

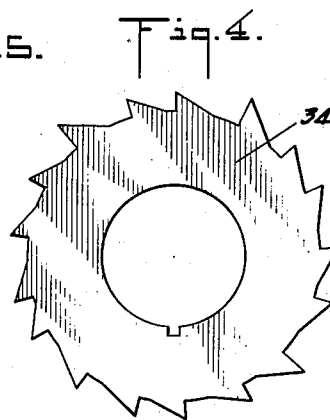
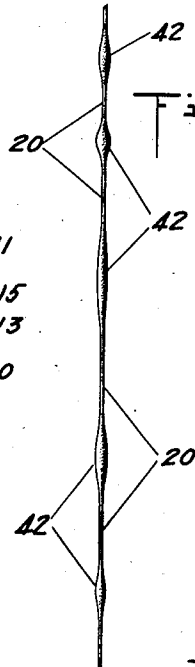
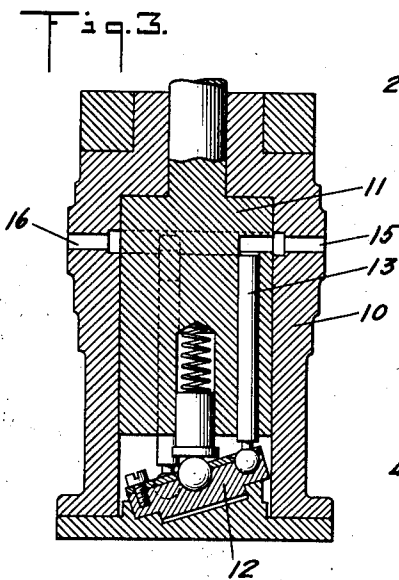
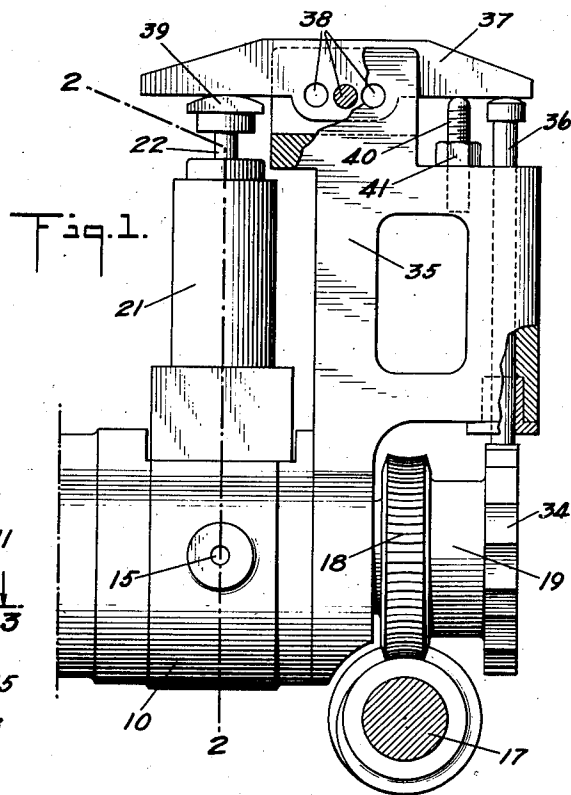
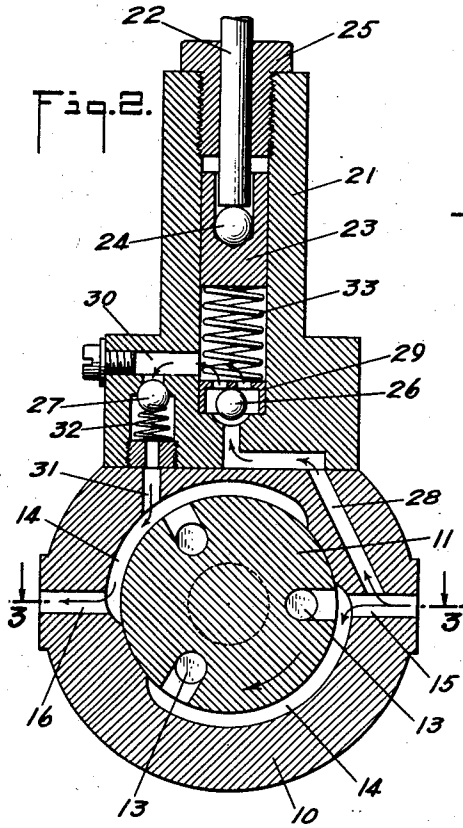
Jan. 3, 1939.

