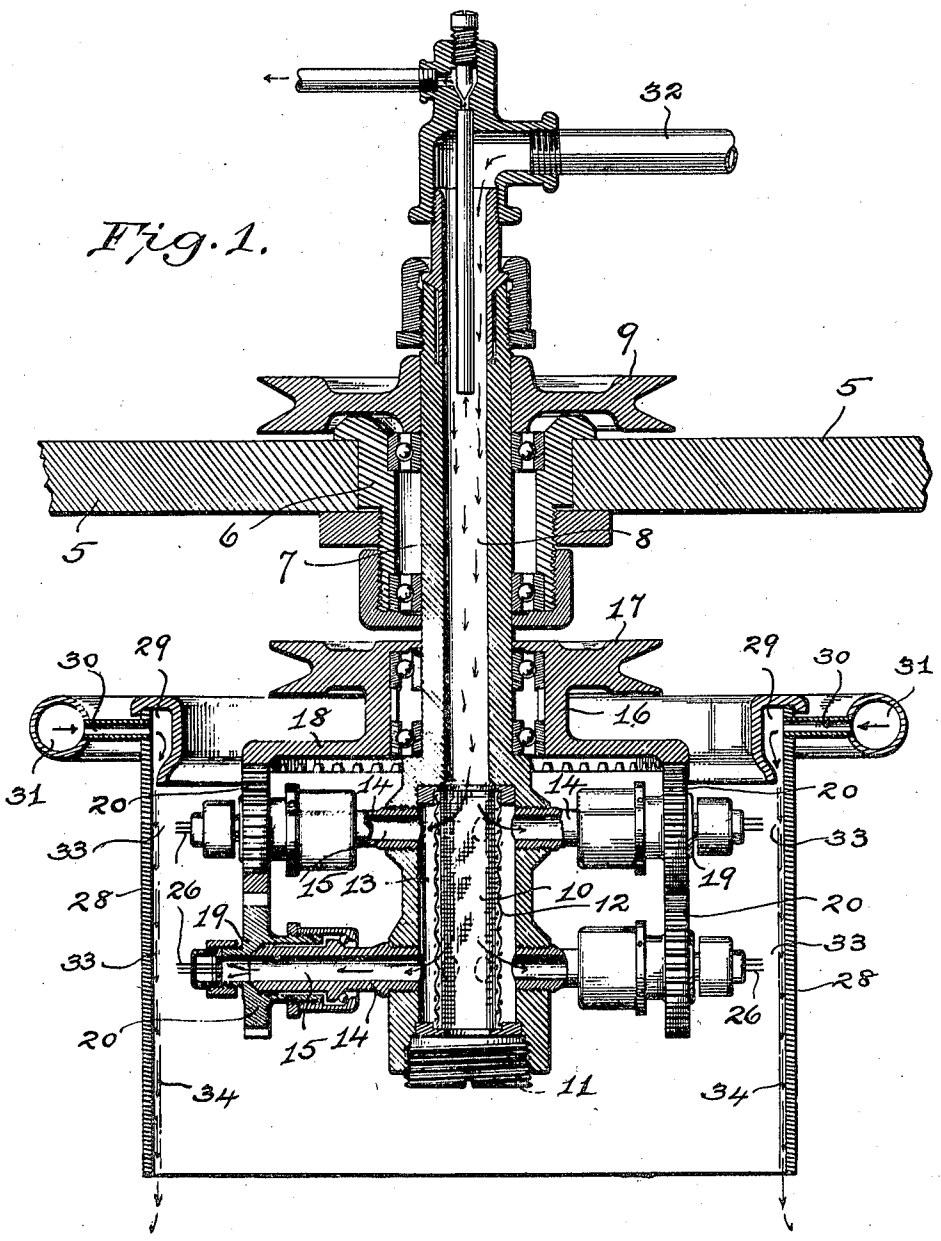
July 8, 1924. 1,500,930

J. P. HOOPER

APPARATUS FOR FORMING AND TWISTING THREADS

Filed April 18, 1922 2 Sheets-Sheet 1

Fig. 1.



