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PROCESS OF CARROTING FUR AND THE LIKE AND COMPOSITION THEREFOR

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This invention relates to the carroting of fur and similar animal fibers for the purpose of imparting felting properties to such fibers. It is well known that in its natural state fur lacks adequate felting capacity and must be treated with certain chemical substances to impart the required felting properties. The commonly used reagents for this purpose are nitric acid and mercuric nitrate in aqueous solutions containing what is commonly known as mercury carrot.

Mercuric nitrate-nitric acid carroting solutions, in spite of their attendant noxious qualities, are in widespread use but have many well known disadvantages. Difficulty in the control of the carroting effect with mercury carrot solutions is commonly experienced due to the specific chemical properties of the solutions. According to the accepted theory, the carroting of fur is carried out by both a hydrolyzing and an oxidizing action.

The carroting effect of mercuric nitrate-nitric acid solutions depends upon the concentration of these reagents. A concentration sufficient to produce the necessary hydrolysis may not produce proper oxidization, while a concentration sufficient to result in a proper oxidization may result in an excessive hydrolysis detrimental to the fur.

One object of the invention is to so control the carroting effect with these solutions that either excessive oxidization or excessive hydrolysis or both may be avoided and the destructive action of either process on the fur fibers prevented.

Furthermore, the carroting effect of mercury carrot solutions also frequently lacks uniformity, due to the low penetrating power of these reagents in aqueous solutions. In the case of many kinds of fur, such, for example, as American double ring and Haresfur, characterized by long, fine, closely grown fibers, it becomes difficult, even with thorough brushing, to secure sufficient penetration to obtain thorough carroting with mercury carrot solutions, particularly when used with concentrations of a safe strength. The result is that an inadequately carroted fur felts slowly and forms a loose felt, tending to separate or "peel" at the surface. If more concentrated solutions are employed the fur itself becomes damaged.

In our co-pending application, Serial No. 88,382, filed July 1, 1936, now Patent No. 2,087,854 there is disclosed the use of protecting agents or inhibitors employed to prevent the destructive action of carroting solutions, such use being illustrated in the case of non-oxidizing acids with separate oxidizers and in the absence of metallic catalysts. We have found that certain of these protective agents or inhibitors can be used in mercury carrot solutions to protect animal fibers by checking either excessive oxidization or excessive hydrolysis. Destructive action on the fur fibers may thereby be prevented should either or both the oxidizing or the hydrolyzing tendency of the solution be excessive, and a measure of control, which has heretofore been lacking, may be exercised in the carroting effect of these solutions.

We have further found that certain of these protective agents or inhibitors, besides serving to control the carroting process, have the property of increasing the penetration of the carroting solution. The use of these substances in such cases, due to the fact that they have a greater affinity to animal fibers than to water, facilitates the thorough application to the fibers of mercury carrot solution, increasing the penetration, permitting the use of more concentrated solutions, if desired, and producing an adequate and more uniform carroting effect.

In the case of skins which are contaminated with grease and blood, high concentrations of certain of these inhibiting and penetrating substances with the mercury carrot solution afford a distinct cleansing effect, insuring a thorough application of the solution to the fibers.

We have found that organic substances suitale as inhibitors and penetrators for carroting compositions should be soluble in water, aliphatic or open chain in structure, incapable of forming insoluble compounds in the mercuric nitrate-nitric acid solution, and are oxygen, sulphur or nitrogen-containing organic compounds.

Oxygen compounds—as carroting inhibitors—comprise aliphatic or open chain compounds in the classes: alcohols, ketones and carbo-acids.

Organic sulphur compounds—as carroting inhibitors— comprise aliphatic or open chain compounds in the class of sulphino-acids.

Organic nitrogen compounds—as carroting inhibitors—comprise aliphatic or open chain compounds in the class of amines.

It is to be understood, however, that there should be avoided the use of organic compounds of the amine group capable of forming insoluble compounds with mercuric nitrate or nitric acid, such as urea, guanidine, glycolyl guanidine and other amino derivatives of carbonic acid, these substances also having a strong reducing action tending to eliminate the nitric acid from the so-

lution. Urea, for example, combines directly with nitric acid, forming urea nitrate insoluble in nitric acid. It also reacts with the mercuric nitrate in the solution, producing precipitate of mercuric urea.

The foregoing classes of inhibitors soluble in water may include bodies having mixed functions: e. g., aldehyde-alcohols with the groups CHO and CH_2OH, aldehyde-acids with the groups CHO and COOH, ketone-alcohols with the groups CO and CH_2OH, ketone-acids with the groups CO and COOH, amido-alcohols with the groups NH_2 and CH_2OH, amido-ketones with the groups NH_2 and CO, amido-aldehydes with the groups NH_2 and CHO, amido-sulphonic acids with the groups NH_2 and SO_3H, etc.

These soluble in water oxygen, sulphur and nitrogen organic substances should be derivatives of open chain compounds. Closed chain or aromatic derivatives should be avoided due to the direct nitration of these substances by nitric acid and the elimination of free nitric acid and its hydrolyzing and oxidizing effect from the carroting solution.

As an example of organic compounds soluble in water, which facilitate and control the action of the carroting reagents comprising nitric acid and mercuric nitrate, we may use, for instance, ethyl alcohol, ethylene glycol, glycerine, acetone, sugar, molasses, lactic acid, glycolic acid, glycine, triethylamine, triethanolamine, amido-ethyl sulphonic acid, etc. It is to be understood that, before carroting solution is used, such organic compounds as triethylamine, etc., have been previously converted into corresponding salts with the acid used in the solution.

