No. 702,163. Patented June 10, 1902.

R. W. STREHLENERT.

APPARATUS FOR SPINNING ARTIFICIAL SILK FILAMENTS FOR FORMING STRANDS OR THREADS.

(Application filed Feb. 24, 1897.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 1.

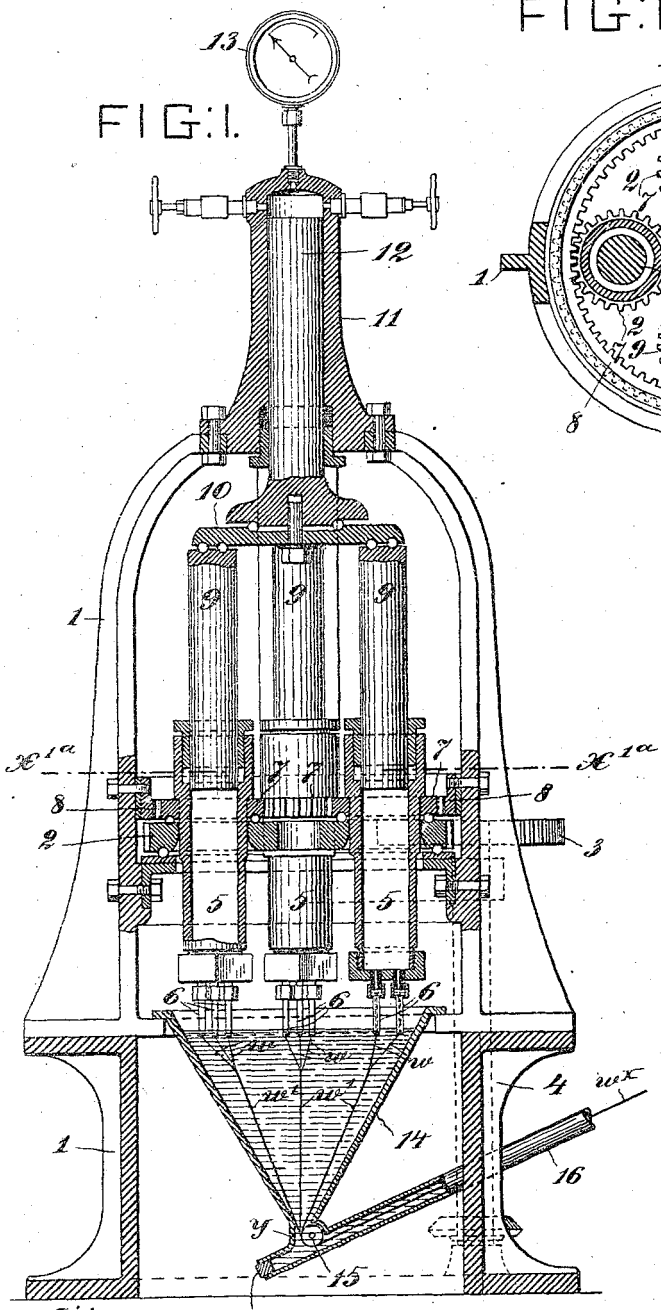


FIG. 1a

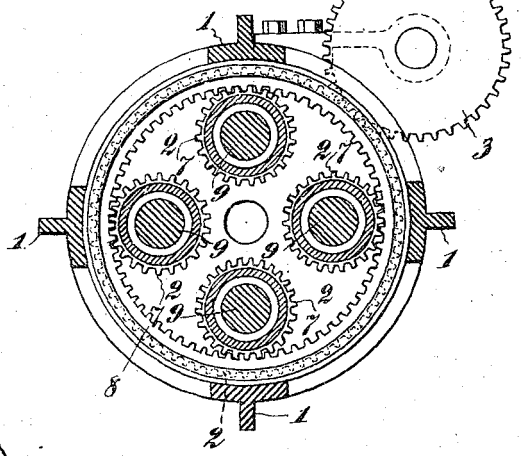
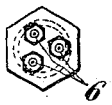


FIG. 1b



Witnesses:
F. A. Tilman
Peter A. Ross

Inventor.
Robert W. Strehlenert
by Henry Connett
his Attorney

No. 702,163. Patented June 10, 1902.

R. W. STREHLENERT.

APPARATUS FOR SPINNING ARTIFICIAL SILK FILAMENTS FOR FORMING STRANDS OR THREADS.

(No Model.) (Application filed Feb. 24, 1897.) 2 Sheets—Sheet 2.

FIG: 2.

