

UNITED STATES PATENT OFFICE.

EMILE CRUMIÈRE, OF PARIS, FRANCE.

MANUFACTURE OF ARTIFICIAL HORSEHAIR AND OTHER CELLULOSE PRODUCTS HAVING RESISTANCE AND ELASTICITY.

No. 911,868.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EMILE CRUMIÈRE, a citizen of the Republic of France, residing in Paris, France, have invented certain new and useful Improvements in the Manufacture of Artificial Horsehair and other Cellulose Products Having Resistance and Elasticity, of which the following is a specification.

10 Generally speaking, in the manufacture of artificial horse-hair, a thread of cellulose is first produced which is then treated by some special process for obtaining the horse-hair. Thus the manufacture is complicated, for

15 instance, the solution of the cellulose in the ammoniacal copper solution is forced by pressure through capillary tubes immersed in an acid coagulating liquid, the cellulose coagulates, the thread is formed and this is

20 treated with strong sulfuric acid to eliminate the copper, and finally washed with water. When the copper has been eliminated, the threads are wound upon a cylinder which is rotated for some time in a bath of concen-

25 trated solution of soda, by means of an arrangement such as has been described in German Specification No. 111409 of the Vereinigte Glanzstoff-Fabriken. The thread is then washed with acidified water until the

30 soda has been completely eliminated, again washed, and finally dried under tension to obtain the artificial horse-hair. It is easy to see how protracted these operations are, and what complexity they present in respect of

35 number, plant, material used, manual labor, and cost.

The present invention relates to a simplified manufacture of artificial horse-hair including the regeneration of the materials

40 used.

The cellulose thread obtained by the usual methods may be deprived of its copper rapidly, completely, and continuously in an automatic and economical manner by using

45 the process described in the French patent applied for on 16th March 1907 under No. 40305, and delivered in France on the 24th May 1907 under the number 375827. For this purpose an electric current is passed

50 through a vat containing a weak solution of an acid, such as sulfuric acid, of 5 per cent. strength for example, in which is immersed the cellulose material to be deprived of copper; the copper is recovered and the solution

of sulfuric acid can be used again practically indefinitely.

The process which forms the subject matter of the present invention imparts to the thread or other object thus obtained the qualities which in a thread are those of good artificial horse-hair, or in another object are properties of strength and elasticity. I have found it advantageous to immerse for a few moments according to the size, the thread or cellulose object obtained in the manner

60 just described, in a bath of zinc chlorid of say 1.70 specific gravity and hot. The threads and objects thus treated are washed with water slightly acidified with acetic acid or sulfuric acid and then with ordinary

65 water before they are dried. The zinc may easily be recovered from the washing waters according to the usual methods, and the bath of zinc chlorid may be regenerated by concentration by heat for example.

70 I have sought to simplify still more these operations by obtaining a thread of artificial horse-hair and other cellulose products by direct spinning of a solution of cellulose in ammoniacal copper solution in

75 chlorid of zinc. I have found that the spinning can easily be done, but the thread deprived of its copper, even after washing, does not present any strength once it is

80 dried. However, pursuing these experiments, I have found that by adding to the bath of chlorid of zinc, caustic soda or potash so as to obtain sodium or potassium zincate in solution, not only can a solution of cellulose in ammoniacal copper solution be di-

85 rectly spun, but the artificial horse-hair thus obtained when it has been deprived of its copper, washed and dried, has a high strength and elasticity. This method furnishes, starting from zinc chlorid, a direct

90 spinning and a direct manufacture of artificial horse-hair, the production of which on an industrial scale is thus extremely simplified, especially from the point of view of the plant and manual labor.

95 100.

At the end of a certain time the spinning bath becomes exhausted and strongly colored blue, as a result of the spinning of the solution of cellulose in ammoniacal copper solution which leaves copper dissolved in the

105 bath of sodium or potassium zincate. This color is unfavorable to good spinning, because the threads cannot be properly seen

and therefore cannot be guided in the coagulating bath. I have found that it is very easy to remedy this inconvenience, which indeed is common to all the processes, and at the same time to regenerate advantageously the spinning bath by merely boiling it with strips of zinc. Under these conditions, the copper is precipitated, the bath is completely decolorized, and the zinc enters into solution in the form of zincate of sodium or potassium ready to be used again.

In the cold, zinc will dissolve whether in the course of the spinning or afterwards, and will produce sodium zincate besides decolorizing the bath, but the action in this case is less rapid.

Having thus described the nature of my

said invention and the best means I know of carrying the same into practical effect, I claim:—

A process for manufacturing rapidly and economically strong and elastic horse-hair or other cellulose products, which process consists in spinning a solution of cellulose in ammoniacal copper solution in a bath consisting of a solution of sodium or potassium zincate.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

EMILE CRUMIÈRE.

Witnesses:

JULES ARMENGAUD, Jeune,
DEAN B. MASON.