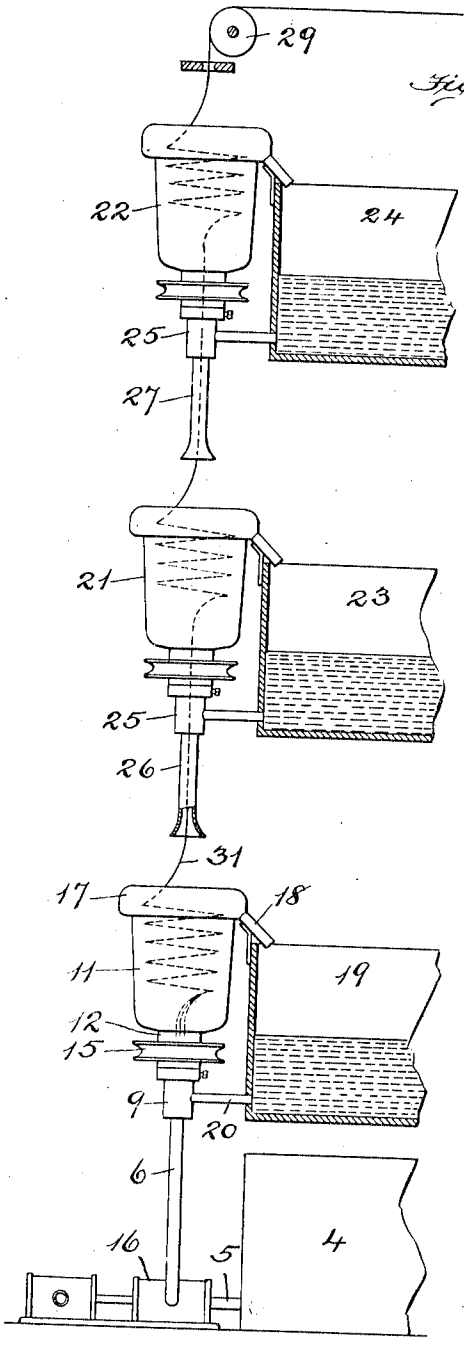
J. P. HOOPER.

PROCESS OF CONVERTING VISCOUS MATERIALS.

APPLICATION FILED DEC. 26, 1918. RENEWED SEPT. 20, 1921.

1,413,332. Patented Apr. 18, 1922.

Fig. 1.



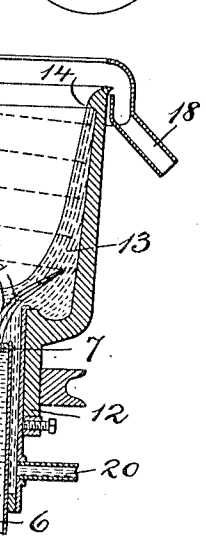
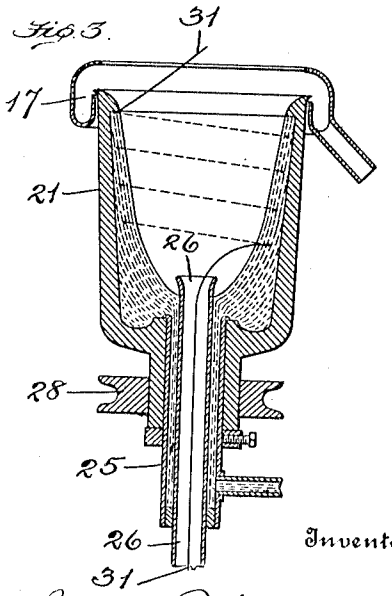


Fig. 2.

Fig. 3.



Inventor

James P. Hooper

By Mann & Co.

Attorneys.

UNITED STATES PATENT OFFICE.

JAMES P. HOOPER, OF RUXTON, MARYLAND.

PROCESS OF CONVERTING VISCOUS MATERIALS.

1,413,332. Specification of Letters Patent. Patented Apr. 18, 1922.

Application filed December 26, 1918, Serial No. 268,323. Renewed September 20, 1921. Serial No. 502,030.

To all whom it may concern:

Be it known that I, JAMES P. HOOPER, a citizen of the United States, residing at Ruxton, in the county of Baltimore and State of Maryland, have invented certain new and useful Improvements in Processes of Converting Viscous Materials, of which the following is a specification.

This invention relates to an improved process of forming filaments of viscose or similar material and has for its object to provide a novel and exceedingly simple process; a process which may be conducted by apparatus arranged in battery formation within a minimum floor space and one that may be practiced economically.

