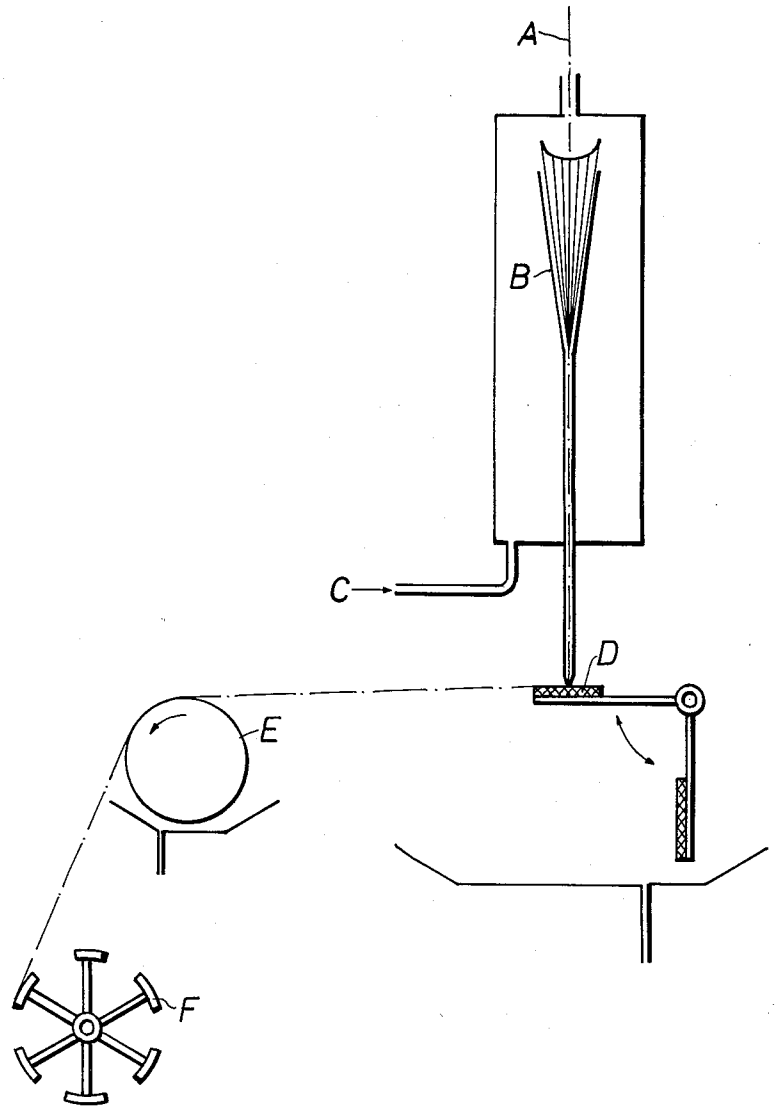
Dec. 12, 1961 H. FROITZHEIM ET AL 3,012,846

PROCESS FOR THE MANUFACTURE OF KNOP FILAMENTS

Filed March 1, 1960



INVENTORS:
HANS FROITZHEIM, JOHANN SCHMITZ, HEINRICH BORGER.
BY Connolly and Hutz
their ATTORNEYS

United States Patent Office

3,012,846

Patented Dec. 12, 1961

3,012,846

PROCESS FOR THE MANUFACTURE OF KNOP FILAMENTS

Hans Froitzheim, Dormagen, Johann Schmitz, Koln-Worringen, and Heinrich Borger, Dormagen, Germany, assignors to Farbenfabriken Bayer Aktiengesellschaft, Leverkusen, Germany, a corporation of Germany

Filed Mar. 1, 1960, Ser. No. 12,182
Claims priority, application Germany Mar. 3, 1959
2 Claims. (Cl. 18—54)

This invention relates to a process for the manufacture of knop filaments by the cellulose-cuprammonium process wherein the withdrawal of the filaments is interrupted after certain withdrawal intervals.

