

UNITED STATES PATENT OFFICE

2,136,464

METHOD OF PREPARING TUBULAR ARTIFICIAL TEXTILE THREADS

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No Drawing. Application July 24, 1936, Serial
No. 92,392. In France August 1, 1935

2 Claims. (Cl. 18—54)

This invention relates to a method or process of producing artificial threads in which each fiber is of a titer less than 2 deniers and also is tubular throughout substantially its entire length.

More particularly, this invention relates to improvements in or modifications of the process described and claimed in our prior United States application Serial No. 22,518.

United States application Serial No. 22,518 relates to the production of threads having tubular fibers of an elementary titer of less than 2 deniers and comprises adapting the total concentration of the coagulation bath to the desired fineness of the fiber. United States application Serial No. 22,518 discloses that the total concentration of a bath for spinning a tubular fiber of 2 deniers according to the indications given in British Patent No. 255,527 must be increased by at least 20% if the elementary titer spun is 1 denier and the increase corresponding to all the titers less than 2 deniers is calculated by interpolation or extrapolation.

We have found that a similar result may be obtained by another process, the latter forming the subject of the present invention. Essentially, the present process comprises varying the temperature of the bath inversely of the elementary titer according to a predetermined law. For example, if different threads of the same total titer of 100 deniers but an increasing number of fibers are coagulated in a bath containing per liter:

	Grams
Sulphuric acid.....	150
Sodium sulphate.....	230
Zinc sulphate.....	2.5

according to British Patent No. 255,527, with a travel of the thread of about 20 centimeters in the said bath according to our United States application Serial No. 22,517 at a bath temperature of:

- (1) 45° C. There is obtained—
A thread having 30 fibers all hollow,
A thread having 60 solid fibers,
A thread having 100 solid fibers.
- (2) 55° C. There is obtained—
A thread having 30 fibers all hollow,
A thread having 60 fibers in part solid,
A thread having 100 fibers all solid.
- (3) 70° C. There is obtained—
A thread having 30 fibers all hollow,
A thread having 60 fibers all hollow,
A thread having 100 fibers all hollow.

In order to produce a viscose rayon having fine tubular fibers according to the methods described in British Patent No. 255,527 and United States application Serial No. 22,517, the minimum temperature of the bath (in degrees centigrade) is given in general by the formula $T=a-bd$, where

d is the elementary titer (in deniers) of the fibers of the thread to be produced, $a=70$ to 75 and $b=9$ to 11.

The instant process may be combined with that described in United States application Serial No. 22,518. In such an embodiment, the increase in the total concentration of the bath resulting from the indications set forth therein is less if the variation is combined with a certain increase in temperature. In this embodiment, the temperature is varied in the same manner as above described but to a smaller extent; also, the concentration of the bath is varied to a smaller extent than described in United States application Serial No. 22,518. In order to illustrate this embodiment of the invention, the following illustrative example is given:

Example.—A viscose (similar to that of Example 1 of British Patent 255,527) containing 7.3 of cellulose and an alkalinity of 4% calculated as NaOH is prepared in the usual manner. The alkalinity thereof is increased to 7% by the addition of sodium carbonate and then ripened for 73 hours at 13° C., after which it is spun to produce 100 denier-100 fibers in a bath containing sulphuric acid and dissolved sulphates, such as sodium sulphate with or without zinc sulphate, the total concentration of the sulphuric acid and dissolved sulphates being of the order of approximately 396 grams per liter, the ratio of sulphuric acid to dissolved sulphates being 1:1.5. The bath is maintained at a temperature of 55° C. and the thread is given a bath travel of approximately 20 cms. The thread, on leaving the spinning bath, may be given an air travel of 160 cms. before arriving at the delivery roller which delivers it at a speed of 60 meters into a centrifugal pot rotating at 5,000 R. P. M. In the product, each fiber is tubular throughout its length. It is to be noted that this example differs from Example A of United States application Serial No. 22,518 in that the concentration of the bath is increased 10% and the bath is maintained at 55° C.

The present invention is particularly useful in the spinning of hollow staple fiber in bundles of very numerous filaments.

It is quite evident that the foregoing example of the application of one of the bath formulae according to British Patent No. 255,527 is by no means restrictive and that the present invention is also applicable to all other formulae of viscose and baths which are suitable for the manufacture of a hollow fiber viscose rayon.

Since it is obvious that various changes and modifications may be made in the above description without departing from the nature or spirit thereof, this invention is not restricted thereto except as set forth in the appended claims.

We claim:

1. In a method of producing artificial threads

formed of a plurality of unitary fibers, each of said fibers being of a titer less than 2 deniers and substantially tubular throughout substantially its entire length, the step of spinning a viscose solution capable of producing hollow filaments in a coagulating and regenerating bath, the temperature of which varies inversely to the desired elementary titer and the minimum temperature being according to the formula:

$$T = a - bd,$$

wherein:

T represents the temperature in degrees centigrade and is not less than 55° C.

a=70 to 75

b= 9 to 11

d=the elementary titer (in denier) of the fibers to be produced.

2. In a process of producing artificial threads formed of a plurality of unitary fibers, each of said fibers being of a titer less than 2 deniers and substantially tubular throughout its entire length, the step of spinning a viscose solution containing a carbonate into a bath maintained at a temperature of approximately 55° C. and containing sulphuric acid and dissolved sulphates in the ratio of 1 part of sulphuric acid to approximately 1.5 parts of sulphates, the total quantity of sulphuric acid and sodium sulphate being approximately 396 grams per liter.

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