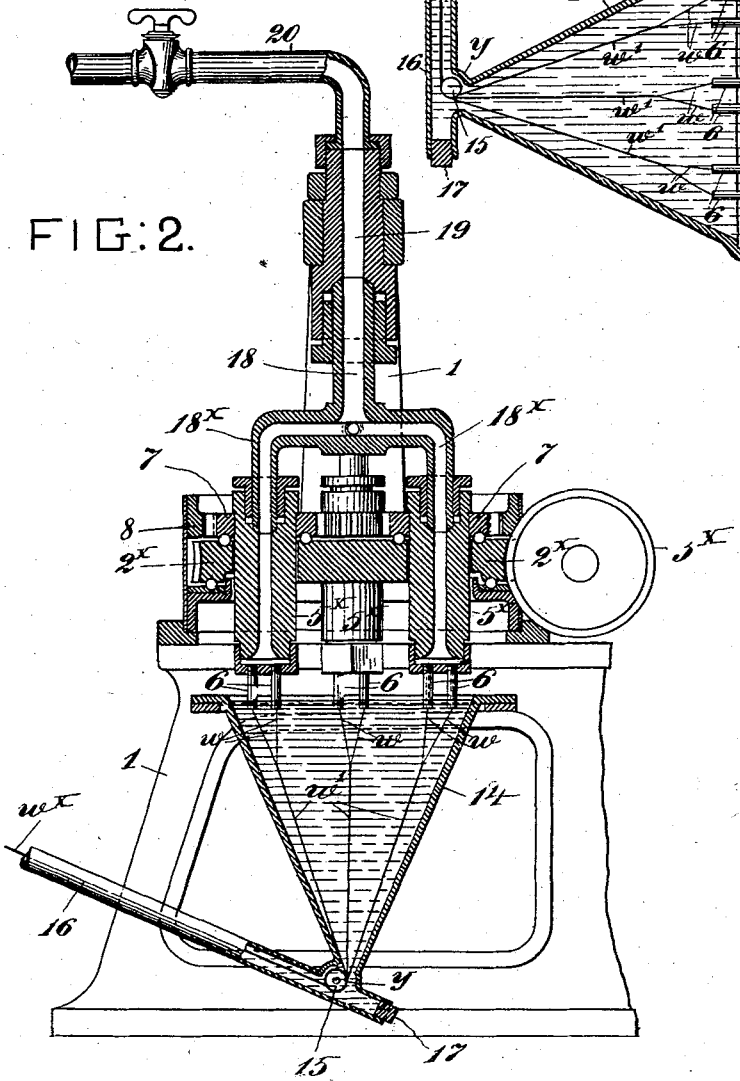
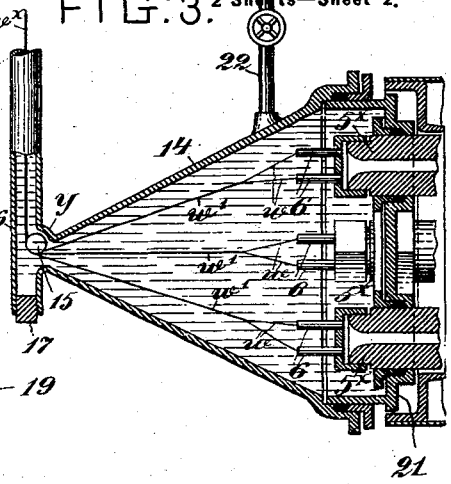


FIG: 3.



Witnesses
J. H. Hinman
Peter A. Ross

Inventor.
Robert W. Strehlenert
by Henry Connett
his Attorney.

UNITED STATES PATENT OFFICE.

ROBERT WILHELM STREHLENERT, OF STOCKHOLM, SWEDEN.

APPARATUS FOR SPINNING ARTIFICIAL-SILK FILAMENTS FOR FORMING STRANDS OR THREADS.

SPECIFICATION forming part of Letters Patent No. 702,163, dated June 10, 1902.

Application filed February 24, 1897. Serial No. 624,848. (No model.)

To all whom it may concern:

Be it known that I, ROBERT WILHELM STREHLENERT, a subject of the King of Sweden and Norway, residing at Stockholm, in the Kingdom of Sweden, have invented certain new and useful Improvements in Apparatuses for Spinning Artificial-Silk Filaments to Form Strands or Threads, of which the following is a specification.

This invention relates to the manufacture of artificial-silk strands and threads from liquid or semiliquid substances or solutions now well known.

According to the modes usually practiced, so far as I am aware, the filaments or threads forced by pressure from the mass and which are rather fragile are apt to be broken between the mouthpiece or spinneret of the apparatus and the bobbin on which it is to be finally wound and usually near said mouthpiece. Such breakage occurring so frequently, as it does, makes it practically impossible to keep the apparatus in continuous operation, and by reason of the difficulty in getting hold of the broken filament and attaching it to the bobbin much time is wasted and the resulting product is the less satisfactory and the more expensive by reason thereof.

