May 3, 1932. F. FERRAND 1,856,071

MANUFACTURE OF ARTIFICIAL FIBERS

Filed Nov. 22, 1928

FIG. 1

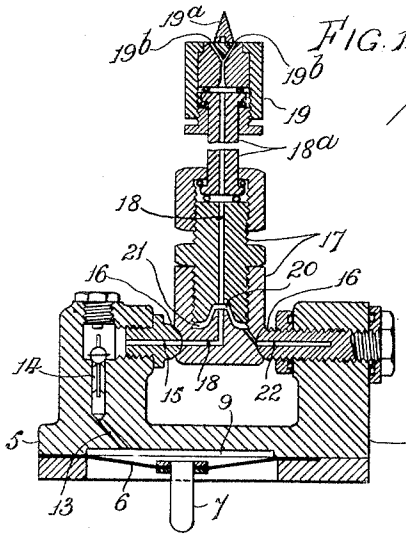


FIG. 2

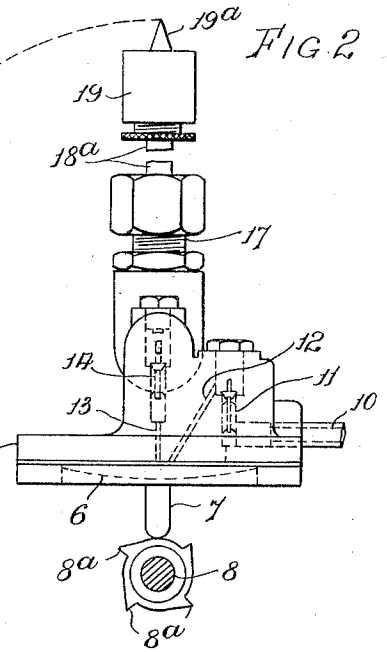


FIG. 3.

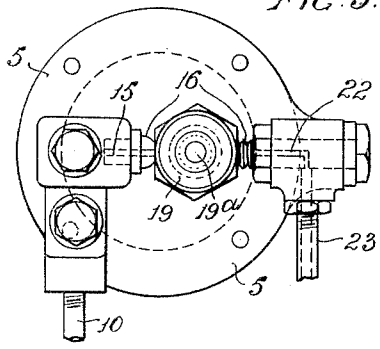
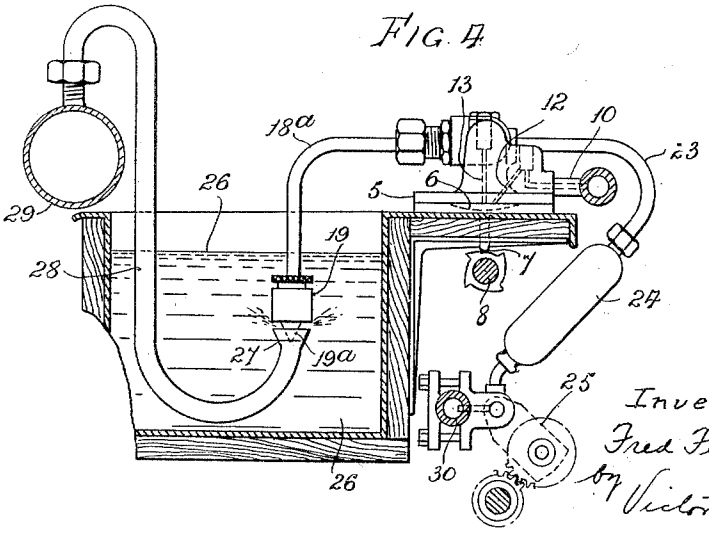


FIG. 4



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Patented May 3, 1932 1,856,071

UNITED STATES PATENT OFFICE

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MANUFACTURE OF ARTIFICIAL FIBERS

Application filed November 22, 1928, Serial No. 321,139, and in Great Britain December 24, 1927.

This invention has reference to the manufacture of artificial fibers and has for its object to provide improved means whereby, in the manufacture of the artificial fibers, e. g., artificial silk or the like, such fiber may be divided into staples of any predetermined length, thereby rendering the fiber suitable for spinning in the manner of, or for mixing or blending with, cotton and other natural or other staple fibers.

According to the invention the column of solution, by which the extrusion nozzle or nozzles is or are fed, is subdivided at regular intervals in such manner that the solution issues from the nozzle or nozzles into the coagulating bath in the form of separated or divided fibers of corresponding length or staple.

The column of solution is conveniently subdivided by the injection thereinto at a relatively higher pressure of a suitable fluid, which is preferably liquid, but may in some cases be gaseous.

