

UNITED STATES PATENT OFFICE

1,947,513

PROCESS FOR THE AFTER-TREATMENT
OF LEATHER

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No Drawing. Application August 8, 1933, Serial
No. 684,222, and in Germany December 21,
1931

17 Claims. (Cl. 149—5)

The present invention relates to a process for the after-treatment of leather dressed or tanned by means of vegetable or combined tanning agents. Leather, dressed or subjected to an after-treatment with the aid of vegetable tanning agents, possesses the disagreeable property, that that part of the vegetable tanning agent which is not firmly combined with the fibre of the skin may be washed out again by water to a considerable extent. A number of processes has already become known aiming at the elimination of this drawback, most of them being based on binding the non-bound, scourable part of the tanning agent contained in the leather by means of an after-treatment with a glue or casein solution. As, however, these dissolved albuminous substances are precipitated most intensively by the tanning agents, so the tanning agent will usually be separated only in the surface of the leather, a total penetration of the leather by the colloidal albuminous solution thereby being rendered very difficult or even impossible. Other media which precipitate the tanning agent have also been suggested for the same purpose, such as salts.

I now have ascertained, that the formaldehyde-urea compounds soluble in water, and particularly the water-soluble higher condensation products of formaldehyde with urea are excellently adapted for combining with vegetable tanning agents. The molecule of the tanning agent will be enlarged thereby to such an extent, that its dissolution in water is made impossible. Consequently, that part of the tanning agent which is liable to be washed out of leather dressed or treated by means of vegetable tanning agents, may be rendered insoluble by an after-treatment of the leather with such urea-condensation products.

A special advantage of the new process is to be seen also in that it will be possible to wholly impregnate the leather right through by steeping it into the aqueous solution of the formaldehyde-urea compound, the tanning agent thus being uniformly bound all over and through the leather. The leathers, treated in accordance with this process, exhibit a very low percentage of loss of tanning substance or even no such loss whatever on being washed out, but, on the other hand, they possess the same properties and quality as the leathers not treated in this manner, and they may be further dressed or curried in the usual manner.

It has already been suggested, to precipitate the vegetable tanning agent contained in the leather by means of hexamethylene-tetramine or its salts, and to fix it thereby. But it was not to be anticipated in any case that it would be possible to utilize instead of the hexamethylenetetramine or its salts also the known urea-formaldehyde condensation products. Both kinds of combinations belong to entirely different classes of chemical substances. The properties, too, of both kinds of combinations, differ very far from one another. For instance, it is known that the hexamethylene-tetramine will be split by acids, formaldehyde and ammonia being formed thereby, for which reason the said compound is employed also in the leather industry as a mild neutralizing agent. It is for the indicated reason, however, that the use of the hexamethylene-tetramine for fixing the vegetable tanning agent in the leather embodies the risk that in the presence of free acid, which, as is known, is frequently contained in leather, the fixing can easily be rendered ineffective and reversed, so that such leathers, particularly after having been stored for some time, will contain again unbound tanning agent which is liable to be washed out.

Consequently it was, on the one hand, not to be anticipated, that a fixing of the vegetable tanning agent would be attainable by the use of urea-formaldehyde condensation products, whereas, on the other hand, by the employment of these condensation products the above mentioned risk is obviated, and, even more, the condensation in this case progresses in the presence of the acid and, therefore, the tanning agent will be fixed in this case even to a gradually increasing degree.

The treatment of the leather by the urea-formaldehyde condensation products may, if desired, be combined with a bleaching process for the leather, by adding to the impregnating solution sulphuric acid, oxalic acid, formic acid, or the like. Also glycerine, sugar, salts or sulphonated oils may be added to the impregnating bath containing the urea-formaldehyde condensation product. The addition of water-soluble salts of inorganic or organic acids is of a special importance. It has been ascertained that by the addition of only a small quantity of such a salt it is made possible to obtain a perfect fixation of vegetable tanning agent which had remained unbound before, by only very small quantities of the urea-formaldehyde condensation products in question.

In place of the urea-formaldehyde condensation products, also the corresponding condensation products of the derivatives of urea, as well as those of thiourea and its derivatives may be

employed for the same purpose. By the term "urea" consequently will be meant here also its derivatives, as well as thiourea and its derivatives. The formaldehyde may be replaced by other aliphatic or aromatic aldehydes and ketones or substances splitting off aldehyde, and the term "formaldehyde", consequently is meant here to embody also these combinations or compounds.

Instead of the condensation products in question being prepared before, mixtures of urea, thiourea or the like with aldehydes or ketones or the like, preferably in the presence of condensing agents may also be employed. The employment of these separate components instead of condensation products formed before, however, causes difficulties.

The process is, as a matter of course, also applicable to leather dressed or tanned in a combined manner, i. e. to such leathers, which have been treated simultaneously or successively with mineral and vegetable tanning agents.

Preferably the urea-aldehyde solutions employed for the present process will be diluted to such a degree that they do not contain more than 20% of the condensation product in question.

Examples of performance

(1) 300 liters of a technical 30% formaldehyde solution are boiled with a solution of 50 kilos of urea in 60 liters of water for one hour with reflux. After the condensation has been finished, the solution is filtered, if necessary, and diluted with water to 1½ cubic meters. Bark-tanned, not yet curried rein-pieces or backs are steeped in this solution. After half an hour the leather is taken out, washed and dressed or curried in the usual manner. During this treatment it suffers only an inconsiderable loss of tanning substance by being washed out.

