

UNITED STATES PATENT OFFICE.

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LEATHER AND PROCESS OF MAKING THE SAME.

No. 848,357.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, LEON FEVAL, a citizen of the Republic of France, residing at Newark, in the county of Essex and State of New Jersey, have invented a certain new and useful Improved Leather and Process of Making the Same, of which the following is a description.

The objects I have in view are the production of a finished leather which will possess great durability, freedom from cracking and other objections and which will be cheap to manufacture. I attain these objects by coating the leather with a plurality of coatings, the inner coating or coatings being elastic, one at least of them containing a relatively large proportion of non-drying oil or oil not readily oxidizable and soluble nitrocellulose, which is preferably in solution with amyloacetate and diluted with alcohol. The innermost coating is preferably formed by making a portion of the diluent of alcohol, which by its quick evaporation will cause the pyroxylin to set before the amyloacetate has an opportunity to penetrate the leather and deposit the pyroxylin on the surface of the leather in the form of a thin film. The inner coating or coatings will never entirely dry, owing to the large proportion of non-oxidizing oil employed, and will remain always in a "tacky" or sticky condition. The outer coating or coatings preferably contain a much larger proportion of pyroxylin and a smaller proportion of oil. The outer coating or coatings will preferably be largely of pyroxylin and will set with a dry surface, which will cover and protect the inner coating or coatings. This outer coating will preferably be very much thinner than the inner coating or coatings.

As a basis of the leather I use real leather as distinguished from artificial leather. Small skins or large hides may be used, and the invention may be applied with success to the less expensive splits, as well as to the more expensive grained and buffed leathers. For the oil I employ a non-drying oil—that is, an oil which is not readily oxidizable. As examples of such oils I may mention castor-oil and peanut-oil, both of which are abundant and serve the purpose admirably. Other oils which answer the requirements, however, may be used without changing the

invention. For the nitrocellulose I prefer to use a nitrated cellulose readily soluble in amyloacetate and methylic alcohol, such as pyroxylin or guncotton. This nitrocellulose may be in solution in a solvent proper, such as amyloacetate, or in a solvent mixed with a diluent, as fusel-oil. Together with the oil and the nitrocellulose I may use gums or other substances to give body to the coating and pigments or other substances to give color; but they are not necessary.

One way of carrying out the process is as follows: The uncoated leather is first coated with a liquid containing the oil and nitrocellulose in solution and preferably diluted with alcohol with or without other materials, such as gums or pigments. This inner coating is allowed to set, (preferably at ordinary temperature.) The first or inner coating when sufficiently set will not be entirely hard and inflexible, owing to the presence of the large proportion of non-drying oil, but, on the contrary, will be tacky and more or less soft, flexible, and elastic. A second coating is then superposed upon it. This outer coating may be like the inner one except that it has a smaller proportion of the oil than in the inner coating. In this outer coating a larger proportion of pigment may be used, if desired, than in the inner coating. The outer coating in some instances may contain no oil whatever, the effect of the oil in the outer coating being secured by the combination of the nitrocellulose of the outer coating with a portion of the oil of the inner coating. The idea of the outer coating is to serve as a finish to the inner coating, the latter being always soft, and therefore impractical for a finished leather. If desired, a third or other coatings may be added, these coatings being similar to the second coating. The process may be modified by making the second coating or additional coatings, if such be used, similar to the first, with the outside or finish coating similar to the second coating above described.

As an example for carrying out my improved process the following proportions may be employed: For a steer-hide split or cowhide split of average thickness for the first coating a solution of about thirteen pounds of pyroxylin dissolved in about thirteen gallons of a mixture of three parts of

wood-alcohol and one part of amylacetate, which is at the rate of one pound of pyroxylin to each gallon of solution. To this is added about seventy-five pounds of castor-oil together with about two pounds of any commercial pigment, depending upon the color desired, ground in about twenty pounds of oil. There is therefore used about ninety-five pounds of oil, so that the oil will therefore be at the rate of about seven and one-third pounds of oil to each pound of nitrocellulose. As an example of coloring pigment for some shades of brown burnt umber may be employed. The inner coating will set and will not permeate the leather to any appreciable extent. One reason why this is possible is the use of the wood-alcohol in large quantity, so that the composition will not entirely or much of it permeate the leather and change the character of the coating from one of great elasticity and ability to stretch to a film formed largely of pyroxylin and incapable of being stretched. Instead of the wood-alcohol some other material may be used to prevent permeation of the leather by the solution. For the second coating the same amount of pyroxylin and amylacetate may be used, but with a smaller proportion of alcohol, depending upon the weather during the operation on account of its tendency to absorb moisture and then precipitate pyroxylin. To this is added sixteen pounds of castor-oil, being much less than for the first coating.

