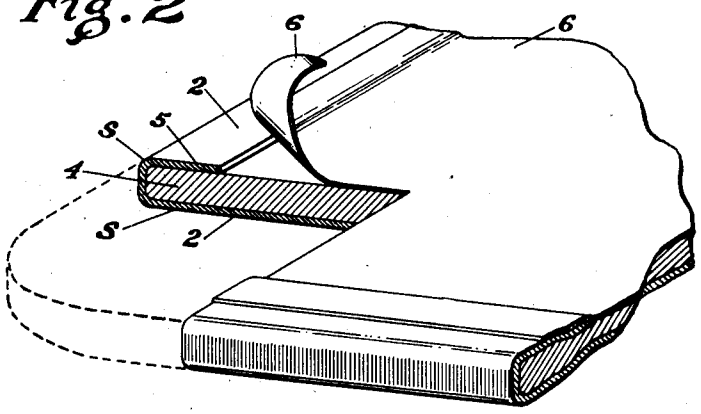


Fig. 2



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LEATHER SUBSTITUTE.

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This invention relates to leather substitute of the cellulose ester, e. g. pyroxylin, coated type. Although the substitute of the present invention is not restricted in its use to the bookbinding art, it finds particularly advantageous use in that art, and therefore the invention is described with more particular reference to that art.

Pyroxylin coated leather substitute, such as fabrikoid, has, as is well-known, found a large field of use in the bookbinding art; but there are certain respects in which improvement is highly desirable, in order to make the leather substitute as satisfactory as possible and overcome certain difficulties that have become apparent in the use of the material:—In handling and inspecting books bound in leather substitute one frequently finds that the paper end leaf has become detached from the leather substitute. This detachment takes place along the edges of the end leaf where they are stuck to the margin of the substitute where the substitute is carried over the edges of the stiffening sheet or board of the cover (forming the "turn-in") and fastened to the inside surface of the board. To the observer such a loosening of the end leaf from the substitute suggests careless work on the part of the bookbinder; but such is not the fact. The difficulty is that the pyroxylin surface of the substitute—it will be noted that it is this surface that is exposed on the inside of the cover at the turn-in and to which the end leaf is attached—is of such character that the glue or other adhesive that is used for connecting the end leaf and the turn-in will not properly spread on and permanently adhere to the turn-in.

We have now devised a leather substitute which, although it has the desired non-sticky, waterproof surface and all-pyroxylin leather substitute film, will properly take glue and other similar solutions and give a permanent joining with any material attached thereto. It is the major object of the invention to provide such a substitute.

We have found, upon careful investigation, that the poor adhesion is due to the high interfacial tension existing between the pyroxylin and the adhesive solution, or the medium which carries the adhesive proper, e. g. the water which carries the glue. That is to say, the poor adhesion is due to the glue solution, or the water, not properly "wetting" the pyroxylin surface. Upon further investigation we have found that the difficulty may be overcome by the application of a proper interfacial tension reducer to the pyroxylin surface. This reducer is casein. It is to be understood that the casein is not used in the capacity of an adhesive or of a water-proofing agent; it is used to facilitate the proper application and adhesion of the usual adhesive.

In the accompanying drawing, Figure 1 is a conventional cross-sectional view of a leather substitute embodying the present invention, and Figure 2 is a fragmental perspective view of a bookbinding, illustrating the use of the present material.

Referring now to the drawing, and particularly to Figure 1, the present leather substitute S comprises the woven fabric back 1, the pyroxylin film 2, and, on the surface of the pyroxylin film, the casein 3. (It will be understood that no effort is made in the drawing to indicate relative thicknesses with accuracy.)

The material may be made as follows:— Any suitable woven fabric base is coated, as in a standard coating machine, with a pyroxylin film of substantial thickness, thereby to give a proper leather substitute surface—as distinguished from merely sizing the goods. Thus, there may be applied three coats of the following coating composition (parts by weight):

Cellulose nitrate	16.
Caster oil	26.
Dry pigment of any desired type as carbon black	10.
Benzol	67.8
Alcohol	27.9
Ethyl acetate	27.9

Each coat or sub-film is dried after depositing and before the application of the next, and the aggregate ultimate coat or film is desirably from .002 to .004 inch thick.

After the final pyroxylin sub-film has dried, the casein is applied. This may be done in any desired way as with a coating machine, drying the casein coat (and expelling the volatile ammonia) with the aid of steam heated coils. As many coats as is necessary to give a finish of the desired thickness, say .00025 to .001 inch, may be applied, drying after each coat, one coat being generally sufficient. The thin casein

coat effects no change in the substitute with regard to appearance, wearing qualities ability to be embossed, rolled etc. The composition may desirably be as follows (parts by weight):

	Range.	Preferred.
Water	94. –23.	60.
Casein	3. –25.	16.
Ammonium hydroxide (.90 specific gravity)	0.5–27.	13.5
Glycerine (C. P.)	2. –30.	20.
Coloring matter	0.5– 5.	0.5

In the above composition, for the dispersing agent, ammonia, others may be substituted, as various alkaline substances such as borax or sodium or potassium hydroxide, or certain acids, such as citric acid. Ammonium hydroxide, however, is believed the most desirable since, in drying, the ammonia is expelled with no alkali remaining; and alkali under certain circumstances might be injurious to the pyroxylin film. For the softening agent, glycerine, others may be used, such as various other polyhydric alcohols, for example ethylene glycol. Ethylene glycol has, indeed, merit, but whereas 10 and 12.5 percent. of glycerine (based on the weight of the whole composition) is highly satisfactory, even about 25% of ethylene glycol is less so. While a polymerizing agent for the casein, for example formaldehyde, may be used, its use has not been found of material advantage. For the coloring matter in the composition there may be used any one giving the desired color, for instance, a suitable dye or pigment, e. g. carbon black. As indicated, the concentration of the color component will vary considerably, depending on the shade and the material, but approximately 0.5 percent (based on the total weight of the (liquid) composition) is generally satisfactory.

