

UNITED STATES PATENT OFFICE.

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CARROTING ANIMAL HAIR AND WOOL.

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My invention relates to carroting animal hair and wool that is to say to preparing these materials for felting.

The ordinary and universally practiced method for carroting animal hair consists in treating the same with an aqueous solution of mercury nitrate and nitric acid.

It was assumed that in this carroting method the nitric acid acted as an oxidizing agent on the hair. The use of mercury being highly objectionable for hygienic reasons, it has been proposed to use nitric acid alone, but it was found that for obtaining an adequate carroting effect the concentration of the nitric acid was far too high (30%) for practical purposes and that hair so treated could not be kept on store because the oxidation continued even after the treatment, whereby the hair was made brittle and soon entirely lost its felting capacity. It has also been proposed to use other oxidizing agents for carroting hair such as peroxide of hydrogen, but in this case too the concentrations necessary for obtaining the desired result were too high for practical purposes.

The object of my invention is to provide a process for carroting animal hair and wool which entirely avoids the use of mercury and permits to use solutions of a comparatively low concentration.

I have discovered that all oxidizing agents, even in low concentration may be caused to readily exert an oxidizing action on animal hair and wool resulting in a very satisfactory preparation of the same for felting by adding to such oxidizing agents substances, hereinafter called oxygen conveyors, which facilitate the transfer of oxygen from the oxidizing agent to the animal hair and wool. While I do not wish to be understood to attempt to give an exact theory of the part played by the oxygen conveyors in my improved process I may say that many of the oxygen conveyors seem to take part in the reaction by taking up oxygen from the oxidizing agent and then giving off such oxygen to the animal hair and wool thus being reduced again, while other oxygen conveyors deposited in a finely subdivided colloidal state on the hair or wool seem to exert only a simple catalytic or contact action without directly taking part in the reaction, or it may be, that even those oxygen conveyors which apparently take part in the chemical reaction also exert catalytic or contact action, say by forming temporary deposits or precipitates

on the hair or wool. Or it may even be that the hair and wool itself exerts or enhances catalytic action.

As a matter of fact I have found that suitable oxygen conveyors are salts soluble in water of metals capable of forming a plurality of oxygen compounds or oxides, the lower oxides being the more stable ones while being readily oxidizable by oxidizing agents. Such salts are those of silver, copper, lead, zirconium, bismuth, manganese, nickel, cobalt, iron, cadmium, cerium, chromium, tungsten and molybdenum and I prefer to use the chlorides of the said metals, provided they be soluble in water. As oxidizing agents I may use any oxygen carriers and the oxygen acids and salts of oxygen acids of the metals of the chromium group soluble in water that is to say any compounds rich in and readily parting with oxygen. Such oxygen carriers are peroxide of hydrogen, the oxygen acids of halogens, persulphuric acid, Caro's acid or the salts of such acids in acidulated solutions, or mixtures of the said substances.

The oxygen conveyors to be used to the greatest advantage in any particular case depend on the nature of the oxygen carrier used. Thus when I use the highly reactive peroxide of hydrogen as an oxygen carrier, oxygen conveyors of comparatively low reactivity are preferably used such as salts of copper, cobalt, nickel, iron, lead, silver, tungsten, molybdenum and the like, while when the oxygen carrier used is of comparatively lower reactivity or parts less readily with its oxygen, such as chlorates or persulphates, an oxygen carrier of a comparatively higher reactivity has to be used such as chromic acid or bichromates. The latter, thus possibly give off in the first moment their oxygen to the hair or wool being reduced thereby, but being afterwards reoxidized to chromic acid or chromates by the oxygen carrier and thus act as oxygen conveyors. As above stated the solutions of the salts used, have to be acidulated. As acidulating agents, I use sulphuric acid, or nitric acid; the latter then acts not only as an acidulating agent, but also as an oxygen carrier. In this case the oxygen carrier consists of a mixture of nitric acid and another oxygen carrier as above indicated. When peroxide of hydrogen is used as an oxygen carrier, an acidulating agent need not be used. The oxygen carrier and the oxygen conveyor are as a rule

applied simultaneously to the hair or wool. But if highly reactive oxygen carriers such as peroxide of hydrogen and highly reactive oxygen conveyors such as chromic acid or bichromates have to be used, they have to be applied to the hair or wool in succession for instance first the oxygen conveyor and then the oxygen carrier.

The concentrations of the solutions used are so low that they have no detrimental action on the hair or wool.

Examples.

1. To hair and wool on the skin is applied a mixture of an aqueous solution containing 6 to 10% by weight of peroxide of hydrogen serving as an oxygen carrier and 1 to 2% of bismuth, cobalt or cerium in the form of a salt soluble in water by spraying or brushing or in any other known or preferred manner. The skins are then dried at a temperature of 70 to 100° centigrade. The hair and wool will be found to be thoroughly caroted and may then be further worked in the well known manner.

