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METHOD OF MAKING TUBULAR ARTIFICIAL TEXTILE THREADS

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Fig. 1.

Fig. 2.

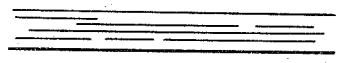

Fig. 3.

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METHOD OF MAKING TUBULAR ARTIFICIAL TEXTILE THREADS

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8 Claims. (Cl. 18—54)

This invention relates to hollow or tubular artificial textile threads and more particularly to a process of producing the same.

United States Patent No. 1,394,270 describes inter alia a process for the manufacture of artificial textiles containing gas bubbles from cellulosic or other solutions containing gases emulsified therein. This process for the manufacture of porous textiles has been the subject of numerous improvements successively described in the United States Patents Nos. 1,427,330, 1,464,048, 1,487,807, 1,544,631, 1,652,206 and 1,831,030, and British Patent 255,527, and their principal result has been the production of more or less swollen tubular fibers. In section, the said fibers have the appearance shown in Figure 1 of the accompanying drawing, and in longitudinal elevation they appear in the form of striated laminae (Figure 2.)

It sometimes happens, however, that in the longitudinal elevation there are to be seen pronounced transverse striations which, under microscopic examination, appear in the form of partitions dividing the tube into sections, hence the name "partitioned" given to this defect (Figure 3).

United States Patent No. 1,544,631 and British Patent 255,527 have indicated certain conditions for the preparation of the spinning solution and the spinning bath, which enable this defect to be eliminated to a very large extent. When in spite of this it exists in part, the more accentuated the defect is, the more the thread is weakened.

The object of the present invention therefore is the total elimination of this defect and the production of artificial thread, the filaments of which are tubular.

One of the well-known procedures for increasing the tensile strength of artificial thread produced from viscose consists in giving the thread a long travel such as, for example, up to 2.50 meters in the spinning bath. When such a procedure is applied to the spinning of an artificial viscose silk having tubular fibers, a partitioned and considerably weakened thread is produced.

We have now found that in spinning viscose under the conditions indicated in British specification No. 255,527 the tenacity of the thread is increased, when the length of travel in the spinning bath is such as to be insufficient to completely fix the thread, and thereafter conducting the thread in air whereby it is substantially completely fixed. Specifically, the bath travel is made as short as possible, that is, less than 25 centimeters, and the path in air is at least 150 centimeters to ensure almost complete fixation. The bath travel contemplated by this invention superficially fixes the thread and substantially complete fixation is secured during the air travel. Furthermore, it has been found advantageous to dispense with thread-guiding members in the bath or any device which impedes the free travel of the thread, leaving only those devices which are intended to increase the tenacity of the thread by stretching before the winding thereof such as, for example, stretching the thread at same stage between the bath and delivery roll or beyond the latter.

Microscopic observation of artificial viscose silks having tubular fibers thus obtained with a short path in the spinning bath shows that by this means a much more uniform width of the fibers is also obtained.

In accordance with the principles of this invention, a viscose solution of the type used in the manufacture of hollow filaments is spun into an appropriate spinning bath. The extruded thread is then given a bath travel which is insufficient to completely fix the thread. Specifically, the thread is given a bath travel whereby the thread is superficially fixed. More specifically, the thread is given a bath travel of not exceeding and preferably less than 25 centimeters. After withdrawal from the spinning bath, the thread is given a travel in the air of not less than 150 centimeters to ensure substantially complete fixation before engaging the delivery roller. The thread is then wound up in any suitable manner as in a centrifugal spinning bucket.

It is to be noted that during the bath travel it is of advantage if the thread does not engage with any devices which impede the free travel of the thread. If the thread is to be stretched, this is preferably effected by suitable devices imposing the desired tension on the thread between the spinning bath and the delivery roll or beyond the latter.

By way of an illustrative example given merely to indicate the results which the process renders it possible to obtain, a viscose containing 7.3% of cellulose and 4% of caustic soda has been increased to the alkalinity of 7% by the addition of sodium carbonate, and then ripened 73 hours at 13° C. The viscose was then spun in a bath containing per liter 145 grams of sulphuric acid, 228 grams of sodium sulphate and 2.5 grams of zinc sulphate, in one case with a travel of 50 centimeters in the said bath, in the other case with a travel of 22 centimetrs. In both cases

the thread on leaving the bath travels 160 centimeters in the air before arriving at the delivery roller, which delivers it at the speed of 60 meters into a centrifugal pot revolving at 5,000 revolutions per minute.

