Mar. 27, 1923. 1,450,131

B. BORZYKOWSKI

APPARATUS FOR THE PRODUCTION OF THREADS

Filed June 18, 1920

Fig. 1.

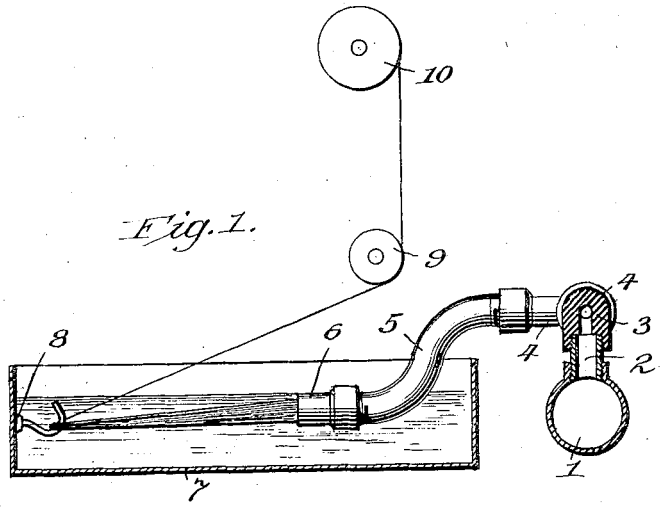


Fig. 3.

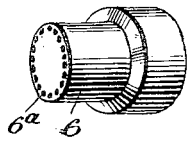


Fig. 2.

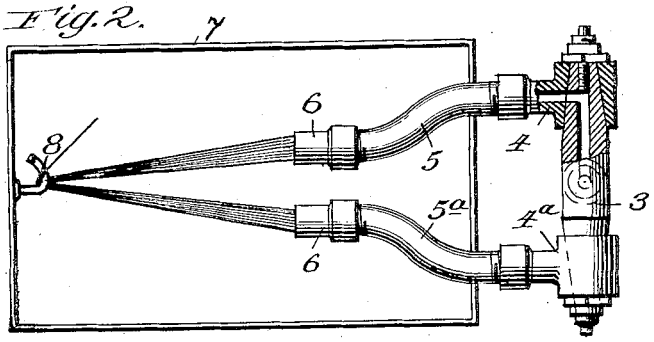


Fig. 5.

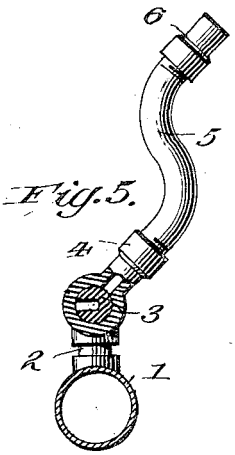
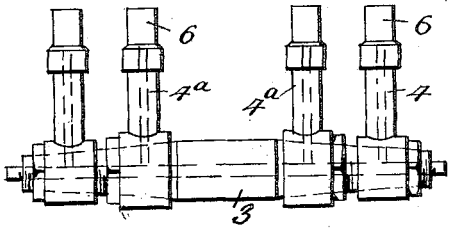


Fig. 4.



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Patented Mar. 27, 1923. 1,450,131

UNITED STATES PATENT OFFICE.

BENNO BORZYKOWSKI, OF PARIS, FRANCE.

APPARATUS FOR THE PRODUCTION OF THREADS.

Original application filed August 31, 1917, Serial No. 189,079. Divided and this application filed June 18, 1920. Serial No. 389,935.

To all whom it may concern:

Be it known that I, BENNO BORZYKOWSKI, a citizen of the Republic of Poland, residing at Paris, France, have invented certain new and useful Improvements in Apparatus for the Production of Threads, of which the following is a specification.

My present invention pertains to an improved apparatus for the production of threads, and more particularly to the formation of the ultimate thread from a number or plurality of capillary fibers or filaments.

In the finest artificial threads hitherto manufactured, the single thread has a thickness of about 7.5 deniers, which has been considered very fine and has heretofore been attainable only by the antiquated and expensive nitro-cellulose process. As a rule, however, the threads are considerably coarser, especially those made by the copper-oxid-ammonium process and the viscose process, the capillary threads being, on an average, of a thickness of from 9 to 10 deniers. While threads of this thickness are suitable for certain purposes, it is nevertheless desirable, and in many cases absolutely necessary, to have still finer threads.

I have found that even by the latest viscose process, which is becoming more and more general, threads of even 5 deniers and below can be secured when, for the production of the artificial threads, nozzles are used which have as many and as fine holes as it is practicable to make and accommodate in a spinning nozzle, or when two or more such spinning nozzles are arranged so close together that the fine threads discharged from them can be united in a bundle in the smallest possible radius and wound up on a spool or the like with the greatest possible tension.

It is also important that all the threads discharged from the nozzles be drawn off and wound up, as far as practicable, in a right line, in order that no sharp bends may be formed and no excessive tension exerted on any of the capillary threads.

The invention is illustrated in the accompanying drawings, wherein,—

Fig. 1 is a transverse vertical sectional view of the apparatus;

Fig. 2 a top plan view thereof;

Fig. 3 a perspective view of one of the nozzles illustrating the plurality of openings employed;

Fig. 4 a plan view showing a plurality of nozzles; and

Fig. 5 a side elevation of one of the nozzles turned upwardly into its closed position.