By means of my process I am able to form the viscous material into filaments and readily combine the filaments into twisted strands during the setting and hardening steps in the operation.

The invention is illustrated in the accompanying drawings wherein,—

Fig. 1, shows in a diagrammatic way an arrangement of apparatus and devices for carrying out the process.

Fig. 2, illustrates on an enlarged scale a vertical sectional detail through one of the filament-forming devices employed in carrying out the process, and

Fig. 3, shows on a similar enlarged scale a vertical section through one of the supplemental devices through which the strand passes to enable it to be subjected to the action of a fluid for setting, hardening or other purposes.

Referring to the drawings, and particularly Fig. 1, thereof, the numeral 4, designates a tank or receptacle to contain the viscous material from which a pipe 5, leads to a pump or other means 16, that is to feed the material under pressure or by a force to a tube 6, whose end is provided with a head or filament-forming disk 7, having perforations or passages of suitable size through which the viscous material will be forced to form a plurality of filaments 8.

In the present disclosure the discharge or ejecting end of the tube 6, is encircled by a cylinder 9, sufficiently larger in diameter to form an annular chamber 10, between the inner tube and cylinder and the lower end of this annular chamber is closed while the upper end thereof is open and extends above the head or disk 7.

On the upper end of the cylinder 9, I mount a funnel-like receptacle 11, having a depending annular sleeve 12, which telescopically fits the cylinder-end and is free to rotate about the cylinder. This receptacle has an interior chamber 13, with an annular wall that flares outwardly from the bottom toward the top, and the upper end of the chamber is open. The bottom of the receptacle-chamber 13, has an opening into which the upper open end of the cylinder 9, projects so that open communication is always maintained between the lower end of the receptacle chamber and the interior or annular chamber 10, of the cylinder.

By preference I form or provide an annular bead 14, around the upper open end of the chamber 13, for a purpose that will presently be explained.

A pulley or equivalent device 15, is provided on the depending sleeve 12, of the receptacle so the latter may be rotated.

On the exterior of the receptacle and around the upper end thereof I provide an annular trough 17, from one side of which a spout 18, depends with its lower end projecting over the rim edge of a tank 19. From the bottom of this tank 19, I lead a pipe 20, that enters the cylinder 9, and communicates with the chamber 10, on the interior thereof.

The tank 19, is to contain a setting solution which latter, in the diagrammatic illustration is designed to flow by gravity through the pipe 20, into the annular chamber 10, and then pass up into the lower end of the receptacle 11, above the filament-forming disk or head 7. The solution may be fed by force.

When the receptacle 11, is at rest the liquid level therein will be determined by the level of the liquid or solution in the tank 19.

Above the rotary receptacle 11, I preferably provide a plurality of additional rotary receptacles 21 and 22,—one above the other,—the number of these superposed receptacles however being a matter of selection and choice according to the character of work to be done.

A separate tank 23 and 24, is provided for each of the superposed rotary receptacles and a connection is provided from each tank so that the solution or fluid which the tank contains may be conveyed to a cylinder 25, and conveyed through the latter and up into the receptacle at the upper end of said cylinder,

A tube 26, is provided for the receptacle 21, while a similar tube 27, is provided for the receptacle 22.

These tubes extend up through the cylinder and the upper ends enter the receptacles next above them and are open, but these upper open ends have position in a horizontal plane above the level of the liquid in the tank which supplies such liquid to the receptacle in which such tube-end projects. For example, the upper end of tube 26, has position in a horizontal plane above the level of the liquid in tank 23, while the upper end of tube 27, has position in a plane above the level of liquid in the tank 24.

The object of this is to prevent the liquid in either of the superposed receptacles from overflowing into the upper end of either of tubes 26 or 27.

The lower ends of both tubes 26 or 27 are open and are preferably flared.

Each receptacle 21 and 22, is designed to be rotated by means of a pulley or equivalent device 28.

The receptacles may all be rotated in the same direction and at the same speed, or in different directions and at varying speeds, according to the amount of twist it is desired to impart to the strand passing through them, as will presently be more fully explained.

Above the uppermost receptacle I provide a pulley or roller 29 over which the strand may pass on its way to a reel 30, on which the product is wound.

In the operation of the device, it being presumed that the tank 4, is provided with the viscous material and the tanks 19, 23 and 24 are each provided with setting, hardening or other liquids or solutions, the pump 16, is operated and the several receptacles 11, 21 and 22, are rotated.