The amount of alcohol used in the second coating depends upon the weather during the operation. The second coating is in a position to absorb moisture, while the first coating is covered. Therefore if moisture be absorbed a spotted appearance in the coating results. It is possible to make it without alcohol; but the solution will penetrate too far unless other means be provided to prevent this, for the reason that the amylacetate dries too slowly. The amount of oil in the inner coating is regulated by the thickness, texture, stiffness, and in some cases by the method of tannage of the leather, and also by the length of fiber on the surface, if the leather is a split. A thick and close-textured leather will require a larger proportion of oil than a thinner leather or one in which the texture is more open. In some instances chrome-tanned leather will require a smaller proportion of oil than a bark-tanned leather. The hand-buffed and machine-buffed leathers will require a smaller proportion of oil than the split referred to above, assuming the proportions to be the same in both cases. The proportion of oil to nitrocellulose should be varied when used in connection with other leathers—such as goatskin, calfskin, &c.—according to the above rule. The proportion may vary from seven and one-half pounds of oil to each pound of nitrocellulose or even slightly more in some leathers down

to very much less in other leathers. I find, however, that it may not well be reduced below three and one-fourth pounds to each pound of nitrocellulose. This proportion of oil, it is to be understood, is to be measured by the amount of nitrocellulose employed and does not in any way depend upon the amount of solution containing the nitrocellulose. The proportion of oil in the outer coating will vary according to the results desired. A smaller proportion of oil will give a leather having a "drier feel." Similarly a larger proportion of oil will give an increased sleekness of feel. The amount of pigment added should be sufficient to secure the desired depth of color. The proportions used will vary with the results desired. The addition of gums or other oils may cause a slight reduction of non-drying oil. For instance, in connection with the example before given if a gum or similar substance, such as camphor, is used, and which is soluble in the solvent used to dissolve the pyroxylin without acting on the pyroxylin, it would be in the proportion of about three-quarters of a pound to each pound of castor-oil used. After the leather is coated it may be further finished by graining, embossing, or pebbling in the usual way.

The leather produced by this process possesses remarkable durability and freedom from cracking or splitting. It is particularly applicable for furniture, upholstery, or for use upon carriages and automobiles and for use in constructing the folding hoods or tops of carriages. In these situations the leather is subjected to severe treatment, strains, and exposure to the weather and is folded and subjected to treatment which would ordinarily cause cracking or flaking of the coating.

Leather made according to my process does not have the objections ordinarily incident to leathers made by old and well-known processes. I find that it may be very much more cheaply manufactured and made with greater expedition than ordinary coated leathers. The successive coatings do not have to be baked and may be quickly dried without artificial heat. Furthermore, a greater cheapness is secured by using cheaper grades of leather to form the basis of the coated leather. I find that leather which is made from the split, deep split, or deep buff according to my process is every way as good as, if not better than, leathers made from the hand-buff or machine-buff according to the old and well-known processes. Furthermore, it has the greater advantage of not drying out or getting stiff by age and will not be affected by cold weather.

Leather produced by this process as disclosed can be distinguished from all others as follows: by chemical analysis—washing carefully, or rather dissolving carefully, the

surface coating of the leather preferably by running over the surface with a sponge impregnated with amylacetate, then drying the leather and the remaining coating, then extracting, by means of benzene or ethyl alcohol, the oil contained therein, then drying thoroughly the leather and whatever coating has remained attached to it after the extraction of the oil. The difference in weight between the original sample of leather submitted to analysis and its weight after the oil has been extracted will give the weight of oil it contains. The weight of nitrocellulose can easily be obtained by dissolving the same from the leather after the oil has been extracted, this dissolution being preferably made by means of amylacetate, which the evaporated will leave as residue the nitrocellulose. If color pigments are present, they may be separated or weighed by burning the dry residue containing nitrocellulose and pigment. The final residue after the nitrocellulose has been burned out will represent the weight of pigment. This method of analysis will establish the proportion of oil to nitrocellulose, which by simple calculation can be expressed in percentage of oil to the total mixture of nitrocellulose and oil. The oil and nitrocellulose can be identified by any of the reliable tests given in text-books by chemical analyses.

By microscopical examination of a section of leather coated by this process the different coats may be identified if they have been given at an interval of two or three days between each, the coats containing the large proportion of oil showing in section a heavier or thicker coat of a peculiar gelatinous appearance.

My leather when heated will give off a slight smell of non-drying oil used in the coating.

