Patented Nov. 25, 1930 1,782,764

UNITED STATES PATENT OFFICE

CHARLES D. PARKS, OF DANBURY, CONNECTICUT

ART OF FELTING

No Drawing. Application filed April 9, 1925, Serial No. 21,998. Renewed February 14, 1930.

This invention relates to the art of felting fur or the like and with regard to its more specific features to the art of preparing felt hat bodies from fur.

One of the objects of this invention is to provide a practical and effective art of felting together fur fibers or the like to form a thoroughly practical and reliable fur fabric, and moreover an art of the above-mentioned nature which may be carried on in practice inexpensively, conveniently, and with thoroughly consistent and reliable results. Another object of this invention is to provide a thoroughly practical art not only of treating fur fibers to give them felting properties, but also of felting the fur fibers together to achieve certain highly advantageous and practical results. Another object is to provide an art of felting fur fibers having felting properties and free from poisonous ingredients, such as components of mercury, for example, which art, particularly in the manufacture of felt hat bodies, will give to the fur undergoing felting action or the completely felted hat, in an efficient and satisfactory manner, certain preservative properties highly desirable in this particular art. Other objects will be in part obvious or in part pointed out hereinafter.

The invention accordingly consists in the several steps and relation and order of each of the same to one or more of the others, all as will be illustratively described herein, and the scope of the application of which will be indicated in the following claims.

In the manufacture of felt, for example as in the manufacture of felt hats, the fur fibers are first "carroted" or treated to give them felting properties, and this carroting treatment has been for many years past carried on by the employment of a carroting material known as mercury nitrate and prepared from nitric acid and mercury. Fur thus prepared is thus made to carry with it mercury compounds aside from necessitating, in the preliminary treatment or carroting of the fur, the handling of this poisonous material as well as the resultant mercury bearing fur, with consequent injurious effect upon the health of the workmen. Such fur when subjected, as in the manufacture of hats, to the various forming and felting processes is still impregnated with this poisonous mercuric compound and subjects the workmen employed in the course of the felting and like operations to mercury poisoning, this mercury compound being released in the form of poisonous fumes during the various felting and other processes, and in the course of which oftentimes there is involved the application of hot water and steam.

In accordance with certain features of this invention, I eliminate the possibility of causing mercury or like poisoning while at the same time achieving a resultant felt of excellent qualities, and embodying certain desirable advantages to be more fully hereinafter set forth. I accordingly first treat the fur fibers, preferably while they are still upon the skin, with a solution comprising a mixture of a non-acid or hydroxide cleansing agent and an oxidizing agent. The preferred solution comprises preferably a mixture of sodium hydroxide and hydrogen peroxide, and this mixture may be conveniently obtained by dissolving sodium peroxide in water and applying the resultant solution, preferably at a strength within the approximate limits of 1° Baumé and 10° Baumé, as by brushing the solution into the fur on the skin. After drying, the fur may be removed from the skin, the treatment above described having had the wax or gummy substance upon the fibers either removed or made soluble and absorbent in water so that it may be washed out. The fur will thus have conveyed to it felting properties, inasmuch as the overlying scales or barbs of the individual hair fibers will thus be either entirely freed from the natural wax or gummy substance thereon, or the latter placed in such condition that it may readily be dissolved or washed out to free these scales or barbs and to permit the latter to assist in interlocking the fur fibers one with another to form a dependable and secure felt. Moreover, a fur thus prepared is free from the defects and disadvantages attendant upon the use of fur carroted by the usual nitrate of mercury, as hereinbefore pointed out.

The fur carroted or treated as just above described, may then be subjected to any of the usual "forming" and felting processes, and will be found to produce a felt which meets all of the exacting requirements such as are characteristic of the manufacture of felt hats. Such a fur will have either an alkaline or a neutral reaction, but will be found generally to have a tendency toward an alkaline reaction, inasmuch as the product, carried by the fur fibers and resulting from the carroting treatment above described, is one which is the result of the reaction with the natural wax on the fur fibers of the mixture of the hydroxide cleansing agent and the oxidizing agent, the latter comprising, as above pointed out, preferably sodium hydroxide and hydrogen peroxide. After the hat body has been "formed" and the resultant hat body "hardened", the hat body is ready to be "sized" and is then in condition for subsequent operations and processes. If these specifically defined steps are carried out without allowing unreasonable intervals of time to intervene between successive steps, fur thus treated produces thoroughly acceptable and practical results, but inasmuch as, in the course of the manufacture of hats, for example, these steps are not in the usual course carried on in prompt succession, the usual conditions that have to be met in the course of the manufacture of hat bodies require the lapse of sometimes considerable periods of time between successive steps. For example, after the hat body has been "formed" into a so-called "bat", generally of conical shape, it is subjected to a treatment known as "hardening", wherein the hat body is kneaded manually but gently together with frequent immersions in hot water; this treatment initiates the interlocking or interfelting action of the individual fur fibers, and conveys to the bat or hat body an initial and necessary integrity of structure, or a required mechanical strength to permit the next succeeding step thereon to be carried out. It is not unusual, to carry out further the above-assumed illustration, to have a series of "hardened" hat bodies await their turn, for considerable periods of time, oftentimes a number of days, to be subjected to the next step, such as the operation of sizing.