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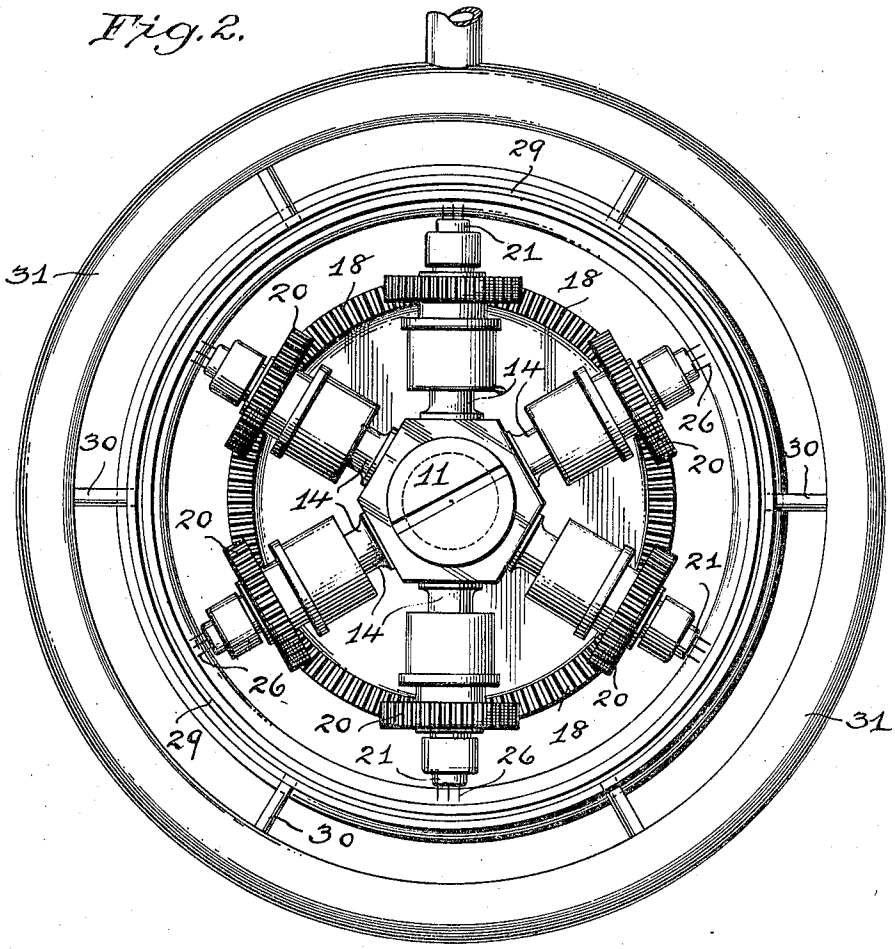
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Filed April 18, 1922 2 Sheets-Sheet 2

Fig. 2.



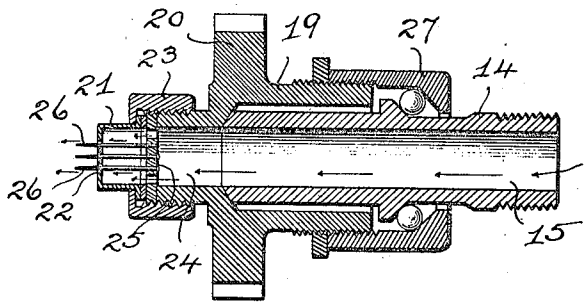


Fig. 3.

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UNITED STATES PATENT OFFICE.

JAMES P. HOOPER, OF RUXTON, MARYLAND, ASSIGNOR TO JAMES P. HOOPER MANUFACTURING COMPANY, OF BALTIMORE, MARYLAND, A CORPORATION OF MARYLAND.

APPARATUS FOR FORMING AND TWISTING THREADS.

Application filed April 18, 1922. Serial No. 554,723.