While all of the foregoing substances are capable of serving as inhibitors, certain of them in practical commercial use are less desirable than others either because of offensive smell, tendency to leave the fur with a slight stickiness which for its removal may require further processing, tendency to slow oxidation requiring prompt use of the solution after its preparation, or because of high cost or commercial unavailability.

Of these substances, ethyl alcohol and acetone have been found to be the most desirable, not only because of commercial availability, effectiveness and simplicity in practical application, but because they have proved the most efficient, penetrating and cleansing agents for increasing the uniformity and effectiveness of the carroting. Acetone is highly effective as a cleansing and pentrating agent but, because of the greater care required in the handling of this highly volatile substance, as well as its greater cost, ethyl alcohol will ordinarily be found preferable.

The quantity of used organic compounds ordinarily varies from about 3 to 10% by weight in carroting solutions.

For certain skins, however, which are contaminated with grease or blood, or for long and dense hair, such as American double ring, Hares-fur, etc., high concentrations of these cleansing and penetrating inhibitors are recommended. For such furs a high concentration of an effective penetrator, such as ethyl alcohol or acetone, is preferably employed, and these concentrations may in some cases be so high that the carroting process is carried out in semi-aqueous or almost non-aqueous solutions, which however are included under the generic term "aqueous".

The organic substances mentioned above may be used alone or in combination with inorganic protective agents; in other words, inorganic neutral salts of the type described in our issued Patent No. 2,048,645, dated July 21, 1936. These salts comprise water-soluble substantially neutral salts of strong inorganic acids and strong bases, preferably salts of strong polybasic inorganic acids and alkali metals, such as bisodium sulphate and trisodium phosphate. It is obvious that this combination of two protective agents strengthens the protection of treated fibers against a destructive action of carroting reagents.

The soluble organic substances previously mentioned may be used with mercury-nitric acid solutions alone, or in combination with some complementary oxidizers, such as hydrogen peroxide, persulphates, or the like, which are used in order to increase the oxidizing effect of the solution and avoid discoloration of the fur.

The application of our carroting solutions to skins may be carried out by any of the usual methods, such as brushing or spraying. Cut hairs can be carroted also. Skins carroted by our solutions may be dried at high artificial temperatures without any detrimental effect on the treated animal fibers. Use may be made in the dryer of such high temperatures as 170–200° F. (dependent on the nature of the fur), which greatly facilitates and accelerates the drying process.

The invention will be better understood by the following specific examples of our carroting solutions which may be prepared according to the general idea of our invention and intended for application to the animal fibers on the skins.

To 20 pounds of metallic mercury there is added 80 pounds of commercial 40° B. nitric acid. After permitting several hours' reaction, mercuric nitrate is formed in solution with free nitric acid. This solution in the following examples is techincally termed "concentrated solution".

Example 1

	Cubic centimeters	Percent by volume
Concentrated solution	1,700	3.74
Ethyl alcohol	2,830	6.21
Water	40,890	90.05

Example 2

Concentrated solution	1,700	3.74
Acetone	3,500	7.71
Water	40,220	88.55

Example 3

Concentrated solution	2,000	4.4
Triethanolamine neutralized with NHO_3	1,362	3.
Water	41,058	92.6

Example 4

Concentrated solution	2,000 c. c.	approx. 4.1% by volume.
Ethyl alcohol	2,300 c. c.	approx. 4.7% by volume.
Sodium bisulphate	908 grams	approx. 2 % by weight.
Water	43,120 c. c.	approx. 89.2% by volume.

Various changes in and departures from the embodiment of our carroting composition may be made as the same have been heretofore exemplified, all within the scope of our generic invention, it being understood that the matter hereinbefore set forth is submitted as illustrative and not in a limiting sense.

We claim:

1. The process of carroting fur and the like for felting, which consists in treating the same with a carroting solution containing mercuric nitrate and nitric acid, causing the penetration and controlling the carroting action of such solution by the presence in the solution with the mercuric nitrate and nitric acid of a water-soluble, organic. oxygen-containing inhibitor present in amount to prevent harmful action, said inhibitor comprising one or more compounds of aliphatic structure incapable of forming insoluble compounds in the solution.

2. The process according to claim 1, in which the inhibitor is an alcohol.

3. The process according to claim 1, in which the inhibitor consists of ethyl alcohol.

4. The process according to claim 1, in which the inhibitor consists of a ketone compound.

5. The process according to claim 1, in which the inhibitor consists of acetone.

6. A fur carroting solution containing mercuric nitrate and nitric acid, the solution containing also in the presence of said mercuric nitrate and said acid a water-soluble oxygen-containing compound of aliphatic structure incapable of forming insoluble compounds in the solution and present in amounts to prevent harmful action of the carroting solution on the fur.

7. A carroting solution according to claim 6, in which the water-soluble oxygen-containing compound is an alcohol.

8. A carroting solution according to claim 6, in which the water-soluble oxygen-containing compound consists of ethyl alcohol.

9. A carroting solution according to claim 6, in which the water-soluble oxygen-containing compound consists of a ketone.

10. A carroting solution according to claim 6, in which the water-soluble oxygen-containing compound consists of acetone.

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