Dec. 18, 1934. A. FRIEDERICH ET AL 1,984,472

MANUFACTURE OF ARTIFICIAL THREADS

Filed May 7, 1929

Fig. 1

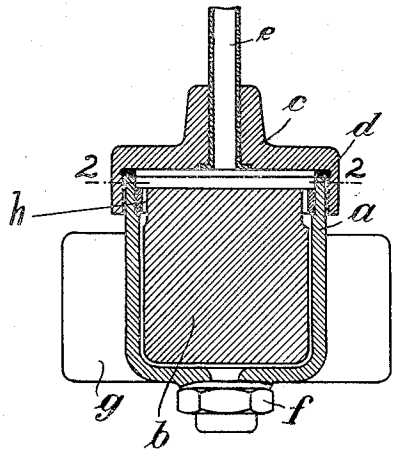


Fig. 3

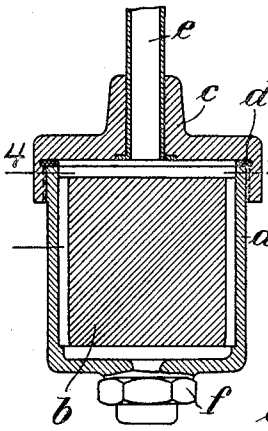


Fig. 5

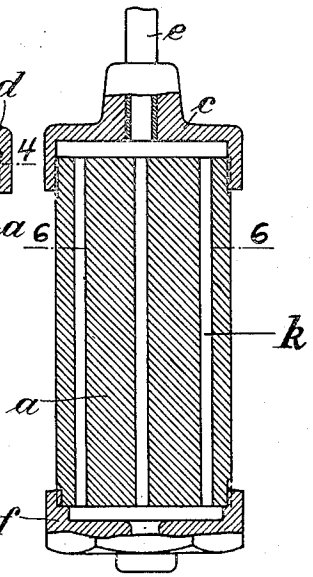


Fig. 2

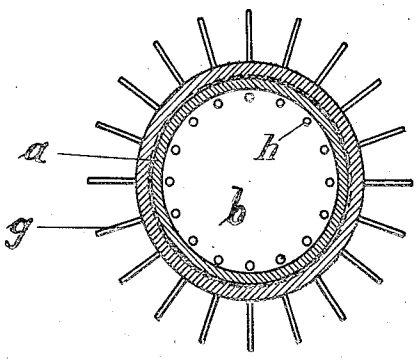


Fig. 4

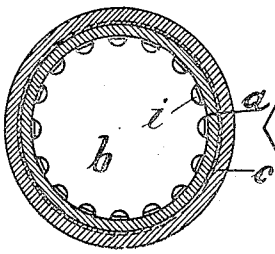
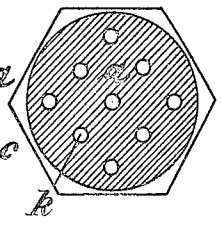


Fig. 6



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UNITED STATES PATENT OFFICE

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MANUFACTURE OF ARTIFICIAL THREADS

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Application May 7, 1929, Serial No. 361,080
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4 Claims. (Cl. 18—8)

This invention relates to a process of and apparatus for avoiding, as far as possible, variations of the titer of the individual threads spun from the nozzle in the dry spinning of artificial threads.

On the way from the reservoir to the spinning nozzle the solution to be spun passes through ducts, pumps, filters and the like which are of different form, mass and surface and exposed to different temperatures, and the passages in them for flow of the solution are of quite different cross sections. It has been recognized that, particularly in the case of highly viscous solutions, these differences in cross section, in surface and therefore in transference of heat cause the solution to partially lose its homogeneity on its way from the reservoir to the nozzle, or at all events to suffer a differentiation in the viscosity of the several layers of the solution, this making itself noticeable in spinning to a more or less injurious extent. When portions of different viscosities arrive at the nozzle at the same time the less viscous solution issues through some of the perforations at a higher speed than that of the more viscous solution issuing from the other perforations. The consequence is the formation of sagging threads in the issuing bundle of threads and in addition variations of the titer of the individual threads, which under some conditions are increased because, in consequence of the loss of homogeneity, the portions of the solution of different viscosities have also different contents of solvent.