To all whom it may concern:

Be it known that JAMES P. HOOPER, a citizen of the United States, residing at Ruxton, in the county of Baltimore and State of Maryland, has invented certain new and useful Improvements in Apparatus for Forming and Twisting Threads, of which the following is a specification.

This invention relates to an improved apparatus for producing threads from viscose or equivalent substances.

An object of the invention is to provide an improved structure whereby the viscose or other solution may be ejected in the form of threads by centrifugal force.

Another object of the invention is to provide an improved structure whereby a spinneret may be given an orbital movement to centrifugally eject a thread-forming solution in a series of strands and to simultaneously twist those strands into a thread.

A further object is to provide a simple and compact structure whereby numerous threads may be formed each from a series of strands and all set within a single shell through which a setting solution is passed.

A still further object is to provide a series of orbitally moving spinnerets each discharging a plurality of thread-forming strands,—the strands from each spinneret being twisted together and stretched and set so as to form a thread from each of the spinnerets.

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

Fig. 1. shows an apparatus in vertical longitudinal section and disclosing one embodiment of the invention.

Fig. 2. illustrates the same in inverted or bottom view, and

Fig. 3. shows an enlarged longitudinal sectional detail through one of the orbitally-movable spinnerets.

Referring to the drawings the numeral 5, designates a supporting member in which a bearing block 6 or equivalent device is sustained, and through which latter a spindle 7 extends so as to be capable of revolution. The spindle is tubular and therefore has a central passage 8.

A pulley 9, is carried on the spindle whereby the latter may be readily revolved.

The lower end of the spindle is provided, in this instance, with an enlarged chamber 10, the end of which is closed by a screw-plug 11 so that, by the removal of the plug, ready access may be gained to the interior of the chamber for cleaning and other purposes.

In the present instance I provide the interior of the spindle-chamber 10, with a cylindrical screen 12 of such diameter as to form an annular chamber 13 around its outer circumference, and this screen is readily clamped in place by the screw-plug 11.

Around the chambered portion of the spindle I provide a series of radially-extending hollow stems 14, each of which has a central passage 15 whose inner end opens into the annular chamber 13.

The number of hollow stems employed may vary as the scope of the invention is such as to include the use of one or more of such stems. In some instances however I may employ a series of radial stems all arranged in a single plane about the spindle, but in the present instance I disclose an apparatus employing two series of radial stems. This however is a matter of choice and may be varied at will.

In the present disclosure of the invention I have elected to show the spindle as extending vertically with the chambers 10 and 13 at the lower end thereof and the two series of radial stems extending horizontally from the chambered end of the spindle with one series of stems arranged in a horizontal plane about the other and each series comprising six stems.

About the spindle 7, I provide a bushing 16, to which a pulley or other driving device 17 is attached and this bushing carries a circular rack or ring-gear 18 which encircles the spindle 7.

The pulley 17, bushing 16 and ring-gear 18 are all designed, in this instance, to be revolved about the spindle 7, and while they may be revolved in the same direction as the spindle, I prefer that they be revolved in a reverse direction with respect to said spindle for purposes that will presently be better understood.

The outer end of each radial stem 14 carries a rotatable spinneret head 19 and each head is provided with a pinion 20. The end of each spinneret-head carries a spin-

neret proper 21 which latter has the form of a thimble and is provided with a series of fine perforations 22.

In this instance the spinneret proper 21, is clamped against the head 19 by a clamping-collar 23, and the head has a central passage 24 which alines with the passage 15 of the stem 14.

By preference I locate a perforated disk 25 in the passage 24 at the inner side of the spinneret 21 and this disk is also held in place by the clamping collar.

The disk 25, forms an inner support for a series of needles 26 which extend laterally from the disk and project freely through the perforations 22 in the spinneret proper and extend on the outer side of said spinneret, as best seen in Fig. 3 of the drawings.

In carrying out my invention I provide for rotating the spinnerets 21 about the ends of the stems 14, and to facilitate the revolution I provide antifriction devices 27.