On cowhide, steer-hide, or bull-hide, such as is used generally for furniture, carriage, and automobile work, any hide not possessing an inner coat containing at least three and one-fourth pounds of oil to each pound of nitrocellulose will break on sharp bending or will remain too stiff and not sufficiently pliable to be used for the above-stated purposes, and the break or cracking of the composition on the leather will be recognized by its being of a nature of the breaking of a brittle material. The interposition of a piece of ordinary wrapping-paper between a plate heated to 160° Fahrenheit or less and the leather made according to my process will leave on the paper oil stains at the points where the paper touches the leather.

Split leather—that is, the part of a hide near to the flesh—finished or coated by my process will be recognized by its resistance to breaking and its appearance absolutely similar to machine-buff and even hand-buff or grained leather made by other processes.

My leather will also be readily recognized, because with the utmost skill and care it is impossible to produce a coated cowhide, steer-hide, or bull-hide of the nature of leather used for furniture, carriage, and automobile trimming with nitrocellulose and a non-drying oil in the proportion of less than three and one-fourth pounds of oil to each pound of nitrocellulose in which the coatings would not crack on sharp bending and yet have the coating so thin that it could be hardly apparent to the naked eye. I have been able to produce on these same leathers a coating containing from three and one-eighth to three and three-sixteenths pounds of oil to each pound of nitrocellulose which would not crack readily on sharp bending; but the thickness of the coating had to be such that on the section of the coated leather it was plainly apparent to the naked eye and for this reason made the resulting coated leather too stiff to be readily marketable and much too expensive to be of commercial value. In fact, such leather with such a thick coating is much more unsatisfactory than the method of producing leather by the ordinary known linseed-oil process, besides in most cases the leather thus coated will get brittle after it is one or two months old. This leather also on account of its "heavy feel" can absolutely not be used for tufting purposes to which it is intended—as, for instance, the tufting of couches, carriage-cushion, and automobile-trimming.

Having now particularly described and ascertained the nature of my invention and in what manner the same is to be performed, I declare that what I claim, and desire to secure by Letters Patent, is—

1. The process of coating leather which consists in coating the leather with a plurality of coatings of a liquid containing a soluble nitrocellulose and a non-drying oil, one at least of the inner coatings containing oil at the rate of at least three and one-fourth pounds of oil to each pound of nitrocellulose.

2. The process of coating leather which consists in coating the leather with a coating of a liquid containing a soluble nitrocellulose and a non-drying oil, the said coating containing oil at the rate of at least three and one-fourth pounds of oil to each pound of nitrocellulose, then coating the leather with a superposed coating or coatings of a liquid containing a soluble nitrocellulose.

3. The process of coating leather which consists in coating the leather with a coating of a liquid containing a soluble nitrocellulose and a non-drying oil, the said coating containing oil at the rate of at least three and one-fourth pounds of oil to each pound of nitrocellulose, then coating the leather with a superposed coating or coatings of a liquid containing a soluble nitrocellulose and a smaller proportion of oil.

4. The process of coating leather which consists in coating the leather with a plurality of coatings of a liquid containing a soluble nitrocellulose and a non-drying oil, one at least of the inner coatings containing oil at the rate of as much as six pounds of oil to each pound of nitrocellulose.

5. The process of coating leather which consists in coating the leather with a coating of a liquid containing a soluble nitrocellulose and a non-drying oil, the said coating containing oil at the rate of as much as six pounds of oil to each pound of nitrocellulose, then coating the leather with a superposed coating or coatings of a liquid containing a soluble nitrocellulose.

6. The process of coating leather which consists in coating the leather with a coating of a liquid containing a soluble nitrocellulose and a non-drying oil, the said coating containing oil at the rate of as much as six pounds of oil to each pound of nitrocellulose, then coating the leather with a superposed coating or coatings of a liquid containing a soluble nitrocellulose and a smaller proportion of oil.

7. As a new article of manufacture, leather

coated with a plurality of superposed coatings formed of a liquid containing a soluble nitrocellulose and a non-drying oil, the said leather being flexible, one at least of the inner coatings containing oil at the rate of at least three and one-fourth pounds of oil to each pound of nitrocellulose, the leather when heated giving off a slight odor of the non-drying oil, and not cracking when sharply bent.

8. As a new article of manufacture, leather coated with a plurality of superposed coatings formed of a liquid containing a soluble nitrocellulose and a non-drying oil, the said leather being flexible, one at least of the inner coatings containing oil at the rate of as much as six pounds of oil to each pound of nitrocellulose, the leather when heated giving off a slight odor of the non-drying oil, and not cracking when sharply bent.

This specification signed and witnessed this 24th day of April, 1906.

LEON FEVAL.

Witnesses:

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