Such hardened hat bodies will thus be stacked up or temporarily stored, and it is not infrequent that the operation of "hardening" leaves them at a temperature considerably above room temperature, and also in a moisture-bearing state. Inasmuch as the product of the non-mercury carroting solution with the natural wax upon the fur fibers is only to a slight extent washed out in these preliminary felting operations, the hardened bats, in view of the tendency of this product to react alkaline, and probably also because of the oxidizing agent which forms a component of the carroting solution, as well as in view of the conditions of temperature and moisture as above noted, tend to have established therein conditions which, if sufficient time is allowed to elapse, are conducive to cause a so-called "souring" of the bats or hat bodies; this souring is due to the fact that the above-mentioned conditions appear to initiate an action analogous to fermentation or decomposition, to the action of which the oxidizing component probably is contributory, and this "souring" may take place at varied degrees depending upon the length of time that the hat bodies are caused to await their turn to be subjected to the next succeeding step or depending upon the initial or subsequently evolved conditions of temperature and moisture. To make possible, upon the part of the manufacture of felt or felt hats, the introduction of as large intervals of time between successive steps in the working up of the fur into a felt as may be desired or as may be imposed, is one of the dominant aims of this invention.

I accordingly, after carroting the fur fibers as hereinbefore described, form the latter into a sheet-like layer, as, for example, by blowing the fur onto a perforated form generally in the shape of a cone, and upon which the fur fibers are evenly and uniformly blown. The sheet of fur fibers thus "formed" is thereupon enveloped by a suitable cloth and the resultant sheet of fur, hereinbefore termed a "bat" or hat body where it is given a shape generally conical, is thereupon treated, as by spraying or dipping, with an aqueous acidic solution. Where the bat is thus treated as by dipping, the vessel into which the bat is dipped may contain a solution formed by adding approximately sixteen ounces of acid per every three hundred gallons of water in the dipping vessel. Any suitable acid may be utilized, but I prefer to use formic acid, though I have achieved good results by using acetic acid, and also by using sulphuric acid, for example. The particular choice of acid to be used in this step of my process, as well as in the subsequent ones hereinafter described, may depend upon the type or character of fur fibers utilized, upon the particular composition and proportion of the mixture of hydroxide and oxidizing agent utilized to give the fur felting properties, or upon the requirements imposed upon the hat body or felt by subsequent operations, such as the dyeing operation.

This acidic aqueous solution, when applied to the bat reacts with the product borne by the fur fibers to neutralize any preponderance of alkali or OH ions which may result from the interaction of this product with the water of the solution. Inasmuch as the treatment of the bats may be carried on most conveniently by dipping or spraying, for

example, the acidity of the solution becomes progressively decreased, due to the neutralizing action of the acid of the solution upon the alkaline components of the product upon the fur fibers, the acidity of the solution is maintained by a progressive addition thereto of small amounts of acid from time to time as the treatment of the bats by or with the solution proceeds.

The bat or hat body is then ready to be "wet down" and then hardened; these operations I carry on by maintaining the aqueous solution used in these steps acidic and the degree of acidity of the solution may be in the neighborhood of from two to four ounces of acid for every fifteen gallons of water. And after the bat has been hardened, the "sizing" or shrinking thereof and hence the completion of the tightening of the interlocking or interfelting action of the fur fibers brought about may be proceeded with in the usual manner, though the hot water used, is, as during the hardening operation, maintained acidic to about the same extent. During these latter steps, in the course of which the mechanical interlocking or interfelting of the fibers is begun and completed, the product carried by the fur fibers and resulting from the carroting treatment, is gradually washed out and whatever tendency thereof to react alkaline is, as these several steps are proceeded with, gradually and progressively counteracted until after the sizing and shrinking has been completed the tightly interlocked and felted fur reacts neutral and is then in condition to be further treated and particularly is in highly advantageous condition for dyeing.

