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ART OF CARROTING FUR

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This invention relates to the art of carroting fur and like fibre. The said fur or fibre may be used for a wide variety of purposes in the arts and the raw material may be the natural fur of rabbits, hares, nutria, muskrat or beaver or any other suitable animal fibre, but, for the purpose of illustration, the invention is hereinafter described as applied to the treatment of rabbit fur for the making of felt hats.

Hitherto, almost all fur used in the manufacture of felt hats has been treated with mercury nitrate, usually in the presence of free nitric acid and mostly with the further addition of hydrogen peroxide. The purpose of this treatment is to prepare the fur for felting.

It is, however, well recognized by the initiate that the use of mercury in this connection is undesirable and, in fact, dangerous to workmen engaged in the preparation of fur for felting and the subsequent felting thereof. Some of the mercury compounds produced are practically insoluble in water and tend to remain in the fur with the consequent threat of mercury poisoning, sometimes manifesting itself as mercury eczema or mercury St. Vitus dance. In the presence of perspiration or the heat of the body, such mercury compounds may also have a detrimental effect upon the wearer. Hydrogen peroxide, heretofore used in conjunction with processes of the character under consideration, is dangerous to the health of workmen engaged in the carroting operation and is undesirable.

In the form of the invention herein disclosed in some detail, neither mercury nor hydrogen peroxide is employed. In fact, the present invention provides for the complete elimination of mercury or hydrogen peroxide, or both, in the carroting operation.

To attain these and other ends the fur is herein disclosed as treated with an acid solution of a salt of a per acid, such, for example, as potassium or other metal permanganate with a strong mineral acid such as nitric acid. The solutions herein described further provide a carroting solution which is easily washed out during the felting operations, so as to leave practically no trace of the carroting solution or its ingredients in the finished product. For this reason the felted fur retains its natural color.

Tests in connection with this invention have shown that, if insufficient acid is used, commercial carroting results cannot be obtained. On the contrary, if too much acid is used, the fur becomes burned and deteriorated to such extent as to render it commercially worthless. Between these two extremes there is an optimum zone wherein I have been able to carrot according to the present invention with extraordinarily satisfactory results. Within this zone there is sufficient acid employed to completely react all of the salt present, plus an excess of acid. At the same time the acid used is less than that which will produce the burning to which I have referred.

When furs were carroted according to the present invention with a suitable composition comprising nitric acid and potassium permanganate, it was found that, when the solution was first applied to the fur, the fur had a violet color, which changed to a deep chocolate. The fur was kept wet while the action proceeded and within a period generally between 12 to 72 hours, depending upon the strength of the permanganate solution, the color disappeared entirely signifying that the reactions were completed and the carroting operation was concluded. The furs were then dried to room temperature and were ready to be removed from the skins and felted.

One advantage of the present invention, when operating within this optimum zone, is that it is unnecessary to heat artificially the carroted fur, or to pile it so that it will automatically heat itself, for the procedures of the present invention are satisfactorily operable at room temperatures.

It is the common practice in this art to test the efficacy of the carrot by measuring the shrinkage in area of the carroted fur bat during the felting operation and it was by following this common procedure that said optimum zone was determined. Solutions prepared in accordance with the present invention were, in each case, spread upon the fur in the usual manner of carroting, and the furs dried at room temperature in a conventional way before starting and sizing. In conformance with usage, fur was "started" wet five rounds by machine and then "sized" wet five rounds by hand and the resulting shrinkage was noted. To enable the shrinkage to be accurately ascertained, about seven and one-half grams of fur were blown on to a flat, perforated disk to produce a bat of about 10" in diameter. The resulting fur bat or disk was thereupon subjected to conventional starting and sizing steps referred to and then measured to ascertain the shrinkage.

This procedure was carried out with widely varying carroting solutions differing from one another in graduated percentages of permanganates and other per salts and nitric, sulphuric and other acids. The results obtained were such as to clearly demonstrate the fact that the use of insufficient acid in the solutions makes it impossi-

ble to obtain a satisfactory commercial carrot while the use of too much acid in the solutions produces deterioration or burning of the fur. These tests further demonstrated that between these extremes for each fur bat, there was a point where a definite relationship of acid to the per salt produced the best shrinkage.

It is herein considered unnecessary to elucidate all of said tests, but the following will be given by way of example to indicate the character of the results obtainable according to the present invention.