Knop filaments of regenerated cellulose have already been produced by supplying spinnnig solution in an irregular rhythm to the spinnerets and by draw off speed of the coagulated filaments being kept constant. Thickenings in the filament are produced in this way, but on account of the gel-like condition of the freshly spun filaments, these thickened portions are drawn out and do not produce short thick knops. Fabrics made from these filaments consequently do not show a linen-like character.

It is an object of the present invention to provide a process for the manufacture of knop filaments, the knops of which are short and thick. Another object of the present invention is to provide knop filaments which show a linen-like character. A further object is to provide a process for the manufacture of knop filaments with constant supply of the spinning solution to the spinneret during the spinning process. A still further object is to provide a process for the manufacture of knop filaments which enables one to predetermined the volume of the knops and the spaces between the knops. Still further objects will become apparent hereinafter.

It has now been found that filaments of regenerated cellulose produced by the cellulose-cuprammonium process are obtained with short, thick knops if, during the spinning of the cellulose-cuprammonium solution and with a constant supply of the spinning solution to the spinning sprinkler, the Thiele funnel is closed at the bottom end and simultaneously the withdrawal of the bundle of filaments is interrupted, the Thiele funnel is opened again after a residence time of 1 to 20 seconds and after a short delay, the bundle of filaments is also withdraw again and this process is repeated, each time after non-uniform withdrawal intervals.

It is possible to use all the cellulose-cuprammonium solutions normally employed for this process. They generally contain 6 to 10% of cellulose, 3.6 to 4.2% of cupric oxide and 5 to 8% of ammonia as well as various other additives. The compositions of these solutions is not critical for carrying out the process according to the invention.

The Thiele funnel which is employed can be used in all previously known constructional forms. The slight differences in the design are also not critical.

The withdrawal speeds for the bundles of filaments produced according to the invention are in the same range as the withdrawal speeds normally employed in the cellulose-cuprammonium process; i.e. withdrawal speeds of 20 to 120 metres per minute, preferably 60 to 80 m./min.

By residence time, is understood that time which lapses from the closing of the Thiele funnel to the subsequent opening thereof. It is between 1 and 20 seconds, preferably 2 and 10 seconds. By the delay time, is understood that time which lapses from the opening of the Thiele funnel until the starting of the withdrawal, and it is between 0.1 to 2 seconds, preferably between 0.2 and 0.5 second. By withdrawal interval is understood that time which lapses between the commencement of the withdrawal after opening the Thiele funnel until cessation of the withdrawal with a fresh closing of the Thiele funnel, and the withdrawal interval is between 1 and 20 seconds, preferably between 2 and 4 seconds.

The sum of residence time, delay time and withdrawal interval represents the period time, i.e. that time after which the complete cycle is again repeated. It is between 2 and 40 seconds, preferably between 4 and 14 seconds. However, it is changed from period to period by the alteration of the withdrawal interval so that the spacing between the indivdual knops is different.

With a constant ratio between supply capacity and withdrawal speed, that is to say, with the spinning of a filament with a constant count, the spacing from knop centre to knop centre is dependent substantially on the period time, the spacing between the end of one knop to the start of the next knop is dependent substantially on the withdrawal interval and the knop thickness and the knop length and thus the knop volume is substantially depedent on the residence time.

In this way, filaments are obtained which comprise a series of knops, i.e. short thick portions, which follow one another at irregular intervals. Depending on the width chosen for the weaving of the yarn, the knops are thus always distributed irregularly over the surface and the fabric is thereby given a linen-like character.

FIG. 1 shows an apparatus suitable for carrying out the process according to the invention. In the figure, A represents the spinning solution, B the Thiele funnel, C the coagulation water supply, D a foam rubber flap, E an acid roller and F a reel for winding the spun filaments.

