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METHOD OF CARROTING AND COMPOSITION THEREFOR

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This invention relates to making felt, and, more particularly, to a carroting solution for treating fur to impart to the fur felting characteristics.

This application is a continuation-in-part of my copending application Serial No. 392,123, filed May 6, 1941.

It is an object of the invention to provide a carroting solution and process for treating fur to form felt having desirable characteristics. It is another object of the invention to provide a carrot which is adapted to treat a wide variety of different furs. Another object is to provide a carrot adapted to produce a large variety of different desirable felting characteristics. It is another object of the invention to provide a carroting solution which when applied to a fur will produce a high quality product which may be rapidly and effectively felted. Other objects will be in part obvious and in part pointed out hereinafter.

The invention contemplates the utilization of novel combinations of chemical reagents for the treatment of furs as will be illustratively described herein, and the scope of the invention will be indicated in the following claims.

As conducive to a clearer understanding of certain features of the invention, it may be pointed out that felt is made from a wide variety of kinds and types of fur and that it is desirable to be able to control the characteristics of the carroted fur and the resulting felt. In the manufacture of felt, as for example, hatter's felt, the pelts of members of the rabbit and hare family are used as a principal raw material. The more desirable pelts are for the most part imported, coming from such countries as Australia, Argentina, Canada, England, and in normal times, the continent of Europe. Due to differences in climatic, dietary and other environmental conditions in these various countries, the skins from different sources vary considerably in certain of their characteristics. As an example, the density of the fur on the skin of an English rabbit in terms of the number of hairs per unit area of skin may be twice as great as that of an Australian rabbit. In addition to being sparser, the hair of the Australian skin may also be coarser than that of the English skin, hence in order to produce the same carroting effect on the two types of skins, the carroting solutions to be applied should differ in such characteristics as penetrating power, strength, and the like.

The skins used in the manufacture of felt vary not only as to source but also as to color and as to the condition of the pelt at the time it is to be treated. If the fur is of a white color, it is important that the carroting solution be of such a character as to carrot the fur without staining or discoloring it so that the fur may be satisfactorily used to make a white or pastel colored felt of uniform appearance. Hence, if the carroting solution used does not stain the fur, its use is naturally more universal for it may be applied to different furs regardless of color characteristics.

The fur on the skin of a rabbit or hare in its natural state is normally overlaid with a layer of coarse hair called "guard" hair. This guard hair may or may not be removed prior to carroting. When the guard hair has not been removed, the skin is designated as "unpulled," whereas, when the guard hair has been removed, as by clipping or pulling, the skin is designated as "entire." Here again the characteristics of the carroting solution should be varied according to whether the solution is applied to unpulled or entire skins.

The characteristics of the carroting solution may also vary according to the method of applying the carrot to the skin. It is a common practice to apply the carrot by manually brushing the solution into the fur, but a number of alternative methods of application are used as well. For best results the characteristics of the carroting solution should be adjusted to the particular mode of application used.

After the fur has been carroted, it is removed from the skin and used in the manufacture of felt such as, for example, hatter's felt. The initial stages of hat manufacture may be generally characterized as a shrinking and felting process carried out in a variety of steps designed to work the fibers into a strong felt as quickly as feasible. In this process the hat body is formed as a very fragile, large cone-like body known as a "bat" becoming stronger as the process proceeds and it shrinks to the desired size; the bat may be worked more strenuously as it becomes smaller and stronger.

After formation of this large, fragile bat, the process may be divided into three principal stages, i. e., "hardening" wherein the body is given some strength to withstand later operations; "starting" wherein the first important stages of shrinking take place; and "felting" wherein the body is shrunk down to the desired size while the fibers shrink and interlock into the solid, tight mass known as felt. It is desirable that these steps be carried on as rapidly and efficiently as possible consistent with the object of providing hats which are of uniform high quality. In some cases speed of shrinkage is the predominant objective and quality a secondary objective, whereas, in other cases quality is the predominant objective and speed of shrinkage a secondary objective. To a considerable degree the attainment of these objectives depends upon the characteristics of the carroting solution used in treating the fur and it is desirable that the carrot used be sufficiently

versatile to permit attainment of the desired objective.