(2) Back-tanned cow leather is fulled with an impregnation liquid produced in accordance with Example 1, after 2% of glycerine and 2% of oxalic acid have been added to said liquid. After a quarter of an hour the leather is taken out, washed and subsequently dried. It possesses an attractive light colour and is not subject to any loss of tanning substance by the treatment with water.

(3) Leather tanned by means of a vegetable tanning agent is impregnated with a solution which has been produced in accordance with a method corresponding to that indicated in the Example 1, thio-urea, however, being employed here instead of the common urea. After this treatment the leather is bleached with oxalic acid and subsequently washed with water. No loss of tanning agent will take place therein.

(4) 20 kilos of urea are dissolved in 120 kilos of a 38% solution of formaldehyde and boiled for 20 minutes in the presence of very small quantities of hydrochloric acid. The condensation product thus obtained is diluted with water to 20 times its volume. By means of this solution, leather tanned with a vegetable tanning agent, is fulled for a period of 1 hour, .5 to 1 kilo of magnesium sulphate per each 100 liters of liquid being added simultaneously. The leather thus obtained is of good appearance and exhibits no loss of vegetable tanning substances, even after having been steeped in water for a long period.

Having now particularly described and ascertained the nature of my said invention, I declare that what I claim is:

1. A process for the after-treatment of leather tanned or treated with vegetable tanning agents,

consisting in that the leather, treated with the vegetable tanning agents, before being washed-out is further treated with an aqueous solution of combinations obtained by the condensation of a urea and an aldehyde.

2. A process for the after-treatment of leather tanned or treated with vegetable tanning agents, consisting in that the leather, treated with the vegetable tanning agents, before being washed-out is further treated with an aqueous solution of combinations obtained by the condensation of urea and formaldehyde.

3. A process for the after-treatment of leather tanned or treated with vegetable tanning agents, consisting in that the leather, treated with the vegetable tanning agents, before being washed-out is further treated with an aqueous solution of combinations obtained by the condensation of thiourea and formaldehyde.

4. A process for the after-treatment of leather tanned or treated with vegetable tanning agents, consisting in that the leather, treated with the vegetable tanning agents, before being washed-out is further treated with an aqueous solution of combinations obtained by the condensation of derivatives of a urea and an aldehyde.

5. A process for the after-treatment of leather tanned or treated with vegetable tanning agents, consisting in that the leather, treated with the vegetable tanning agents, before being washed-out is further treated with an aqueous solution of combinations obtained by the condensation of derivatives of urea and formaldehyde.

6. A process for the after-treatment of leather tanned or treated with vegetable tanning agents, consisting in that the leather, treated with the vegetable tanning agents, before being washed-out is further treated with an aqueous solution of combinations obtained by the condensation of urea and substances splitting off formaldehyde.

7. A process for the after-treatment of leather tanned or treated with vegetable tanning agents, consisting in that the leather, treated with the vegetable tanning agents, before being washed-out is further treated with an aqueous solution containing urea and formaldehyde.

8. A process for the after-treatment of leather tanned or treated with vegetable tanning agents, consisting in that the leather, treated with the vegetable tanning agents, before being washed-out is further treated with an aqueous solution containing urea, formaldehyde and a condensing agent.

9. A process for the after-treatment of leather tanned or treated with vegetable tanning agents, consisting in that the leather, treated with the vegetable tanning agents, before being washed-out is further treated with a strongly diluted aqueous solution of combinations obtained by the condensation of a urea and an aldehyde.

10. A process for the after-treatment of leather tanned or treated with vegetable tanning agents, consisting in that the leather, treated with the vegetable tanning agents, before being washed-out is further treated with a strongly diluted aqueous solution of combinations obtained by the condensation of urea and formaldehyde.

11. A process for the after-treatment of leather tanned or treated with vegetable tanning agents, consisting in that the leather, treated with the vegetable tanning agents, before being washed-out is further treated with an aqueous solution of combinations obtained by the condensation of a urea and an aldehyde, and with an acid.

12. A process for the after-treatment of leather tanned or treated with vegetable tanning agents, consisting in that the leather, treated with the vegetable tanning agents, before being washed-out is further treated with an aqueous solution of combinations obtained by the condensation of a urea and an aldehyde, in the presence of an acid.

13. A process for the after-treatment of leather tanned or treated with vegetable tanning agents, consisting in that the leather, treated with the vegetable tanning agents, before being washed-out is further treated with an aqueous solution of combinations obtained by the condensation of urea and formaldehyde, in the presence of an organic acid.

14. A process for the after-treatment of leather tanned or treated with vegetable tanning agents, consisting in that the leather, treated with the vegetable tanning agents, before being washed-out is further treated with an aqueous solution of combinations obtained by the condensation of a urea and an aldehyde, and with oxalic acid.

15. A process for the after-treatment of leather

tanned or treated with vegetable tanning agents, consisting in that the leather, treated with the vegetable tanning agents, before being washed-out is further treated with an aqueous solution of combinations obtained by the condensation of a urea and an aldehyde, in the presence of small quantities of a salt.

16. A process for the after-treatment of leather tanned or treated with vegetable tanning agents, consisting in that the leather, treated with the vegetable tanning agents, before being washed-out is further treated with an aqueous solution of combination obtained by the condensation of urea and formaldehyde, in the presence of small quantities of a salt.

17. A process for the after-treatment of leather tanned or treated with vegetable tanning agents, consisting in that the leather, treated with the vegetable tanning agents, before being washed-out is further treated with an aqueous solution of combinations obtained by the condensation of a urea and an aldehyde and with an acid, in the presence of small quantities of a salt.

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