The object of the present invention is to overcome the difficulties named above, all as will be hereinafter set forth.

The accompanying drawings illustrate the apparatus employed and embodying the invention.

Figure 1 is a vertical axial section of the apparatus as adapted for successive or intermittent operations. Fig. 1^a is a sectional plan of one-half of this apparatus, taken in the plane indicated by line x'^a in Fig. 1; and Fig. 1^b is an end view of a group of mouthpieces. Fig. 2 is a similar section to Fig. 1, showing the apparatus constructed and adapted for continuous operation. Fig. 3 is a fragmentary sectional view illustrating a construction where the action of the pressure is in a horizontal direction.

Referring first to Figs. 1 and 1^a, 1 is a suitable frame in which is mounted horizontally a large gear-wheel 2, which is driven from a gear-wheel 3 on an upright shaft 4 from any source of power. Mounted rotatively in the wheel 2 are upright cylinders 5, four of such being here shown, although the number is not restricted. There may even be one with rotary motion around its own axle. Each cylinder 5 has a mouthpiece or mouthpieces with one or more holes 6, preferably two or more, from which the filaments w issue, and each cylinder has fixed on it a toothed gear wheel or pinion 7, which gears with internal teeth on an annular rack 8, fixed in the frame 1. When the wheel 2 is driven, the cylinder 5 is carried around its own axle or concentrically with the machine-axis, and when there are more cylinders each cylinder is at the same time rotated about its own axis. The mouthpiece or mouthpieces 6 being arranged about the cylinder-axis, as seen in Fig. 1^b, revolve about said axis when the cylinder rotates.

Each cylinder 5 has a plunger 9, which is free to rotate with its cylinder. A plate or disk 10, resting on the plungers, revolves with them, each plunger rotating independently, however, under the plate and about its own axis. Above the plungers is a hydraulic cylinder 11, the plunger 12 of which has its head loosely coupled to the disk 10, so that the plunger 12 need not rotate. To lessen the friction, there may be ball-bearings between the several superimposed parts, as shown in Fig. 1.

In the operation a charge of the solution from which the silk filaments w are to be formed is introduced into the cylinders 5, the plungers placed therein, and water or other liquid under pressure admitted to the hydraulic cylinder 11 above its plunger 12. A suitable manometer or pressure-gage 13 enables the operator to regulate the pressure. The filaments w are formed by the solution being forced out through minute apertures in the mouthpieces 6.

Below the cylinder or cylinders 5 is situated a reservoir 14, preferably of hopper shape and containing a liquid—as water, for example—into which the mouthpieces 6 dip, as indicated. The filaments from each group of mouthpieces are twisted together in the liquid to form strands w' and then converge to a point y at the bottom of the reservoir, where they pass over a sheave 15 or any fixed point and change direction. At the point y the strands are twisted and the thread $w^{\times}$, which they form, is led off through a tube 16 to the bob-

bin, on which the thread is wound. This bobbin is not shown.

By the means herein described, which form a part of the present invention, the filaments are twisted before they are wound, and any filaments which may be broken will be caught by an adjacent filament or filaments and twisted in, thereby avoiding the necessity of stopping the apparatus. This proper catching of a broken filament is partly due to the revolutions of the cylinders and their axial rotation and partly due to the rotation of the filaments in the water, which itself rotates to a considerable extent, motion being imparted to it by the mouthpieces 6, submerged or dipping therein. The water prevents the broken strand from being thrown out radially; but the water or liquid is not absolutely necessary to the automatic reparation by the catching of the broken filament. Good results can be attained without it.

The water in the open reservoir 14 may be supplied and renewed in any convenient manner. It washes the filaments, and when desired it may be drawn off by the removal of the plug 17.

In the construction of Figs. 1 and 1ª just described the solution is used in successive charges; but it may be supplied in a continuous manner to the mouthpieces. An apparatus for such continuous operation is illustrated in Fig. 2, which will now be described. The large gear-wheel $2^{\times}$, which carries the cylinder or cylinders $5^{\times}$, is in Fig. 2 represented as a worm-wheel driven by a worm or screw $3^{\times}$; but this is not essential. The cylinder or cylinders have no pistons or plungers, but receive, respectively, at the upper or their upper ends through suitable stuffing-boxes the branch or the several branches $18^{\times}$ of a tubular spider 18, the central branch of which has a bearing in a stuffing-box in a tubular socket-piece 19, fixed in the frame. The solution for producing the filaments of artificial silk is supplied to this socket-piece 19 through a pipe 20, being supplied from some source under pressure and not herein shown, and it passes down through the spider 18 and its branches to the cylinder or several cylinders, and thence to the mouthpiece with one or several holes or several mouthpieces 6. In other respects the construction and operation are substantially the same as that seen in Fig. 1.

