

UNITED STATES PATENT OFFICE.

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TREATMENT OF HAIR FOR FELTING OR LIKE PURPOSES.

993,461.

Specification of Letters Patent.

Patented May 30, 1911.

No Drawing.

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To all whom it may concern:

Be it known that I, BENJAMIN RONJAT, a citizen of the Republic of France, and resident of Paris, France, have invented new and useful Improvements in or Relating to the Treatment of Hair for Felting or Like Purposes, which improvements are fully set forth in the following specification.

Hare and rabbit hair intended for hat making has to undergo an operation of the greatest importance, the object of which is to give to the hairs the property of felting. This operation is hereinafter called "secreting" and it is a harmful and dangerous process. It is effected by treatment with a solution of an acid nitrate of mercury. This solution is prepared by dissolving ordinary mercury in nitric acid of 36 or 40°. The reaction is a very violent one, and a great quantity of nitrous fumes are generated, which are very dangerous to the health of the operators. For that reason it has been necessary to provide regulations for this work which nevertheless remains very dangerous.

Rabbit or hare skins are brushed by hand with the mercury solution produced by the addition of water to about 10° Be., then after draining, they are placed in a drying chamber or stove heated to about 70°. As soon as the drying chamber is filled, it is closed; and it is opened again at the end of a more or less long period, which varies according to the nature of the skins and of the secreting process. There are two kinds of secreting: the yellow and the pale or white, which differ, however, by the proportion of metal employed. In yellow secreting, the skins remain in the drying stove for about an hour with a strong flame. For pale secreting, the fire is put out, so that the skins dry slowly from 8-12 hours. The heating results in a chemical action which modifies the physical constitution of the hair as is clearly shown by examination with a microscope, by means of which it is possible to ascertain whether the secreting has been effected in a satisfactory manner.

Hitherto, the theory of secreting has not been made clear. It is however certain that mercury nitrate gives a perfect result. It appears that the useful effect is produced

by the action of the nitrous acid obtained by the decomposition of nitric acid by organic substance with the assistance of heat. The nitrous acid or the nitric acid, or both, attack the cortical substance of the hair and produce deep corrosions, torn places clearly seen under the microscope. The hairs become more supple and softer, and owing to the asperities in question, acquire the property of felting.

Dry skins withdrawn from the stove, are heaped up and kept for a certain time before being passed to the cutting machine.

It is obvious that the water of the mercury solution has evaporated, but it is certain that mercury salt has remained impregnated in the hairs and even in the skin. All the subsequent manipulations to which the skins and the hairs are subject until their transformation into hats, necessitate their passing through many hands, namely that of the secreting operator, cutter, fuller, dyer, finisher, etc., who all remove a little of the mercury salt which, being reduced to dust, is absorbed by the respiratory and digestive organs and causes mercurial poisoning, which has been frequently observed, and the greatest cleanliness cannot prevent poisoning, more particularly as the operators often forget the washing that would partly protect them against the harmful results. The use of mercury is, however, not necessary for giving the hairs the felting property. All metalloids or metal or organic substances having a reducing or deoxidizing action, can produce the same result with more or less great facility. It is, therefore, very important from the hygienic point of view to replace mercury by a harmless substance giving the same result as far as the secreting process is concerned.

This invention relates to a secreting process without mercury, which is applicable to the industry of cutting hairs intended for hat making. This process is chiefly characterized by the use of tin or zinc in the form of acid nitrates, and of other metal nitrates which do not color the skins, except yellow owing to the excess of nitric acid which is essential for good secreting, and by the addition of nitrite of sodium, more particularly for yellow secreting, in order

to bring about a more energetic action owing to the formation of free nitrous acid which favors the reaction on the hairs.

According to the known process, the three formulae for secreting, used in the hair cutting industry, have the following constitution:

1. Yellow secreting: mercury 5 kg., nitric acid 40° B. 25 kg.
2. Pale " " 8 kg., " " 8 kg.
3. White " " 10 kg., " " 10 kg.

These are replaced by the following formulae:

1. Yellow secreting: tin 3 kg., nitric acid 40° B. 24 kg.
2. Pale " " 4.72 kg., " " 21 kg.
3. White " " 5.9 kg., " " 20 kg.

that is to say, mercury nitrate is replaced by acid nitrate of tin, viz. either by stannous nitrate $\text{Sn}(\text{NO}_3)_2$ or by stannic nitrate $\text{SnO}_2(\text{N}_2\text{O}_5)_2$ but keeping the same quantity of free acid in the nitrate obtained, that is to say, the molecule of mercury is replaced by the molecule of tin, the weight of which is not the same.

Stannous nitrate is prepared (1) by dissolving tin in nitric acid of 15° in which case there is formed nitrate of ammonia which remains in the liquor and is not injurious (operate cold); (2) by dissolving in the same nitric acid of 15° hydrated oxide of tin H_2SnO_2 freshly precipitated from a solution of a stannous salt, for instance protochlorid. Stannic nitrate is prepared by dissolving cold a quantity of stannic hydrate corresponding to the quantity of tin in the formula that it is desired to obtain. With these solutions by brushing the skins in the same way and "stoving" equally good secreting is obtained as with the mercury solutions.

Obviously the proportions of nitric acid hereinbefore specified can vary within cer-

tain limits according to the nature of the skins treated. Tin can be replaced by zinc, but the secreting is then not so good.

Numerous experiments have shown that the use of nitric acid alone is impossible, the secreting operation takes place but it does not penetrate so deeply. The skins get a greenish tint, and not yellow, as when treated with metals. This has been responsible for the failure of all attempts made hitherto with salts which did not contain free nitrous acid, and this has led the inventor to use a reaction frequently used in the manufacture of azoic dye stuffs. This reaction consists in the use of nitrite of sodium NaNO_2 which in the presence of nitric acid, forms free nitrous acid and sodium nitrate, and gives sodium, which enables the quantity of tin to be strongly reduced while insuring equally good yellow secreting. The formula becomes: yellow secreting: tin 1 kg. sodium nitrite 2 kg. nitric acid of 40° 25 kg. This preparation is cheaper than that with 2 kg. of tin and gives the same result.

Claim:

1. The hereindescribed process for secreting hair for felting which consists in treating such hair with a solution containing nitrate of tin.

2. The hereindescribed process for secreting hair for felting which consists in treating such hair with a solution containing nitrate of tin and nitrite of sodium.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

BENJAMIN RONJAT.

Witnesses:

EMILE LEDRET,
H. C. COXE.