From the above, it is apparent that there are a great many variable factors which affect the carroting process and that the problem of finding a single carrot which is sufficiently versatile to satisfy the many commercial requirements and conditions met with in commercial practice is an exceedingly difficult one. I have discovered that a carrot comprising a mixture of sulphuric, chloric, and nitric acids and hydrogen peroxide is particularly well adapted to meet the varied requirements described above. The combination of these four ingredients produces an unusually versatile carrot in that the relative proportions of the materials and their concentrations may be adjusted to produce carroting solutions which will effectively and desirably carrot a wide variety of furs to produce a wide variety of felting characteristics while exhibiting certain important advantages throughout all such variations. I have also found that the carrot of the present invention may be used on the one hand to produce a carroted fur having a better quality for a given shrinking speed than is obtained with the carrots heretofore proposed and on the other hand to produce a fur having a higher shrinking speed for a given quality than has heretofore been obtainable.

Further than this the concentrations and proportions of the ingredients of the present carrot may be so adjusted as to give a relatively wide range of shrinking speeds with relatively slight changes in quality. This last advantage of the present carrot is of considerable importance from a commercial standpoint. For example, a hat manufacturer sometimes uses a mixture of furs wherein one or more of the components have been previously dyed. Such a dyeing treatment tends to reduce the feltability of the fur and hence if the fur is to be dyed before being formed into felt, it is necessary to use a faster fur which after dyeing will still retain a shrinking speed sufficient to felt with the undyed components of the mixture. Different dyeing treatments have different effects on the feltability of the fur, and it is desirable that the speeds of the carroted furs, whether or not dyed, entering into the mixture be so adjusted that the mixture after dyeing will have a certain desired shrinking speed. The carrot of the present invention makes it possible to prepare such a mixture.

Maximum speed is not always a desired objective. Each hat factory is designed to operate with a given set of conditions, and the characteristics of the carroted fur must be adjusted to meet such unique conditions. The present carrot may be easily adjusted to produce carroted fur best suited for such individual conditions.

Another advantage of the present carrot is that it gives a fur which forms a plumper or thicker felt. Many carroted furs having the proper felting speed characteristics may produce a thin-bodied felt which, although it may have the desired weight, has the appearance and feel of a lighter weight product. In general, the faster furs produce thinner felts. However, for a given shrinking speed, the felt produced when the present carrot is used has more plumpness and springiness than is obtainable by using prior carroting solutions.

A still further advantage of the carrot of the present invention resides in the fact that it is more nearly "foolproof" than the carrots which have heretofore been suggested. In order to effectively carrot fur, it is necessary to use relatively strong chemical reagents and hence there is always a danger that the fur will be damaged. The carroting solution is frequently applied by semiskilled or unskilled labor and if improperly applied may result in a fur which is stained or otherwise discolored or unduly sticky or gummy and therefore unusable to produce high quality felt. I have found that the carrot of the present invention permits a relatively wide variation in the conditions of application of the carrot to the fur without unduly damaging the fur. Hence there is less danger that the fur will be damaged by improper application of the carroting solution to the skin.

As previously pointed out, the relative proportions of the materials used in compounding the carrot of the present invention may be varied widely. In order to illustrate the use of the carrot in its application to different types of fur to produce different felting characteristics the following specific examples are given:

Example 1

An aqueous solution is prepared having approximately the following composition in terms of per cent by weight of the various ingredients:

Sulphuric acid	2.0
Chloric acid	2.1
Nitric acid	1.2
Hydrogen peroxide	1.7

This solution is particularly well adapted for carroting the fur of skins known in the trade as Australian entire, i. e. Australian rabbit skins from which the guard hairs have been removed as by clipping or pulling. The carroting solution may be applied to the fur by brushing in the usual manner after which the fur is dried, removed from the skin and formed into felt in the manner described above. The fur thus produced is of high quality and has good shrinking speed.

Example 2

An aqueous solution is prepared having approximately the following composition in per cent by weight:

Sulphuric acid	0.6
Chloric acid	3.6
Nitric acid	3.2
Hydrogen peroxide	2.5

This carroting solution is particularly well adapted to be used for carroting skins known in the trade as English unpulled, i. e. the pelt of an English rabbit from which the guard hairs have not been removed. The fur produced by using the above carrot is of high quality and is exceptionally fast-shrinking.

Example 3

An aqueous solution is prepared having approximately the following composition in per cent by weight:

Sulphuric acid	0.8
Chloric acid	1.5
Nitric acid	3.4
Hydrogen peroxide	6.0

This solution is, perhaps, best suited for general application on various types of furs and is particularly suited for carroting hare's fur such as that of the Argentine hare and, when applied to the skins in the usual manner, produces a fur having highly satisfactory felting characteristics.