One form of apparatus for carrying the invention into effect is illustrated in the accompanying drawings, whereof Fig. 1 is a sectional elevation of the apparatus, Fig. 2 is an elevation thereof taken at right angles to Fig. 1, and Fig. 3 is a plan thereof. Inasmuch as the extrusion jet and the staple-subdividing chamber are formed capable of being turned up out of the operative position, they are so shown in Figs. 1 to 3 for the sake of clarity in illustration. Fig. 4 is a general view, partly in section, of the apparatus shown in conjunction with the coagulating bath and pump.

Referring to the drawings, the apparatus illustrated comprises a circular base 5 to the underside of which is fitted a diaphragm 6 provided with a central peg or tappet 7, the lower end of which rests upon a rotating cam 8 having a plurality of peaks 8^a, the arrangement being such that the rotation of the cam 8 intermittently raises and lowers the diaphragm 6 which thereby acts as a pump.

The diaphragm encloses a chamber 9 which communicates with a water supply pipe 10 by way of an automatic non-return valve 11 and a passage 12. Also communicating with said chamber 9 is a passage 13 leading by way of a second automatic non-return valve 14 into a passage 15 formed in one of two trunnions 16 provided upon the base 5 and upon which is pivotally mounted a barrel or the like 17 having an axial passage 18 connected with said passage 15. The barrel or the like 17 is adapted to be turned out of its normal or operative position, which is horizontal, into an upright position as shown in Figs. 1 to 3.

The passage 18 leads into a pipe or duct 18^a which is coupled at one end to the barrel 17, and at the other end is provided with an extrusion nozzle or spinneret 19, which consists of a cone 19^a, the base of which is surrounded by a number of minute diverging orifices 19^b.

The passage 18 of the barrel is interrupted by a cavity 20 connected with an annular duct 21 which communicates by means of a passage 22 in the second trunnion 16, with a pipe 23, the other end of which is connected through a suitable filter 24 and a measuring pump 25 with a pipe 30 to which the cellulose solution is supplied under pressure.

The extrusion nozzle 19 dips beneath the surface of the usual coagulating bath 26, and partially surrounding the nozzle is arranged the funnel-shaped mouth 27 of a siphon pipe 28 leading to a conduit 29 within which sufficient suction is maintained to draw fluid from the bath thereinto, for the purpose hereinafter described.

In operation, the cellulose solution passes from the pipe 30 by way of the pump 25, filter 24, pipe 23 and the passage 22 to the annular passage 21 and cavity 20 leading to the passage 18. The diaphragm pump 6 draws water from the pipe 10 by way of the valve

11 and passage 12 into the chamber 9 and expels same through the passage 13, and past the valve 14 into the passage 15 whence it issues into the cavity 20 and subdivides the column of cellulose solution entering the passage 18 and flowing by the pipe 18a to the nozzle 19 so that the solution is extruded in form of short or staple fibers of corresponding length.

Short or staple fibers of any desired length may be obtained in the manner described by varying the amount of water injected by the pump 6 into the passage 18 at each interval, or by regulating the speed of the pump so as to vary the frequency with which successive jets of water are injected.

Any suitable liquid, other than water, may be employed to serve as a fluid separator between the divided threads of solution. If desired, the separating fluid may be gaseous.

The fibers issuing from the several orifices of the nozzle 19 are maintained separate by the cone 19a hereinbefore referred to, until they have become sufficiently "fixed" by the coagulating solution to preclude the possibility of their uniting to form a single thread.

As the separated fibers are coagulated they are collected by the funnel-shaped mouth 27 of the siphon pipe 28 along which they are conveyed, together with coagulating solution into the conduit 29 whence they may be treated to remove the excess coagulating solution (which is returned to the bath) and subsequently carded or parallelized as in the treatment of cotton for the production of yarn or thread. Alternatively, the fibers may be treated in any other desired manner, and/or mixed with cotton or other fibers.

What I claim as my invention and desire to secure by Letters Patents is:—

1. The process for the production of staple artificial fibers of predetermined length which consists in forming a column of solution, forcing the column of solution along a passage to an extrusion nozzle, and subdividing the column at regular intervals during its passage to the extrusion nozzle.

2. The process for the production of staple artificial fibers of predetermined length which consists in forming a column of solution, forcing the column of solution along a passage to an extrusion nozzle, and injecting a fluid at predetermined intervals into the passage along which the column is forced.

3. The apparatus for the production of staple artificial fibers of predetermined length comprising an extrusion nozzle, means for supplying a column of solution to said nozzle, a connection between said nozzle and said means having a passage therethrough for the column of solution, and additional means for injecting a subdividing fluid into said passage at regular intervals.

4. The apparatus for the production of staple artificial fibers of predetermined length comprising means for supplying column of solution, an extrusion nozzle, a connection between said nozzle and said means and said nozzle having a passage therethrough for delivering the column of solution to the nozzle, a pump, a connection between the pump and the passage, and means for operating said pump to inject a subdividing fluid into said passage at regular intervals.

In witness whereof I have hereunto set my hand.

FRED FERRAND.