Example 1.—Clipped white French rabbit fur was carroted with a solution carrying 12 per cent of nitric acid and 2 per cent of potassium permanganate. After drying, the fur was started and sized as mentioned above and a total shrinkage of 78 per cent in area was noted.

Tests made with the same amount of potassium permanganate solution carrying either less acid or more acid produced less shrinkage. When the same amount of potassium permanganate was used with less than 6 per cent of the acid on this particular fur the shrinkage was not commercial and the bat was loose and could not be properly felted. Also, when the acid content was raised to 19 per cent a similar unsatisfactory result was obtained. The same optimum result of 78 per cent shrinkage in area was obtained when the same fur was carroted with a solution carrying 10 per cent of nitric acid and 3 per cent of potassium permanganate.

Similarly, no commercially useful result was obtained when less than 6 per cent of acid was used with this percentage of potassium permanganate.

Example 2.—A heavier sample of clipped white French rabbit fur, carroted with a solution carrying 14 per cent nitric acid and 5 per cent of potassium permanganate, and treated in the above mentioned manner, showed a total shrinkage of 76 per cent in area.

Again, a decrease in acid percentage to 6 per cent, rendered the bat uncommercial and, with an increase of the acid to 17 per cent, the resulting shrinkage was less satisfactory.

Example 3.—A finer lot of clipped white French rabbit fur, carroted with a solution carrying 13 per cent nitric acid and 1 per cent potassium permanganate, yielded a total shrinkage of 75%.

In general it was found possible to use much stronger acid solutions without impairing their effect on carroting provided a corespondingly stronger potassium permanganate content was used. These highly concentrated solutions have been found especially useful in treating certain coarse furs, but were also found to have no deleterious effect on other furs, despite their high acid contents, although the optimum shrinkage is somewhat reduced as shown by the following example:

Example 4.—Clipped white French rabbit fur was carroted with a solution containing 6 per cent of potassium permanganate and 21 per cent of nitric acid, yielding a shrinkage of 75 per cent.

Example 5.—Clipped grey Australian rabbit fur carroted with a solution carrying 12 per cent nitric acid and 2 per cent of potassium permanganate yielded a total shrinkage of 76 per cent.

Other tests on grey Australian rabbit fur, parallel to the test of white French rabbit fur, showed results comparable to that on the white French rabbit fur.

In the foregoing examples, the nitric acid is computed as 100 per cent nitric acid, although in actual tests a more dilute acid was used in proper proportions to yield the percentage named.

I found that very satisfactory uniform results were obtained when I applied to the fur an amount of carroting solution, of proper strength, about equal in weight to the weight of the pelt. A useful carrot could, however, be obtained by applying a greater weight of a more dilute or weaker solution.

I also found that it is not absolutely essential to apply the acid and per salt mixed in the same solution, for I obtained satisfactory results by applying separate solutions carrying suitable proportions of the acid and salt.

It appeared that the shrinking operation depended for its effectiveness very largely upon the hydrogen ion content of the solution, but the hydrogen ion content varied somewhat according to a rather complicated curve with the different proportions of nitric acid used and with the different proportions of potassium permanganate used.

I found it possible to substitute sulphuric acid for the nitric acid when used in such proportions as to yield approximately the same hydrogen ion content, or to mix these acids. The products of reaction with sulphuric acid, however, tended to injuriously affect the fur unless the fur was subsequently treated, as with ammonia or other alkali. A satisfactory procedure for treating sulphuric acid-treated fur was to expose the treated fur, in dried condition, to ammonia fumes or the fumes of a suitable ammonium salt, either before or after the carroted fur was cut from the skin, and either under pressure or after evacuating the air therefrom. This neutralizing operation turned the manganese pink, but rendered it water-soluble so that it washed out in the felting operation, with the result that the carrot of the present invention did not discolor the finished felt which retained the natural color of the fur.

Instead of neutralizing the acids present with ammonia fumes or the fumes of a suitable ammonium salt, such, for example, as ammonium carbonate, I may, if desired, apply to the treated wet fur a barium chloride solution which serves to change the strong non-volatile acids present to volatile acids which readily volatilize off, leaving the fur in a perfectly safe condition. Barium nitrate may also be used if sulphuric acid is present and also other soluble salts of barium may be employed depending on conditions.