Referring to Figs. 1 and 2, 1 denotes the supply pipe from which the material to be spun is forced through a tube 2 into a head or spigot member 3. On said head is mounted one or more swinging cocks 4 and 4^a, the bores in the head and the cocks being such that they register when the cocks are turned downwardly and are closed off when the cock is turned upwardly, as in Fig. 5. The cocks have tubular extensions 5 and 5^a attached thereto, and said tubes being formed or curved so that they extend downwardly and inwardly, their extremities lying fairly close together. At the outer end of each of said members there is detachably secured a spinning or extruding nozzle 6. The outer end of each nozzle is provided with a multiplicity of fine holes or openings 6^a, the diameter of each opening being 0.1 mm. or even less, if possible.

The main supply pipe is arranged adjacent a tank 7 so that when the apparatus is in operation the nozzles may be submerged in the setting bath contained in the tank. Secured to the tank, remote from the nozzle, is a hook-shaped member 8, preferably formed of glass.

The purpose of the downward bend or curvature of the tubular extensions 5 and 5^a is to maintain the threads, extruded from the nozzles, submerged in the bath as they pass rearwardly in a substantially straight line through the bath to the hook 8.

The inward curvature is required only when the threads discharged from two or more nozzles are to be united in a single bundle and wound upon a single spool. By so arranging the parts the threads are brought together within a small radius, each capillary thread being given practically the same tension on being drawn off.

Located above the tank is a drawing-off cylinder 9, and above said cylinder is a spool 10, said cylinder and spool being positively driven and the spool having a speed or take-up capacity in excess of that of the cylinder, so as to put the thread bundle under tension between the drawing off cylinder and the spool as the bundle is wound, as will presently appear.

The operation is as follows:

From the tube 1 the material to be spun is forced by any suitable means, as air pressure in the supply tank, through tube 2, head 3, cocks 4, 4ª (which are then turned down and are open) into pipes or tubes 5 and 5ª, and through the minute orifices or openings in the nozzles 6. The extruded filaments or minute threads pass through the setting bath and come together and pass about the glass hook 8, being then carried back beneath the drawing cylinder 9, and finally onto spool 10. The nozzles stand, by reason of the bend or curvature in pipes 5, 5ª, in substantial alinement with hook 8, so that the extruded filaments are carried or drawn back in a substantially straight line through the bath to the hook.

By the arrangement set forth the filaments as above noted, are brought together within a small radius, and each filament or capillary thread is given the same tension on being drawn off.

The use and arrangement of the cylinder 9 is of great importance. The capillary threads as they pass from the nozzles and through the setting or coagulating bath are very fine and tender, and the use of the cylinder allows a very strong tension to be placed or exerted on the threads throughout the whole bundle, without excessively stretching any single thread, which would tend to break or disrupt the same. Said cylinder 9, being driven separately, it is possible to reduce the tension on the threads in the bath, and at the nozzle, to a minimum and to regulate it at will. The stretching proper of the whole bundle of threads does not take place until they pass from the cylinder 9 to the spool 10, more meters being wound up per minute on the spool 10 than the cylinder 9 has conveyed out of the setting bath 11. For instance, when the number of revolutions of the cylinder 9 is such that it supplies forty meters per minute, while the spool 10 rotates at such speed as to wind up fifty meters a minute, the plastic thread will be stretched twenty-five per cent.

In spinning processes in which no setting baths are used, but gases, air, or the like are employed for the purpose of coagulating the discharge threads, the tube sections need not have the curved form shown in Fig. 1, but may be straight, as shown in Fig. 4, provided the threads run to the spool in a substantially straight line.

The multi-spinning apparatus as above outlined answers the purpose of a doubling frame, and saves a great deal in the way of wages and waste. It has heretofore been customary to produce artificial threads of 100 or 150 deniers and then to unite two or more such threads; after having been finished, into a thick thread on a separate doubling frame. With the apparatus above described, however, the use of a separate doubling frame is avoided and threads of the highest degree of fineness may be produced from a number of very fine capillary threads or filaments.

This application is a division of my application Serial No. 189,079, filed on or about the 31st day of August, 1917.

What is claimed is,—

1. In a spinning apparatus for producing artificial threads, the combination of a supply pipe or main; a plurality of swinging cocks connected thereto and in communication therewith; a spinning nozzle carried by each cock; and winding mechanism adapted to receive the threads discharged from said nozzles, whereby the flow of material from one or more of the nozzles may be shut off as desired.

2. In a spinning apparatus for producing artificial threads, the combination of two swinging cocks; a pipe connected to each cock, the outer ends of said pipes lying adjacent to each other and in substantial parallelism; and a nozzle secured to the outer end of each pipe, whereby the material extruded from the nozzle may be projected into a setting bath in a straight line.

3. In a spinning apparatus for producing artificial threads, the combination of a supply pipe; a pair of swinging cocks in communication therewith; a pipe connected to each cock, said pipes being curved downwardly and inwardly so that their ends lie in substantial parallelism; and a spinning nozzle secured to each pipe, whereby the threads may be discharged from the nozzles within the smallest possible radius so as to facilitate their being united into a bundle.

4. In a spinning apparatus for producing artificial threads, the combination of a nozzle adapted to discharge the material into a coagulating medium; means for guiding the thread as it passes from the coagulating medium; a driven cylinder adapted to place tension upon the thread as it passes from said medium; and means for subjecting the thread after it leaves the cylinder to a stretching action.

In testimony whereof I have signed my name to this specification.

BENNO BORZYKOWSKI.