

UNITED STATES PATENT OFFICE.

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PROCESS OF MANUFACTURING ARTIFICIAL THREADS.

1,034,235.

Specification of Letters Patent.

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No Drawing.

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To all whom it may concern:

Be it known that I, JOSEF HERMANS, a citizen of the Empire of Germany, and residing at Herrenhausen, near Hanover, Germany, have invented a certain new and useful Improved Process of Manufacturing Artificial Threads, of which the following is a specification.

My invention relates to the manufacture of artificial threads, from cuprammonium cellulose solutions.

It is well-known that salt solutions, when rendered alkaline, exercise a very considerable precipitation action on cuprammonium cellulose solutions. The threads produced in this manner, however, heretofore met the requirements placed upon them only to a limited extent. On account of their possessing but little expansibility and strength they could not be employed in all branches of the textile industry.

My present invention relates to a process in which a sufficient quantity of a nitrite is added to the alkaline salt solutions, *e. g.* to a nitrate solution. In this manner I believe that not only is the rapidity of precipitation considerably increased; but that, above all, the resulting cellulose structure has a degree of strength and elasticity both when moist and dry which, as numerous tests have repeatedly confirmed, cannot remotely be obtained with other combined salt solutions, least of all with acids, and even not by soda lye which otherwise acts as a powerful precipitant. The reason of this peculiar behavior is apparently to be found in the fact that the cellulose is chemically changed during its coagulation by the nitrite solution in consequence of the capability of reaction to be ascribed to it in such manner that small quantities of carbon hydrates are formed which no longer agree with the constitution of the cellulose. In the present case, therefore, one has to do with cellulose whose cohesion has become very materially increased by the variety in its composition.

In order to explain the composition of the precipitating baths by means of an example, the following numbers may serve:—25.0 kg. nitrate of soda, 15.0 kg. nitrite of soda, 4.5 kg. hydrate of soda, 55.5 kg. water.

The testing of the products by means of instruments of precision in all cases showed

that the strength and elasticity of the threads made according to this process is approximately 50% greater than the best obtained heretofore. Thus, threads made by means of the above-described precipitating bath had, for example, the great elasticity of 236 mm. per meter, while under similar working conditions but employing a different precipitating bath the following numbers were obtained:—1. When employing a precipitating bath composed of 30% sulfuric acid the finished silk had a dilatation of 128 mm. per meter. 2. When using a precipitating bath consisting of soda lye of 40° Bé. a dilatation of 162 mm. per meter was obtained. 3. When an alkaline salt solution consisting of 30.0 kg. chlorid of sodium, 4.5 kg. hydrate of soda and 65.5 kg. water was used as precipitating bath, a dilatation of 104 mm. per meter was obtained in the elasticity test.

In the individual tests the subsequent treatment of the threads after the spinning took place according to one and the same process, only the precipitating bath being varied during the manufacture of the various samples.

An additional phenomenon which can be explained by the same action of the nitrite and is of a value not to be underestimated is the capacity of rapidly and uniformly absorbing dye stuffs in such manner that the best intensity and uniformity of color are obtained. Threads made with other precipitants after being dyed with the same dyes do not compare in their effect with the nitrite threads. It is not impossible that in this manner a product similar to nitro-cellulose has been obtained.

The most valuable property of the new product is its employability in weaving. As is well-known, very many attempts have recently been made to manufacture artificial threads not only into trimming, braid and the like, but also into textile fabrics and articles of clothing. For the weft material, in which great elasticity is not so very important, there were less difficulties, but the numerous attempts to employ the artificial products as warp heretofore failed solely because the product was not sufficiently elastic and strong. Now the product made according to my process possesses these valuable properties to an extent not even approximately attained heretofore, so that the new

artificial thread has opened a field in which it is decidedly superior to other products in consequence of this valuable property.

I claim:

5 1. The hereindescribed process of manufacturing artificial threads, which consists in passing a filament of a cuprammonium cellulose solution through a slightly alkaline salt solution containing a nitrous salt dis-
10 solved therein.

2. The hereindescribed process of manu-

facturing artificial threads, which consists in passing a filament of a cuprammonium cellulose solution through a slightly alkaline nitrate solution containing a nitrous salt dis- 15
solved therein.

In testimony whereof, I affix my signature in the presence of two witnesses.

JOSEF HERMANS.

Witnesses:

THOMAS H. NORTON,
MINNA CASSEL.