Aug. 16, 1932. H. KEMPF 1,871,704

APPARATUS FOR THE PRODUCTION OF STRONG FILAMENTS OF ARTIFICIAL SILK BY THE STRETCH SPINNING PROCESS

Filed July 29, 1927

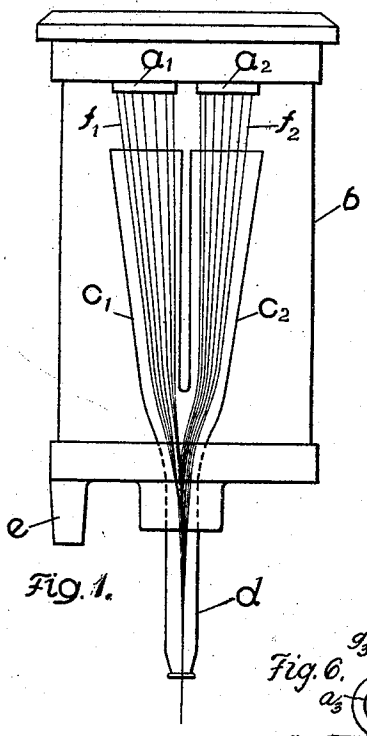

Fig. 1.

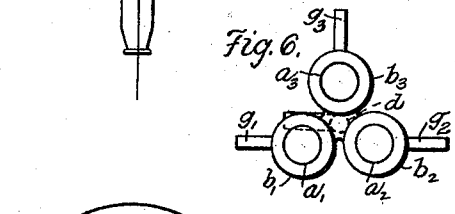

Fig. 6.

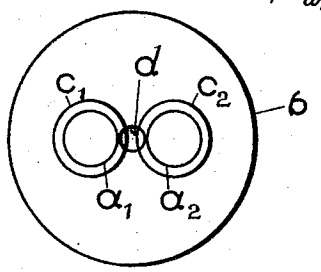

Fig. 2.

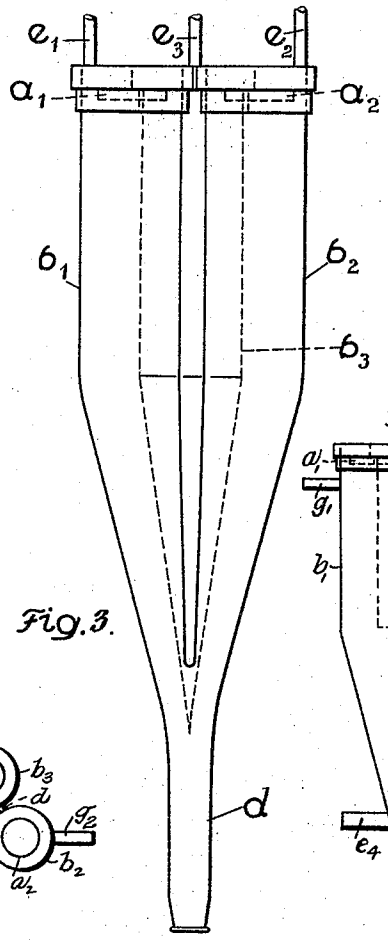

Fig. 3.

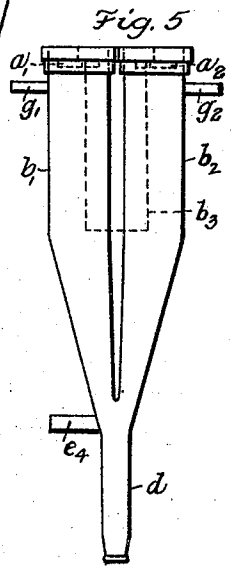

Fig. 5

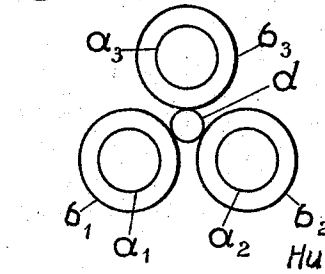

Fig. 4.

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1,871,704

UNITED STATES PATENT OFFICE

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APPARATUS FOR THE PRODUCTION OF STRONG FILAMENTS OF ARTIFICIAL SILK BY THE STRETCH SPINNING PROCESS

Application filed July 29, 1927, Serial No. 209,231, and in Germany August 5, 1926.

The present invention relates to improvements in processes for the production of strong filaments of artificial silk by the stretch spinning process, and particularly by the cupro-ammonium stretch spinning process, as well as to apparatus for carrying out the said process.

In the production of staple filaments it has been suggested to divide larger groups of filaments into smaller groups, but these latter were not afterwards combined so as to form a single thick filament. It has also been suggested to force groups of filaments through numerous nozzles into a tube through which precipitating liquid flowed. For example, 64 nozzle plates were employed, some of which were disposed adjacent to each other and some were arranged over each other around a tube and 14,000 filaments were produced simultaneously. In this case, however, the precipitating liquid flowed in turn to the various groups of nozzle plates arranged over each other, so that owing to variations in the precipitating liquid during the spinning process, the lower filaments were coagulated to a different extent from the upper filaments. Moreover, the groups of nozzles were disposed so closely to each other, that the sticking together of the separate filaments was inevitable. The known process, therefore, did not produce strong filaments of artificial silk, but on the other hand produced a rope of filaments which consisted of separate filaments entangled together. Presumably, this rope of filaments was to serve as raw material for the production of staple filaments.

In contrast to the previous processes, strong filaments of artificial silk are obtained by the present process, in which the separate filaments are prevented from sticking together and lie next to one another without being entangled as in the production of thinner filaments.