This invention minimizes these difficulties in spinning highly viscous solutions by guiding the spinning solution which enters the spinning cell into symmetrically placed streams and in as thin layers as possible along the surface of a body of high heat capacity placed directly above the nozzle. For the desired purpose there is not only question of metallic bodies. In the same manner bodies of porcelain or of any artificial material may be applied. These materials even would have the advantage of higher heat capacity over the metal. This body is at the head of the spinning shaft and is not subjected to variations of temperature. Moreover, it is possible to make its metallic mass so large in comparison with the volume of the spinning solution with which it is to be in contact that small variations in the temperature of the outside atmosphere have no effect. Thus, should the spinning solution enter this equalizing body in a partly non-homogeneous condition its gradual flow along the body serves to homogenize it, so that it arrives at the nozzle in a uniform condition. In this manner a thoroughly uniform spinning of the several threads occurs without formation of sagging threads and variations of the titer of the individual threads.

Apparatus for realizing the invention may be constructed in various ways.

Figs. 1–6 of the accompanying drawing illustrate some of these ways, Figs. 1, 3 and 5 being axial sections and Figs. 2, 4 and 6 corresponding cross sections. The same letters of reference indicate the same parts in all the figures.

Referring to Figs. 1 and 2, two bodies of the highest possible heat capacity are arranged one within the other in such a manner that between them there is a space as narrow as may be for the passage of liquid, the opposite faces of the two bodies having any desired form; for example, as in the case shown, the bodies may be co-axial cylinders.

The outer cylinder *a* of a diameter of, for instance, 5 cm. having comparatively thin walls of a thickness of, for instance, 0.4 cm. is furnished for the purpose of increasing its heat capacity, with external ribs *g*. The massive, inner cylinder *b* is fitted into the outer cylinder and has perforations *h* for entering of the solution into the narrow annular space of a thickness of, for instance, 0.3–0.5 cm. between the two cylinders, these separate streams all issuing through the nozzle *f* connected to the end of the outer cylinder. At the other end of this cylinder the spinning solution enters through the duct *e* fixed in the cover *c*, this latter being screwed on to the cylinder with interposition of the washer *d*.

The form shown in Figs. 3 and 4 is essentially the same as that already described, but the attempt has been made to provide a larger surface of contact for heat exchange with the outer and inner cylinders. For this purpose the inner cylinder is provided with 16 peripheral grooves of a diameter of, for instance, 0.3–0.5 cm. in the axial direction through which the solution flows, the cylinder otherwise fitting closely in the external cylinder *a*.

In the form shown in Figs. 5 and 6, the equalizing body consists of a single piece *a* through which the spinning solution flows by way of 9 bores of the diameter of, for instance, 0.3–0.5 cm. parallel with the axis. Since these bores are narrow in comparison with the mass of the body, the desired homogenizing of the spinning solution is obtained more or less in the same manner as in the other construction.

As mentioned above these homogenizing devices are arranged at the head of the spinning

shaft and they always accept the temperature of the said spinning shaft.

It is obvious that our invention is not limited to the special forms of the homogenizing device as described. Thus, for instance, they may be arranged in combination with a special heating or cooling device in order to heat or cool them at any desired temperature.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A device for equalizing the temperature of the spinning solution before leaving the nozzle comprising in combination a hollow heat conducting body provided with an inlet for the spinning solution, a massive heat conducting body placed in the said hollow body, filling up the latter nearly completely and causing the spinning solution to flow in form of a thin layer between the inner face of the hollow body and the outer face of the massive body, and an outlet on said hollow body bearing the spinning nozzle.

2. A device for equalizing the temperature of the spinning solution before leaving the nozzle comprising in combination a cylindrical heat conducting hollow body provided with heat capacity increasing ribs, and an inlet for the spinning solution, a cylindrical heat conducting massive body, placed in the said hollow body, filling up the latter nearly completely and causing the spinning solution to flow in form of a thin layer between the inner face of the hollow body and the outer face of the massive body, and an outlet on said hollow body bearing the spinning nozzle.

3. A device for equalizing the temperature of the spinning solution before leaving the nozzle comprising in combination a cylindrical heat conducting hollow body provided with an inlet for the spinning solution, a cylindrical heat conducting massive body placed in the said hollow body filling up the latter nearly completely and causing the spinning solution to flow in form of a thin layer between the inner face of the hollow body and the outer face of the massive body, means for asserting the heat exchange arranged on the outer cylinder and an outlet on said hollow body bearing the spinning nozzle.

4. A device for equalizing the temperature of a spinning solution before leaving the nozzle which comprises a body of high heat capacity, placed in the path of the spinning solution directly above the nozzle, of such a character that the spinning solution flows finely distributed over a substantial distance across said body of high heat capacity.

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