Example 4

An aqueous solution is prepared having approximately the following composition in per cent by weight:

Sulphuric acid	2.5
Chloric acid	2.7
Nitric acid	2.1
Hydrogen peroxide	9.5

The above solution is particularly well adapted for carroting the skins of the Canadian white tail hare.

Example 5

An aqueous solution is prepared having approximately the following composition in per cent by weight:

Sulphuric acid	2.8
Chloric acid	3.0
Nitric acid	2.4
Hydrogen peroxide	7.0

This solution is particularly adapted for carroting the skins of the snowshoe rabbit.

Example 6

An aqueous solution is prepared having approximately the following composition in terms of per cent by weight:

Sulphuric acid	3.5
Chloric acid	1.0
Nitric acid	2.0
Hydrogen peroxide	7.5

For some purposes this solution is best suited for carroting white skins such as those of the French and Belgian rabbit.

Example 7

An aqueous solution is prepared having approximately the following composition in terms of per cent by weight:

Sulphuric acid	0.5
Chloric acid	1.0
Nitric acid	0.5
Hydrogen peroxide	1.0

The fur obtained by using the above carroting solution, although it produces a felt which is useful for some purposes, is, in general, somewhat less satisfactory than that obtained by using the carroting solutions of Examples 1–5.

Example 8

An aqueous solution is prepared having approximately the following composition in terms of per cent by weight:

Sulphuric acid	6.0
Chloric acid	6.0
Nitric acid	5.0
Hydrogen peroxide	10.0

The above solution is relatively concentrated and hence when applied in the usual manner requires careful application to avoid damage to the fur. It is particularly useful in those methods of application where strong carroting solutions are desired.

Example 9

An aqueous solution is prepared having the following composition in terms of per cent by weight:

Sulphuric acid	2.5
Chloric acid	4.0
Nitric acid	9.0
Hydrogen peroxide	15.0

This solution also is particularly useful in some carroting methods where a strong solution is desired.

It is of course to be understood that the above examples are illustrative only and that as indicated thereby, the composition of the carroting solution will not only vary according to the type of fur carroted but also according to the particular felting characteristics desired as well as the method of application to the fur. It is a practical advantage of the present invention that it is not limited in its usefulness to any specific ranges of concentrations and that it affords wide latitude to skilled operators to adjust the concentrations of the different ingredients to obtain particular results under particular conditions, e. g. as above, such as the type of skin to be carroted, the felting characteristics desired and the method of application of the solution to the fur.

The maximum effective concentration range of any one of the four constituents of the above described carroting solutions depends to some extent on the proportions of the other three constituents present in the solution.

I have found, in general, that the carroting solution of Example 7 contains the lowest concentrations of the various ingredients that will be found practicable under ordinary conditions. However, as the strengths of the various ingredients are increased, the many variables involved make it impracticable to set forth any specific values for the upper limits of the particular requirements. Nevertheless, it is possible to formulate certain generalizations which when properly qualified indicate how the concentrations of ingredients should be varied to produce particular, desired results.

In general, the shrinking speed of the carroted fur may be adjusted by varying the amount of the active carrot applied to the fur. Normally an increase in the concentration of the active ingredients of the carroting solution increases the felting speed of the carroted fur. A convenient way of varying the amount of carrot applied is to vary the concentration of the carrot while maintaining the relative proportions of the active ingredients constant. To a limited extent, a similar result may be attained by varying the quantity of solution applied to the fur. It is to be understood that before adjusting the dilution of the carrot, the relative proportions of the ingredients should be adjusted to give desired felting characteristics other than shrinking speed.

The following observations from my experience will guide those skilled in this art in selection of proper strengths and proportions:

A. Sulphuric acid.—Sulphuric acid contributes to the acidity and hydrating characteristics of the carroted fur. If too much sulphuric acid is used, a gummy fur results. Apparently, the strong acid decomposes the fur tending to give a tarry product which renders the fur unsuitable for most purposes. As the proportion of sulphuric acid is reduced too far, the carroted fibers begin to lose luster and, unless the reduction in concentration of sulphuric acid is made up by increase in strength of, for example, the nitric acid, a serious loss of speed of shrinking occurs which may make the carroted fur commercially unsatisfactory. If, on the other hand, the reduction of sulphuric acid strength is made up by additional amounts of the other acids, the defects characteristic of excessive proportions of those ingredients will appear.