In the constructions of Figs. 1 and 2 the direction in which the solution flows through the apparatus is downward vertically, the revolving and rotating parts moving about vertical axle or axes, and this is the preferred arrangement, as it permits the use of a simple open reservoir 14; but the apparatuses seen in Figs. 1 and 2 might be so modified that the moving parts would rotate about inclined or horizontal axes. This arrangement is sufficiently well illustrated in Fig. 3, which is a fragmentary illustrative sectional view showing a horizontal arrangement.

The construction of Fig. 3 is based on that of Fig. 2 and differs therefrom in substance only in the cylinders $5^{\times}$ having packed bearings in a disk 21, which forms a cover for the end of the reservoir 14, said cover having a packed bearing on the said reservoir. The latter has a filling-inlet 22 at its upper side. Obviously this construction is not so simple as that seen in the other views.

The words "revolution" and "revolving" are herein used to express the movement of several bodies about a common center and the words "rotation" and "rotating" to express the idea of the movement of a body about its own axis or center.

Having thus described my invention, I claim—

1. An apparatus for making artificial silk having a reservoir of liquid in which the mouthpiece on the twisting mechanism is submerged, substantially as set forth.

2. An apparatus for making strands of artificial silk from a solution, having a mouthpiece with holes or a group of mouthpieces adapted to revolve about a common center, means for revolving said mouthpiece or mouthpieces, means for supplying the solution to said mouthpiece or mouthpieces, whereby the filaments produced from the mouthpiece or mouthpieces are twisted together in a continuous manner as fast as, and immediately after they are produced, and a reservoir containing a liquid in which said mouthpiece or mouthpieces revolve, whereby the operations are carried on in a liquid medium.

3. An apparatus for making strands of artificial silk from a solution comprising a mouthpiece with holes or a plurality of mouthpieces or groups of mouthpieces adapted to revolve about a common center, the mouthpiece or mouthpieces of each group being also adapted to revolve about a common center, means for effecting said revolutions, means for supplying the solution to said mouthpiece or mouthpieces, and a reservoir containing a fluid arranged adjacent to said mouthpiece or mouthpieces and in which the mouthpiece or mouthpieces are submerged during their operation, substantially as set forth.

4. In an apparatus for producing strands of artificial silk from a solution, the combination with a suitable frame and an annular rack 8, fixed therein, of a toothed gear-wheel, mounted rotatively in the frame concentric with the rack 8, means for rotating said gear-wheel, a cylinder or plurality of cylinders mounted rotatively in said gear-wheel and when more than one cylinder each provided with a pinion in gear with the rack 8, a mouthpiece or group of mouthpieces 6 on the end of each cylinder, and means for supplying the solution of artificial silk to the mouthpiece or mouthpieces through the cylinder or respective cylinders, substantially as set forth.

5. In an apparatus for producing strands of artificial silk, the combination with a suitable frame and an annular rack 8, fixed therein,

of a toothed gear-wheel, mounted rotatively in the frame concentric with the rack 8, means for rotating said gear-wheel, a cylinder or plurality of cylinders mounted rotatively in said gear-wheel and when more than one cylinder, each provided with a pinion in gear with the rack 8, a mouthpiece or group of mouthpieces 6 on the end of each cylinder, means for supplying the solution of artificial silk to the mouthpiece or mouthpieces through the respective cylinder or cylinders, and a reservoir 14, arranged adjacent to said mouthpiece or mouthpieces whereby they are adapted to revolve in a liquid contained therein, said reservoir having an outlet at its lower part for the thread, substantially as set forth.

6. In an apparatus for the production of strands of an artificial silk from a solution, the combination with a suitable frame, a press mounted in the same and having a plunger 12, a plate or disk 10, coupled loosely to said plate, and an annular rack 8, fixed in the frame, of a gear-wheel 2, mounted rotatively in the frame concentric with said rack, a cylinder or plurality of cylinders 5, mounted rotatively in said gear-wheel 2 and when more than one cylinder, each provided with a pinion 7, in gear with the rack 8, plungers 9 in the respective cylinder or cylinders, the plate 10 bearing thereon, means for driving the gear-wheel 2, mouthpiece or mouthpieces 6 in the ends of the cylinder or respective cylinders and supplied therefrom, a liquid-reservoir 14, adjacent to and embracing the mouthpiece or mouthpieces, whereby the latter are adapted to revolve in the liquid in said reservoir, and the tube 16, connected with the lower part of the reservoir for conducting away the thread.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ROBERT WILHELM STREHLENERT.

Witnesses:
ERNST SVANQVIST,
E. HERMANSSON.