By referring to Fig. 1, it will be noted that the pinions 20 on the series of spinnerets immediately beneath the ring-gear 18, all mesh with that gear so that as the spindle 7 is revolved and the upper series of stems are swung around in a horizontal plane, the spinnerets will be revolved because of the engagement of the pinions 20 with the ring-gear. It is clear therefore that the spinnerets are given an orbital movement in that they rotate in a horizontal plane around the axis of the vertical spindle and are simultaneously revolved in a vertical plane during their horizontal travel.

By revolving the ring-gear 18 in one direction and revolving the spindle and the stems in a reverse direction the spinnerets may readily be rotated at a high speed.

The lower series of spinnerets have their pinions meshing with the pinions on the upper series of spinnerets whereby the said lower series of spinnerets are also given an orbital movement.

It is to be understood that the spindle is to be revolved at a high speed in order that the thread-forming solution fed down through the spindle may be discharged through the stems and spinnerets by the centrifugal force set up by the rapid rotation.

By thus discharging the solution through centrifugal force I am able to avoid the use of force pumps, the expense of the latter and all the objectionable features incident thereto.

About the circular series of spinnerets I locate a tubular shell 28 on the interior of which the spindle and the spinnerets all revolve. This shell is provided with an annular channel 29 on the interior into which a series of supply-tubes 30 enter from a circular pipe 31 so that a continuous stream of setting solution may be supplied to the annular channel 29 and delivered by the latter, in the form of an annular wall of solution, to the interior of the shell. The solution will thus flow continuously down the interior wall of the shell but will be spaced from the ends of the spinneret needles 26 which are rapidly revolved as they travel about the interior of the shell.

The operation is as follows:

Viscose or similar thread-forming material is fed by a pipe 32, into the upper end of the spindle 7 and flows downwardly through the latter to the chamber 10 where the cylindrical screen 12 is located.

As the spindle and the lateral stems 14 are revolved at a high speed the fluid material on the interior of the screen 12, will flow, because of the centrifugal force set up, through the screen which filters and breaks up the material as it passes therethrough into the outer chamber 13.

From the outer chamber 13 the fluid material is thrown laterally through the passages 15, of the stems 14 and also through the perforations in the disks 25 to the interior of the hollow spinnerets proper 21.

The material in the spinnerets is not only swung around with the spindle and the stems but is rotated with those spinnerets because of the orbital movement imparted to the latter.

From the interior of the spinnerets the material will flow along the series of needles 26 and pass out through the fine perforations 22 in the spinnerets in the form of fine strands which strands, upon leaving the ends of the needles, will be thrown across the air-gap or space at 33 which intervenes between the needle-ends and the annular wall of setting solution which is indicated by the broken line 34 at the inner circumference of the shell 28. As the fine strands enter the downwardly-flowing setting solution they travel, so to speak, behind the spinneret from which they were discharged and are thereby subjected to a longitudinal tension which stretches them and at the same time the series of strands from each spinneret are twisted together because of the revolution of the spinnerets during the continuous discharge.

The operation of the several spinnerets is such that each will form a twisted thread that is separate and independent of the threads formed by the other spinnerets so that numerous threads may be simultaneously formed and set by the plural spinneret structure from the one spindle and within the one encircling shell.

Having described my invention, I claim,—

1. A mechanism for forming threads including a spinneret having a thread-discharge outlet, means for supplying a thread-forming material to the spinneret and

means for rotating the spinneret and simultaneously moving the rotating spinneret through a circular path to impart an orbital movement thereto while the material is being discharged in the form of a thread.

2. A mechanism for forming threads including a spinneret having a series of discharge outlets, means for supplying a thread-forming material to the spinneret, means for moving the spinneret through one circular path to eject strands of the material therefrom by centrifugal action, and means for moving said traveling spinneret through another circular path to twist the strands after the same are ejected.