The results were as follows:

Path cm. (in bath)	Tenacity gms. per denier		Extension on breaking, percent	
	Dry thread	Wet thread	Dry thread	Wet thread
50	1.5	0.65	20	21
22	1.6	0.80	21	25

In the first case 50% of the fibers are partitioned. In the second case, all the fibers are provided with a continuous central tube.

British Patent No. 255,527 has specified the limits of concentration in which the spinning bath should be maintained in order to produce threads with tubular fibers. The central part of the ranges thus drawn represents the optimum condition. As one departs from the optimum condition, partitioning appears and becomes more and more frequent. This central part is considerably broadened by spinning with a short path in the bath according to the present invention, which confirms the importance it possesses for the manufacture of an artificial viscose silk having tubular threads.

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

We claim:

1. In a process of making artificial thread formed of unitary fibers, each of said fibers being substantially tubular throughout substantially the entire length thereof, the steps which comprise spinning a viscose solution capable of producing hollow filaments in a spinning bath, causing the thread to travel for a distance of not over 25 centimeters in the spinning bath to incompletely fix the thread, and then causing the thread to travel in the air for a distance of at least 150 centimeters to substantially completely fix the thread.

2. In a process of making artificial thread formed of unitary fibers, each of said fibers being substantially tubular throughout substantially the entire length thereof, the steps which comprise spinning a viscose solution capable of producing hollow filaments in a spinning bath, causing the thread to travel for a distance of not over 25 centimeters in the spinning bath, said thread being caused to travel through said bath without engaging any device which impedes the movement of said thread, and then causing the thread to travel in the air for a distance of at least 150 centimeters.

3. In a process of making artificial thread formed of unitary fibers, each of said fibers being substantially tubular throughout substantially the entire length thereof, the steps which comprise spinning a viscose solution capable of producing hollow filaments in a spinning bath, causing the thread to travel for a distance of not over 25 centimeters in the spinning bath to incompletely fix the thread, then causing the thread to travel in the air for a distance of at least 150 centimeters to substantially completely fix the thread, stretching the thread at some stage between the bath and wind-up device, and finally winding up the thread.

4. In a process of making artificial thread formed of unitary fibers, each of said fibers being substantially tubular throughout substantially the entire length thereof, the steps which comprise spinning a viscose solution capable of producing hollow filaments in a spinning bath, causing the thread to travel for a distance of not over 25 centimeters in the spinning bath, said thread being caused to travel through said bath without engaging any device which impedes the movement of said thread, then causing the thread to travel in the air for a distance of at least 150 centimeters, stretching the thread at some stage between the bath and wind-up device, and finally winding up the thread.

5. In a process of making artificial thread formed of unitary fibers, each of said fibers being substantially tubular throughout substantially the entire length thereof, the steps which comprise spinning a viscose solution capable of producing hollow filaments in a spinning bath, causing the thread to travel for a distance of 22 centimeters in the spinning bath, and then causing the thread to travel in the air for a distance of 160 centimeters.

6. In a process of making artificial thread formed of unitary fibers, each of said fibers being substantially tubular throughout substantially the entire length thereof, the steps which comprise spinning a viscose solution capable of producing hollow filaments in a spinning bath, causing the thread to travel for a distance of 22 centimeters in the spinning bath, said thread being caused to travel through said bath without engaging any device which impedes the movement of said thread, and then causing the thread to travel in the air for a distance of 160 centimeters.

7. In a process of making artificial thread formed of unitary fibers, each of said fibers being substantially tubular throughout substantially the entire length thereof, the steps which comprise spinning a viscose solution capable of producing hollow thread in a spinning bath, causing the fibers to travel in said bath without engaging any device which impedes the movement of the thread and for a distance sufficient to superficially fix the fibers, said distance being not in excess of 25 centimeters, withdrawing the fibers from the bath, and causing the fibers to travel in air for a distance sufficient to permit substantially complete fixation thereof.

8. In a process of making artificial thread formed of unitary fibers, each of said fibers being substantially tubular throughout substantially the entire length thereof, the steps which comprise spinning a viscose solution capable of producing hollow thread in a spinning bath containing 145 grams of sulphuric acid per liter of bath, 228 grams of sodium sulphate per liter of bath and 2.5 grams of zinc sulphate per liter of bath, causing the fibers to travel in said bath for a distance of 22 centimeters and without engaging any device which impedes the movement of the thread, withdrawing the fibers from the bath, causing the fibers to travel in air for a distance of 160 centimeters, and delivering said thread at a speed of 60 meters per minute to a collection device.

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