The series of steps hereinbefore described may be and in practice generally is interrupted at the completion of any one step, and this interruption may be of any desired length of time. At the completion of each of these felting steps, the felt will be free from such conditions as tend to bring about a "souring" of the fabric, as hereinbefore described, and the highly desirable and advantageous features as result from the elimination from the fur and resultant felt of poisonous or mercuric compounds may be effectively achieved without necessitating the prompt succession of one step by another.

It will thus be seen that there has been provided in this invention an art of felting fur or the like in which many practical and useful advantages are achieved and which art may be carried out in practice both conveniently and inexpensively. It will furthermore be seen that there has been provided in this invention an art in which the several objects hereinbefore noted, as well as many thoroughly practical advantages, are successfully achieved.

As the art herein described might be varied in various parts all without departing from the scope of the invention, it is to be understood that all matter herein set forth is to be interpreted as illustrative and not in a limiting sense.

I claim as my invention:

1. The herein described art of felting which consists in treating fur or the like with an alkaline solution of an oxidizing agent adapted to attack the wax on the fibers thereof, drying the fur, forming a bat out of the fur, treating the resultant bat with an acidic aqueous solution, and felting the fibers of the bat together while applying thereto an acidic aqueous solution.

2. The herein described art of felting which consists in forming a fabric out of fur or the like having upon the fibers thereof a product resulting from the reaction with the natural wax thereon of an aqeuous solution of an oxidizing agent and a cleansing agent, and treating the fabric with an acidic aqueous solution.

3. The herein described art of felting which consists in forming a fabric out of fur or the like having upon the fibers thereof a product resulting from the reaction with the natural wax thereon of an aqueous solution of an oxidizing agent and a cleansing agent, and treating the fabric with water acidified with formic acid.

4. The herein described art of felting which consists in forming a fabric out of fur or the like having upon the fibers thereof a product resulting from the reaction with the natural wax thereon of an aqueous solution of an oxidizing agent and a cleansing agent, and treating the fabric with water acidified with acid in the proportion substantially of one pound of acid to three hundred gallons of water.

5. The herein described art of felting which consists in forming a fabric out of fur or the like having upon the fibers thereof a product resulting from the reaction with the natural wax thereon of an aqueous solution of an oxidizing agent and a hydroxide, felting the fibers of the fabric together, and utilizing during the felting operation acidified water.

6. The herein described art of felting which consists in forming a fabric out of fur or the like having upon the fibers thereof a product resulting from the reaction with the natural wax thereon of an aqueous solution of an oxidizing agent and a hydroxide, and treating the resultant fabric with an acidic aqueous solution.

7. The herein described art of felting which consists in forming a fabric out of fur or the like having upon the fibers thereof a product resulting from the reaction with the natural wax thereon of an aqueous solution of an oxidizing agent and a hydroxide, treating the resultant fabric with an acidic aqueous solution, felting the fibers of the fabric to-

gether, and utilizing during the felting operation an acidic aqueous solution.

8. The herein described art of felting which consists in forming a fabric out of fur or the like having upon the fibers thereof a product resulting from the reaction with the natural wax thereon of an aqueous solution of a hydrogen peroxide and a hydroxide, and treating the resultant fabric with an acidic aqueous solution.

9. The herein described art of felting which consists in forming a fabric out of fur or the like having upon the fibers thereof a product resulting from the reaction with the natural wax thereon of an aqueous solution of a hydrogen peroxide and a hydroxide, felting the fibers of the resultant fabric together, and utilizing during the felting operation an acidic aqueous solution.

10. The herein described art of felting which consists in forming a fabric out of fur or the like having upon the fibers thereof a product resulting from the reaction with the natural wax thereon of an aqueous solution of hydrogen peroxide and sodium hydroxide, and treating the resultant fabric with a solution having an acid reaction.

11. The herein described art of felting which consists in first treating the fur or the like with a material adapted to give the fibers thereof felting properties, forming a fabric out of the fibers, felting the fibers of the fabric together, and treating the fibers of the fabric with a solution adapted to counteract fermentation.

In testimony whereof, I have signed my name to this specification this 4th day of April, 1925.

CHARLES D. PARKS.