Such an arrangement therefore provides a spinning funnel, such as is known for spinning artificial rayon by the cellulose-cuprammonium process, this being the so-called Thiele funnel. This funnel consists of three main parts: the sprinkler head, a cylindrical vessel on which the sprinkler head is mounted and a conical tube inside the cylindrical vesesl into which fall the filaments containing copper salt and discharging from the sprinkler. Arranged above the sprinkler head is a tube section leading to the spinning pump and adapted to be shut off by a valve. Flowing between the wall of the cylindrical vessel and the wall of the conical tube is the coagulation liquid, which usually consists of purified ammonia-containing water, this liquid flowing upwardly from the bottom of the cylindrical vessel and falling simultaneously with the filaments continuously into the conical portion of the device. It is here that coagulation is also effected. Normally, the liquid discharges with the coagulating filaments continuously from the bottom of the conical tube; at its bottom edge, the solidified filament is drawn off at an angle by a withdrawal assembly.

According to the invention, the outlet of the conical tube is briefly closed and opened again by a mechanical device. In order not to damage the coagulated filaments the closure flap is covered with a soft plastic layer to prevent nipping of the filaments. The plastic layer can be made from polyester, polyether or isocyanate foams. However, any other soft elastic covering can be used. After the conical tube is closed, the formation of the knops occurs in this tube, because the spinning pump continues to supply solution and the withdrawal is shut off. Due to the relatively long residence time in the temporarily standing coagulating bath, the forming thickening of the filament is solidified. The volume of the thickened portions on the filament depends on the residence time. After opening the closure flap, the thickened filament with the coagulating liquid descends within the delay time and discharges from the conical tube. Since the withdrawal arrangement has been stopped si-

multaneously with the closure procedure, it being possible to effect this through an electrically controlled magnetic coupling on the winding member, it is necessary after the opening for this winding member to start running again after this delay time. If the withdrawal is effected simultaneously with the opening, an undesired thinning of the filament beneath the knop is produced. Due to the longer residence time of the filament knop in the coagulating bath, this knop has become so solid that it no longer yields to plastic deformation in spite of its gel-like structure, i.e. it can no longer be drawn out. The closing of the funnel cone and the simultaneous stopping of the withdrawal device, as well as the opening of the funnel cone and the somewhat delayed restarting of the withdrawal mechanism, can be effected by means of an electromagnetic regulating member which in its turn receives timing impulses.

Example

The process according to the invention can for example be carried out by spinning a bundle of filaments with a denier of 120 from a cellulose-cuprammonium solution containing 9% of cellulose, 3.8% of copper and 7% of ammonia, in a Thiele funnel 50 to 70 cm. long through sprinklers (91 apertures), the spinning taking place into a spinning bath consisting of salt-free or softened water containing 0.4 g. of ammonia per litre and heated to 37° C. The flow quantity of liquid is 600 cc./min. The filament formed is wound at a withdrawal speed of 60 m./min. on to a reel. The withdrawal is stopped and simultaneously the discharge aperture of the spnning funnel is closed. Within 10 seconds, a thick knop has formed. Shortly after opening the funnel (about half a

second), the withdrawal is started again. The procedure is for example repeated in 2 or 4, 6, 8, 10 and 12 seconds. The withdrawal intervals thus amount to 2, 4, 6, 8, 10 and 12 seconds. The knop then has a thickness of about 1000 denier and the distance from the end of one knop to the start of the next knop along the filament is then about 2 or 4, 6, 8, 10 and 12 m.

The knop filament thus produced is for example shot as a weft filament into a warp. The knops are then distributed irregularly over the surface of the fabric, depending on the width which has been chosen therefor. This fabric is similar to a fabric consisting of natural fibres, for example of linen yarn.

We claim:

1. Process for the manufacture of knop filaments by the cellulose-cuprammonium process which comprises closing, during the spinning process and while the supply of the spinning solution to the spinneret is kept constant the Thiele funnel at the lower end and interrupting simultaneously the withdrawal of the bundle of filaments, opening the Thiele funnel again after a residence time of 1 to 20 second, withdrawing after a short delay the bundle of filaments again, and repeating this operation after irregular withdrawal intervals.

2. Process as claimed in claim 1, wherein the opening and closing of the funnel is coupled to the stopping and restarting of the withdrawal device by way of an electromagnetic mechanism.

References Cited in the file of this patent

UNITED STATES PATENTS

2,125,230 Hofmann ---------- July 26, 1938