B. Nitric acid.—The nitric acid is very effec-

tive in carroting the fur and contributes also a "flowability" to the carroting solution, i. e. it increases the capacity of the solution to rapidly penetrate and wet the fur. As the proportion of nitric acid is increased, however, an increasing yellow coloration will be obtained and the carroted fur will have a harsher feel. As the nitric acid concentration is decreased, the resulting fur becomes slower until eventually its shrinking speed is so far decreased as to lose the speed advantage of the present carrot.

C. Chloric acid.—The chloric acid in addition to its known carroting action helps to give a soft and silky fur, but if used in too high proportion, its oxidizing action becomes so severe that it tends to "burn" the ends of the fibers so they may actually break during subsequent working. If the chloric acid concentration is decreased too far, both the softness of the fur and the shrinking speed are impaired.

D. Hydrogen peroxide.—The peroxide acts in part to protect the fur against the damaging effects of other ingredients and thus permits the use of higher concentrations of the other ingredients without undue damage to the fur. As the concentration of peroxide is increased, it tends to produce bleaching in addition to the carroting and if excessive amounts are used, embrittlement of the fur fibers may result. If, on the other hand, the peroxide is decreased too far, and, especially, if the decrease is compensated by increased strengths of the other active ingredients, there is danger of "gumming" and "burning" of the fur.

To a limited extent a reduction of the concentration of one ingredient of the carroting solution may be compensated for by increasing the concentrations of other ingredients. Thus in some cases a decrease in concentration of sulphuric acid may be compensated for by increasing the concentration of nitric acid. In other cases, a reduction in nitric acid or chloric acid may be counterbalanced by an increase in the concentration of hydrogen peroxide. However, each of the four ingredients when used in excessive amounts tends to damage the fur and this fact operates to effectively limit the extent to which an increase in the concentration of one constituent may be used to compensate for a reduction in concentration of other ingredients.

While the above observations are the result of my experience in the use of this carrot and represent my opinions as to the effects produced by the several ingredients, I realize that the exact chemical and physical phenomena of the carroting process are still unknown and for this reason my opinions as to possible effects may not prove to be wholly the fact in the light of information which may be developed as a result of further scientific research in this field.

From the above it will be readily seen that there is herein provided a process and a composition of matter which attains the objects of this invention, including many distinct, practical, and useful advantages.

As various possible embodiments might be made of the above invention and as many changes might be made in the embodiment above set forth without departing from the scope of the invention, it is understood that all matter hereinabove set forth is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. The art of preparing fur for felting comprising, subjecting the fur to the chemical action of a solution, comprising as its active carroting ingredients, sulphuric acid, chloric acid, nitric acid and hydrogen peroxide.

2. An aqueous carroting solution for treating fur comprising as the active carroting ingredients, sulphuric acid, chloric acid, nitric acid and hydrogen peroxide.

3. The art of preparing fur for felting comprising, subjecting the fur to the chemical action of a solution, comprising as its active carroting ingredients, sulphuric acid, chloric acid, nitric acid and hydrogen peroxide, said ingredients being present in amounts not less than about the following in per cent by weight of the solution:

Sulphuric acid	0.5
Chloric acid	1.0
Nitric acid	0.5
Hydrogen peroxide	1.0

4. An aqueous carroting solution for treating fur comprising as the active carroting ingredients, sulphuric acid, chloric acid, nitric acid and hydrogen peroxide, said ingredients being present in amounts not less than about the following in per cent by weight of the solution:

Sulphuric acid	0.5
Chloric acid	1.0
Nitric acid	0.5
Hydrogen peroxide	1.0

5. An aqueous carroting solution for treating fur comprising as the active carroting ingredients approximately the following amounts in per cent by weight of the stated materials:

Sulphuric acid	0.8
Chloric acid	1.5
Nitric acid	3.4
Hydrogen peroxide	6.0

6. The art of preparing fur for felting comprising, subjecting the fur to the chemical action of a solution comprising as the active carroting ingredients approximately the following amounts in per cent by weight of the stated materials:

Sulphuric acid	0.8
Chloric acid	1.5
Nitric acid	3.4
Hydrogen peroxide	6.0

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