The viscous material will be forced through tube 6, and ejected through the head or disk 7, in the form of filaments 8, and immediately is brought into contact with the setting solution in the upper end of the chamber 10, and also in the chamber 13, of the rotating receptacle 11.

This receptacle 11, is revolved at a sufficient rate of speed to cause the solution which enters the bottom thereof to rise by centrifugal force and overflow at the top rim edge,—the bead or annular projection 14, on the inner edge, serving to retard the upward flow of such solution.

The filaments 8, ejected from the head or disk 7, are caught up by the flowing and rotating setting solution and are drawn forward with the latter. During this operation the filaments are brought together and formed into a strand and at the same time the rotating solution produces a series of coils in the strand which increase in diameter as they are drawn away from the ejecting means. The rotating solution also increases in velocity as it rises in the receptacle and by this means a constant and increasing tension is placed on the strand. While the coils of the strand are traveling upward with the constantly up-flowing current of solution, the tension imparted thereto effectively combines the filaments into a strand so that at the top of the receptacle the strand, being sufficiently set, may be led from the receptacle.

The solution thrown from the upper end of the receptacle 11, is caught in the annular trough 17, and returned to the tank 19, by the spout 18, and in this way the level of the solution tank 19, is maintained at a substantially uniform point and such solution is thus kept in circulation and used over and over.

From the uppermost coil in the lower receptacle 11, the strand 31, passes up through tube 26, and out through the upper end of the same into the next rotary receptacle 21.

If it is desired to further twist the strand 31, after it leaves the receptacle 11, the next receptacle 21, through which the strand is to pass may be revolved at a speed higher than that at which the receptacle 11, is revolved, and this speed can be so increased as to provide additional tension on the strand.

When the strand passes from the upper end of tube 26, it will be caught by the whirling solution fed from tank 23, and carried upwardly through the receptacle 21, by the up-flowing solution which further acts upon the strand.

In some instances it may be desirable to pass the strand through a third bath and in another rotary receptacle 22, in which case the strand will enter this latter receptacle through the tube 27, and be conveyed by the up-flowing current from the tank 24, which may harden, clean or otherwise treat the strand or thread and leave it in a condition to be passed around a roll 29 and wound on a reel 30.

It is to be understood that the number of rotary receptacles employed may be varied and a greater or lesser number than that shown may be employed.

It is also to be understood that the drawing in no way defines the scope of the invention but is merely a diagrammatic illustration of the process involved.

Having described my invention, what I claim is,—

1. The process of converting viscous material consisting of ejecting a thread of the viscous material into a setting solution while the solution is being whirled to convey the strand in a series of coils in a direction away from the ejecting means.

2. The process of converting viscous substances consisting of maintaining a setting solution in a constant state of whirling mo-

tion to produce a centrifugal conveying medium and ejecting the viscous substance into said solution and conveying the ejected substance through the solution by the whirling motion of the latter.

3. The process of converting viscous substances consisting of ejecting the viscous substance into a receptacle containing a setting solution and conveying the substance forward through the receptacle by centrifugally whirling the solution away from that end of the receptacle where the substance enters the latter.

4. The process of converting viscous substances consisting of centrifugally whirling a setting solution to produce an upwardly-traveling current and feeding the viscous material into the lower end of the centrifugally whirling solution and carrying it in upward in a series of coils to twist the thread.

5. The process of converting viscous substances into a twisted strand consisting of ejecting the viscous material into a receptacle containing a setting solution and whirling the solution to discharge the same from the receptacle by centrifugal force and thereby twist the material as it revolves during its passage through the receptacle.

6. The process of converting viscous substances into a thread consisting of ejecting the substance into a rotating current of setting solution and thereafter passing the ejected substance through a second rotating current of hardening solution.

7. The process of converting viscous substances into a thread consisting of ejecting the substance in the form of a strand and successively passing such strand through a plurality of rotating solutions to act successively on the strand.

8. The process of converting viscous substances consisting of ejecting the viscous substance into a rotating current of setting solution and forming a series of coils of increasing diameters to apply a tension on the successive coils.

9. The process of converting viscous substances consisting of ejecting the viscous substances into a tapered receptacle containing a solution, rotating the solution to cause it to travel forward and gradually spread by centrifugal force and utilizing the said force to apply a tension on the ejected substance.

10. The process of converting viscous substances consisting of rotating a setting solution to move the solution by centrifugal force, ejecting viscous material into the moving solution and forming a series of traveling coils of increasing diameter as they advance in the solution and effecting a constantly increasing tension on the viscous material.

In testimony whereof I affix my signature.

JAMES P. HOOPER.