3. A mechanism for forming threads from a viscous substance including a spinneret having a series of discharge outlets, means for supplying a viscous substance to said spinneret, means for imparting an orbital movement to the spinneret to centrifugally discharge the substance in the form of strands and to twist the strands together and means for setting the strands.

4. A mechanism for forming threads including a plurality of spinnerets, means for supplying a thread-forming substance to said spinnerets, means for moving said spinerets through one circular path to eject the substance from each spinneret by centrifugal force and means for moving each spinneret in another circular path to twist the strands of each spinneret into a separate thread.

5. A mechanism for forming threads including a hollow spindle having a plurality of lateral outlets, a spinneret for each of said outlets said spinnerets and spindle being revolved together, means for supplying a thread-forming substance to said spindle and spinnerets and means for revolving the spinnerets as they travel with the spindle.

6. A mechanism for forming threads including a hollow spindle having a plurality of lateral outlets, a spinneret for each of said outlets, means for moving the spindle to cause the spinnerets to travel through one circular path, means for supplying a thread-forming substance to said spindle and spinnerets, means for revolving the spinnerets in another circular path while they are traveling through the first-named circular path, and means encircling the spinnerets to provide a setting bath.

7. A mechanism for forming threads including a hollow spindle having a lateral outlet, a spinneret at the outer side of said outlet,—the axis of the spinneret being at an angle with respect to the axis of the spindle, means for revolving the spinneret, means for supplying a thread-forming substance to the spindle and its lateral outlet, means for moving the revolving spinneret through a circular path to centrifugally eject the substance therefrom, and a shell about the spindle and spinneret to provide a setting bath for the thread ejected from the spinneret.

8. A mechanism for forming threads including a hollow spindle having a plurality of lateral outlets, a spinneret for each outlet,—the axis of each spinneret being at an angle with respect to the axis of the spindle, means for revolving the spinnerts, a shell about the spindle and spinnerets, means for supplying a setting solution to the shell, means for supplying a thread-forming substance to the spindle and the revolving spinnerets, and means for moving the revolving spinnerets through a circular path to centrifugally eject the substance therefrom.

9. A mechanism for forming threads including a hollow spindle, a series of hollow stems extending laterally from the spindle, a spinneret at the outer end of each stem, means for revolving the spindle to move the stems and spinnerets through one circular path about the axis of the spindle, means for revolving the spinnerets through another circular path as they travel with the stems, means for supplying a thread-forming substance to the traveling and revolving spinnerts and means for maintaining a wall of setting solution in spaced relation about the traveling spinnerets.

10. A mechanism for forming threads including a hollow spindle, stems radiating from the spindle in different planes, a spinneret at the end of each stem, means for rotating the spinnerets in one plane, means for rotating the spinnerets of another plane from those in the first-named plane and means for supplying a thread-forming substance to the spinnerets.

11. A mechanism for forming threads including a series of needles, means for moving the needles through one circular path to throw off a thread-forming substance deposited thereon and means for revolving the series of needles as they travel through said circular path.

12. A mechanism for forming threads including a spinneret having a plurality of outlets, a plurality of needles projecting on the discharge side of the spinneret, means for supplying a thread-forming substance to the spinneret and means for rotating the spinneret and simultaneously moving the rotating spinneret through a circular path to impart an orbital movement to the spinneret and its needles.

13. A mechanism for forming threads including a plurality of spinnerets each having a plurality of outlets, needles projecting through the outlets of each spinneret, means for moving said spinnerets and their needles through one circular path, means for revolving the several spinnerets and their needles as they travel through said circular path.

14. A mechanism for forming threads in-

cluding a hollow spindle having a plurality of lateral outlets, a spinneret for each outlet and each spinneret having a plurality of needles, means for supplying a thread-forming substance to the spindle and the spinnerets, means for revolving the spindle to move the spinnerets through a circular path and discharge the said substance along said needles and means for revolving each spinneret as it travels with the spindle to twist the strands thrown from the needles.

In testimony whereof I affix my signature.

JAMES P. HOOPER.