According to another procedure, fur was treated with a solution of permanganate and sulphuric acid in the proper proportions used to carrot, but in a solution too weak to give a satisfactory carrot. To complete the carroting the fur was treated, after the permanganate had completely reacted and the color had disappeared, with a solution of an oxygen-bearing barium salt, such as barium perchlorate or barium chlorate, which precipitated the sulphuric acid contained in the fur as insoluble barium salt and effected oxidation. This also prevented injury to the fur by free sulphuric acid. The resulting reactions, when carried out at room temperature, in addition to producing a satisfactory carrot, served to lighten the color of the fur. This last step may, if desired, be carried out under elevated temperatures to produce, in effect, a "yellow" carrot.

With regard to all the methods of this invention, as hereinbefore described, it is entirely feasible to effect the whole or part of the carroting

operations under elevated temperatures in order to obtain the commercial advantages of "yellow" carroting, such, for example, as speeding up production, although, as previously stated, satisfactory results are obtained without the application of artificial heat.

As hereinbefore stated, the present invention provides for a complete elimination of mercury or hydrogen peroxide or both in the carroting operation. It is, however, possible to replace a part of the per salt with the mercury nitrate or other mercury salt heretofore used to carrot fur or to add to the composition of this invention mercury nitrate or hydrogen peroxide or both without departing from this invention, and at the same time greatly reducing the dangers incident to the uses of mercury or hydrogen peroxide carrots heretofore employed.

In the foregoing detailed description, I have set forth certain examples and procedures as illustrative of the methods which may be followed in practicing the invention, to enable those skilled in the art to appreciate its advantages and obtain the desired results.

With the usual run of furs, a composition comprising 2–3 per cent permanganate and 10–12 per cent nitric acid will ordinarily give satisfactory results, but it will be understood that the process is one for dealing with a large class of furs, each one presenting its special problem, and it is obviously impossible to specify the precise treatment which would be most successful and economical in each case. Consequently, preliminary tests must be made to determine the exact amount of acid and salt to be used to obtain the best results for the purposes in hand on each particular fur.

The foregoing description of this invention is clearly sufficiently definite to guide those skilled in the art to its successful application. The examples which have been given and which specify proportions or percentages are to be understood as examples only and are not given with the intent of limiting the invention, the scope of which is commensurate with the appended claims.

Having thus described in detail certain embodiments of the invention, what I claim as new and desire to secure by Letters Patent is:

1. The process of carroting fur which includes treating the fur with a solution containing permanganate and an acid selected from the group consisting of nitric and sulphuric, said acid being in excess of that which will completely react the permanganate into a substantially colorless compound on the fur upon completion of the reaction, and the permanganate and acid being present in proportions sufficient to cause substantial shrinkage but insufficient to burn the fur.

2. The process of carroting fur which includes treating the fur with a solution containing permanganate and an acid selected from the group consisting of nitric and sulphuric, said acid being in excess of that which will completely react the permanganate into a substantially colorless compound on the fur upon completion of the reaction, and the permanganate and acid being present in proportions sufficient to cause substantial shrinkage but insufficient to burn the fur, and maintaining the wet fur at room temperature until the reaction is completed.

3. The process of carroting fur which includes treating the fur with a solution containing permanganate and nitric acid, said acid being in excess of that which will completely react the permanganate into a substantially colorless compound on the fur upon completion of the reaction, and the permanganate and acid being present in proportions sufficient to cause substantial shrinkage but insufficient to burn the fur.

4. The process of carroting fur which includes wetting the fur with a solution carrying an acid selected from the group consisting of nitric and sulphuric, and potassium permanganate, said acid being in excess of that which will completely react the permanganate into a substantially colorless compound on the fur upon completion of the reaction, and said solution having a hydrogen ion content equivalent to that of the reaction product of approximately 10–12 per cent of nitric acid and 2–3 per cent of potassium permanganate.

5. The process of carroting fur which includes treating the fur with a solution containing permanganate and sulphuric acid, said acid being in excess of that which will completely react the permanganate into a substantially colorless compound on the fur upon completion of the reaction and the permanganate and acid being present in proportions sufficient to cause substantial shrinkage but insufficient to burn the fur, and thereafter further treating the wet fur with a barium salt to react with the sulphuric acid to produce a volatile acid.

6. The process of carroting fur which includes treating the fur with a solution containing permanganate and sulphuric acid, said acid being in excess of that which will completely react the permanganate into a substantially colorless compound on the fur upon completion of the reaction, and the permanganate and acid being present in proportions sufficient to cause substantial shrinkage but insufficient to burn the fur, and thereafter treating the fur with an oxygen-yielding barium salt to complete the carroting.

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