In Figure 2 of the drawing there is shown a portion of a book cover illustrating the use of leather substitute in binding and indicating the particular significance of the present material. In this figure the board of the cover is shown at 4, and the leather substitute at S. The substitute, when applied, has its pyroxylin surface 2 exposed on the outside of the cover, and when the substitute is "turned in" over the edge of the board, as indicated at 5, this surface 2 is still the exposed one. Thus, when the back leaf 6 is fastened to the board 4, with paste or glue, it becomes necessary to fasten it to the pyroxylin surface of the leather substitute. With material of the present invention, its pyroxylin surface being covered with the interfacial tension reducer, this can be properly and permanently done.

Returning now to the interfacial tension reducer, as stated casein has been found the most suitable for the purpose, the desideratum being a material that not only has the primary property of reducing the interfacial tension between the pyroxylin and the usual adhesives, or the organic hydroxylic compounds such as water and alcohol, used as solvents for such adhesives, e. g. paste, glue, gelatin, shellac and so on, causing the adhesive (solution) to wet the pyroxylin film and spread properly thereon, but also is insoluble in water and not sticky, will, in solution, fully spread upon and wet the pyroxylin film, and will cause no difficulties when the material is subjected to the embossing press, and so on. With the present substitute, glues, pastes, gelatin solutions, and so on, properly spread on the surface of the substitute and wet the same over the entire surface thereof, so that when the material to be fastened to the substitute is applied thereto complete facial connection and permanent anchorage between the substitute and the material is obtained.

To mention further advantages of the material, also particularly apparent in the bookbinding art:—In applying the gold, or other leaf, to leather substitute bindings of the usual type difficulty has been experienced in obtaining proper adherence of the leaf to the pyroxylin film. With the usual type of pyroxylin-surface leather substitute it is necessary, preparatory to the stamping of gold leaf, to wash the surface with a size consisting usually of an aqueous-borax-shellac, or an alcohol shellac, composition, to prepare the surface and endeavor to obtain proper adherence of the leaf. Such application of the size is, however, unsatisfactory as the size fails to "spread" properly or wet the surface—a condition comparable to that observed when mercury is poured upon a glass surface. This behavior is the direct result of the high interfacial tension existing between water or alcohol and the leather substitute.

Because of the above considerations, it is customary to resort to the use of a special alcohol wash preparatory to the application of the shellac size. Not only does such a practice mean an additional operation in the bindery, but under certain conditions special size compositions prepared for leather substitute material behave quite unsatisfactorily. With the present material the use of the ordinary shellac size is made entirely possible, without the use of any of the special preparatory washes just mentioned. This is because the ordinary size will spread properly on the present leather substitute because of the low interfacial tension developed. Furthermore, if it be desired to work in that way, the sizing treatment (and, of course, the special wash) may be wholly omitted and the gold leaf directly stamped on the present goods. This is because the

casein surface is sufficiently thermo-plastic, under the heat of the hot tools by which the leaf is stamped onto the substitute, to cause the leaf to properly adhere to the substitute. It may also be noted that in lettering the present material with colored ink, the ordinary inks employed with leather may be employed, it being unnecessary to use the special ink heretofore necessary in stamping pyroxylin-surfaced goods. This is a substantial advantage since the special ink requires about three days to dry, whereas the regular inks require but about twelve hours.

While in the foregoing description the interfacial-tension-reducing coat has been described as applied to a pyroxylin coat containing oil it will be understood that its efficiency is not dependent upon whether or not the pyroxylin coat contains oil, the reducer overcoming a difficulty existing with the pyroxylin coat whether or not it contains oil. Furthermore, the invention is applicable to leather substitutes having films of cellulose esters other than nitrocellulose, as cellulose acetate, the casein overcoming the difficulty of non-wetting, and so on, as heretofore described.

Although the material to be attached to the leather substitute has, for definiteness, been described as paper, i. e. the back sheet of a binding, it will be understood that the action of the interfacial tension reducer is not dependent on the particular material to be attached to the leather substitute, as the paper may be glazed or unglazed, or some other material.

While casein has been particularly mentioned, and is preferred, other materials comparable to casein, in being satisfactory interfacial tension reducers, water insoluble, non-sticky, and capable, when used alone without admixture with pyroxylin, of adhering properly to pyroxylin, and fully spreading thereon, may be used.

We claim:

1. A leather substitute comprising a fabric backing, a pyroxylin film of leather-substitute type, and a surface film comprising casein.

2. A leather substitute comprising a fabric backing, a pyroxylin film of leather-substitute type, a surface film of casein, and a softener therefor.

3. A leather substitute comprising a fabric backing, a pyroxylin film comprising a plurality of substantial sub-films, and, directly on the pyroxylin film, a film of casein.

4. A leather substitute comprising a textile fabric backing, a pyroxylin film of leather-substitute type, and a waterproof, non-sticky, flexible, pyroxylin-free surface film comprising, as an interfacial tension reducer, casein.

In testimony whereof we affix our signatures.

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