In accordance with the invention, strong filaments of artificial silk are produced by forming in a spinning apparatus two or more groups of filaments which are treated and kept separated from each other until the filaments have lost their tackiness, after which the groups of filaments are united to form a single filament and the latter conducted out of the spinning apparatus.

This process has the advantage that the separate groups of filaments need not be made stronger than previously, so that a uniform coagulation of the separate filaments is ensured, whilst if too large a number of individual filaments were joined to form a single group of filaments, the filaments thus produced would not be uniform.

The process in accordance with the invention may be carried out in various kinds of apparatus so long as the spinnerettes are arranged to produce separate groups of filaments which are kept separate from each other while passing through a funnel and are ultimately combined together before being delivered from the apparatus. As many funnels as groups of filaments are being treated may be employed in the spinning apparatus and in which case the funnels lead to a common outlet tube. Also, instead of employing funnels disposed inside an outer casing, this latter may itself have the shape of a funnel and the ordinary funnels omitted. In this form of construction, the casings are provided with a common outlet for the filaments. Suitable vessels of other shapes may also be employed where desirable.

Various forms of apparatus are illustrated diagrammatically by way of example for carrying out the invention, and in which:—

Figure 1 shows an elevation of a spinning apparatus embodying the invention.

Figure 2 is a plan view of the device shown in Figure 1.

Figures 3 and 4 are elevation and plan views, respectively, of a modified form of the improved spinning apparatus.

Figures 5 and 6 are similar views of a further modified form of the improved spinning apparatus.

Referring to Figure 1, two spinnerettes a^1 and a^2, through which the spinning solution may be forced in the manner ordinarily used in the production of filaments while manufacturing artificial thread by the cupro-ammonia stretch spinning process, are provided at the top of the casing b. Within

the casing b is provided a split funnel made up of two separate inlet sections c_1 and c_2 with a common outlet d. The precipitating liquid is admitted through the tube e. The groups of filaments f^1 and f^2 are discharged separately from the spinnerettes a^1 and a^2 and are kept separate as they pass through the funnels c_1 and c_2 up to the point at which the funnels meet the common outlet tube d. In the latter the groups of filaments are united and are conducted in this condition out of the apparatus. A single spinnerette may be employed instead of using two separate spinnerettes so long as the holes in the spinnerette are divided up into separate groups, the number of which latter corresponds to the number of groups of filaments to be produced and may be varied as desired.

In this construction the initial separation of the separate groups of filaments f^1 and f^2 is fully ensured since each group of filaments is conducted through its own particular funnel. The precipitating liquid may also be admitted through a number of tubes and these latter may if desired be provided at the upper edges of the funnels, provided the precipitating liquid is admitted without any considerable amount of turbulence.

Figures 3 and 4 illustrate three separate funnel-shaped casings b^1, b^2 and b^3. The casings are provided with a common outlet tube d. The casings b^1, b^2, b^3 are provided with spinnerettes a^1, a^2, a^3 respectively. The precipitating liquid may be admitted to the apparatus in any suitable manner. Tubes e^1, e^2, e^3 may be employed if desired by means of which precipitating liquid may be admitted separately to the vessels b^1, b^2 and b^3. As illustrated in Figures 5 and 6 an inlet tube e^4 may be disposed in known manner at the junction of the funnels and outlets g^1, g^2, g^3 may be disposed at the top of the vessels b^1, b^2, b^3 respectively. In this latter case the precipitating liquid flows first in the opposite direction to the movement of the groups of filaments and in the same direction from the point at which the groups of filaments are combined.

The various forms of the apparatus described show that the process in accordance with the invention may be carried out independently of the apparatus in any spinning apparatus which permits groups of filaments to be passed through the apparatus separately and then to be brought together during the spinning procedure.

What I claim is:

1. An apparatus for the production of threads of artificial silk, comprising a precipitating apparatus, an extrusion device provided with groups of separate apertures for forming a plurality of individual filaments arranged in groups, said extrusion device being mounted at the top of the precipitating apparatus, and a plurality of funnels disposed beneath said extrusion device to receive said groups of filaments, said funnels having a common outlet for the combined groups of filaments.

2. An apparatus for the production of thread of artificial silk, comprising a casing, a plurality of extrusion devices mounted at the top of said casing, and each provided with a number of apertures for forming a plurality of individual filiments arranged in separate groups, an inlet tube for supplying precipitating liquid to said casing, and a plurality of funnels disposed within said casing to receive said groups of filaments, said funnels having a common outlet for precipitating liquid and for the combined groups of filaments.

3. An artificial silk stretch spinning apparatus for producing threads, comprising a precipitating apparatus, a plurality of spinnerettes arranged to provide a plurality of individual filaments arranged in separate groups, a plurality of funnels, each of which is disposed to receive one of said groups of filaments, said funnels being provided with a common outlet tube for precipitating liquid and for the united groups of filaments, and an inlet tube adapted to supply precipitating liquid to each of said funnels.

4. An artificial silk stretch spinning apparatus for the production of threads, comprising a precipitating apparatus, a plurality of spinnerettes having separate apertures adapted to form a plurality of individual filaments arranged in separate groups, a plurality of funnels each disposed to receive one of said groups of filaments and provided with a common outlet tube for precipitating liquid and for the united groups of filaments, an inlet tube for supplying precipitating liquid positioned at the junction of said funnels and an outlet tube positioned at the top of said funnels for overflow precipitating liquid.

In testimony whereof, I have signed my name to this specification this 15th day of July, 1927.

HUBERT KEMPF.