2. To hair or wool on the skin is applied, as in Example 1, an aqueous solution containing 5 to 10% by weight of nitric acid 3 to 5% of peroxide of hydrogen and 1 to 2% of silver, lead, zirconium, bismuth, manganese, nickel, cobalt, iron, cadmium or cerium, in the form of a salt soluble in water, the said salts acting as oxygen conveyors while the peroxide of hydrogen acts as an oxygen carrier, and the nitric acid as an acidulating agent. The further treatment is the same as in Example 1.

3. To hair or wool on the skin is applied, as in Example 1, an aqueous solution containing 5 to 10% of nitric acid acting as an acidulating agent, 3 to 5% of peroxide of hydrogen, acting as an oxygen carrier or oxidizing agent and 1 to 2% of tungsten or molybdenum in the form of a tungstate or molybdate soluble in water and acting as an oxygen conveyor the tungsten or molybdenic acid being oxidized by the peroxide of hydrogen to pertungstic or permolybdenic acid respectively which gives off oxygen to the hair or wool being reduced to tungstic or molybdenic acid respectively and this is oxidized in turn by the peroxide of hydrogen and so on. The further treatment is the same as in Example 1.

4. To hair or wool on the skin is applied, as in Example 1, an aqueous solution containing 2% by weight of potassium chlorate, 1% sulphuric acid and 0.1% of chromium in the form of chromic acid or of a bichromate soluble in water; the further treatment is the same as in Example 1.

5. To hair or wool on the skin is applied, as in Example 1, an aqueous solution containing 4% by weight of ammonium persulphate, 2% sulphuric acid and 1% of chromium

alum. The further treatment is the same as in Example 1.

6. To hair or wool on the skin is applied as in Example 1 an aqueous solution containing 2% by weight of nitric acid 1% of ammonium persulphate and 1% chromium in the form of chromic acid or of a bichromate. The further treatment is the same as in Example 1.

7. To hair or wool on the skins is applied as in Example 1, an aqueous solution containing 1.5% by weight of potassium chlorate, 4% of ammonium persulphate and 1% of chromium in the form of chromic acid or of a bichromate. The further treatment is the same as in Example 1.

8. To hair or wool on the skin is applied, as in Example 1, an aqueous solution containing 3% by weight of ammonium persulphate 2% of sulphuric acid and 0.4% of chromium in the form of chromic acid or a bichromate.

In Examples 4 to 8 the potassium chlorate and ammonium persulphate act as oxygen carriers, the chromic acid bichromate and the chromium alum act as oxygen conveyors and the sulphuric and nitric acid act as acidulating agents.

The above described process is also applicable to hair or wool cut from the skin but in this case the concentrations above indicated will have to be notably reduced, say to one quarter or one tenth of those above given, according to the degree of concentration of the liquid remaining on the hair or wool after removal of the excess of liquid and according to the nature of the hair and wool treated.

I wish it to be understood that I do not claim the use of nitric acid and a metal or metal salt without the use of an oxidizing agent.

What I claim is:

1. In carroting animal hair and wool the step comprising the application to the hair and wool of an aqueous solution of an oxygen carrier and of an oxygen conveyor and of nitric acid.

2. In carroting animal hair and wool the step comprising the application to the hair and wool a mixture of aqueous solutions of an oxygen carrier and of an oxygen conveyor and nitric acid.

3. In carroting animal hair and wool the step comprising the application to the hair and wool of an aqueous solution of an oxygen carrier and of an oxygen conveyor, such oxygen conveyor consisting of an oxygen compound of a metal having a plurality of degrees of oxygenation, those poorer in oxygen being readily converted into those richer in oxygen by the oxygen carrier and the compounds of such metals richer in oxygen being capable of readily giving off oxygen to the hair and wool.

4. In carroting animal hair and wool the step comprising the application to the hair

and wool of an aqueous solution of an oxygen carrier and of an oxygen conveyor, such oxygen conveyor consisting of an oxygen compound of a metal of the chromic group.

5 5. In carroting animal hair or wool the step comprising the application to the hair and wool of an aqueous solution of an oxygen carrier and of an oxygen conveyor, such oxygen conveyor consisting of a tungstate
10 soluble in water.

6. In carroting animal hair and wool the step comprising the application to the hair and wool of an aqueous solution of an oxygen carrier and of an oxygen conveyor, such
15 oxygen conveyor consisting of a tungstate soluble in water, the oxygen carrier consisting of peroxide of hydrogen.

7. In carroting animal hair and wool the

step comprising the application to the hair and wool of an aqueous solution of an oxygen carrier and of an oxygen conveyor, such oxygen conveyor consisting of a tungstate
20 soluble in water, the oxygen carrier consisting of peroxide of hydrogen and an acidulating agent.

8. In carroting animal hair and wool the step comprising the application to the hair and wool of an aqueous solution of an oxygen carrier and of an oxygen conveyor, such oxygen conveyor consisting of a tungstate
25 30 soluble in water, the oxygen carrier consisting of peroxide of hydrogen and nitric acid acting as an acidulating agent.

In testimony whereof I have affixed my signature.

ERICH BÖHM.