G. M. ALLEN ET AL

2,142,597

RAYON SPINNING PUMP

Filed Oct. 15, 1936



INVENTORS
GEORGE M. ALLEN
HENRY J. McDERMOTT
BY THEIR ATTORNEYS

Howson and Howson

UNITED STATES PATENT OFFICE

2,142,597

RAYON SPINNING PUMP

George M. Allen, Swarthmore, and Henry J. McDermott, Prospect Park, Pa., assignors, by mesne assignments, to American Viscose Corporation, a corporation of Delaware

Application October 15, 1936, Serial No. 105,786

6 Claims. (Cl. 103—4)

This invention relates to rayon spinning pumps, and more particularly pumps adapted to produce yarns of irregular denier, such for instance as the so-called "thick and thin" yarn. One object of the invention is to produce a pump which is simple in construction and operation and which will produce the variations in denier in a satisfactory manner at a reasonably high speed. It is characteristic of yarns produced by this new spinning pump that they have portions of essentially normal denier and portions that are thicker, but none that are of appreciably less denier than normal.

In the drawing,

Fig. 1 is a side view in elevation of a rayon spinning pump constructed in accordance with my invention, certain parts being broken away;

Fig. 2 is a view in vertical section through the pump in a plane parallel to the front, taken on the line 2—2 of Fig. 1;

Fig. 3 is a view in horizontal section looking down on the lower half of the portion of the regular part of the pump, taken on the line 3—3 of Fig. 2;

Fig. 4 is a view in side elevation of the irregular toothed wheel which drives the plunger in the auxiliary chamber; while

Fig. 5 is a view of a short piece of yarn of irregular denier such as can be produced by the pump.

One manner of producing the so-called "thick and thin" yarn is by varying the pump delivery, of which the patent to Henry Dreyfus et al. No. 1,996,796, dated April 9, 1935, is an example.

It has been found desirable to rely on the regular pump for the supply of spinning solution for the portions of the yarn which are of normal thickness, and to keep this regular pump going uniformly, even when portions of abnormal diameter are being produced. It is absolutely essential that a satisfactory device be very simple and that the path of travel of the spinning solution be shortened and simplified to the greatest possible extent. The piping leading up to the pump therefore has not been disturbed in any way and the extra solution necessary to make the thick portions of yarn is obtained at the inlet port of the regular pump. The extra solution is returned to the regular outlet port of the regular pump. The auxiliary mechanism itself is fastened directly to the pump, with a minimum of piping and parts.

Referring now to the drawing, there is the usual pump 10 to deliver the uniform quantity of solution or regular supply of spinning solu-

tion. This may be of the gear type or of the rocking cam plate type. In the drawing we have shown this regular pump of the rocking cam plate type, such as is shown in the patent to Charles F. Topham, 1,480,425, dated January 8, 1924. In this type of pump there is a cylindrical rotating body 11 supported above a stationary cam plate 12. There are three pistons 13 mounted on the cam plate and passing through the rotatable body. As the rotatable body 11 turns, the pistons, reciprocating longitudinally of the rotatable body in cooperation with certain semi-circular passages 14, receive the spinning solution from the inlet port 15 and deliver it to the outlet port 16. These semi-circular passages 14 may be considered part of the inlet and outlet ports. The rotatable body 11 is turned by means of a spiral gear 17 and worm wheel 18 mounted on a shaft 19. This regular part of the pump is adapted to make the portions 20 of the yarn which are of normal diameter.

The means for producing the extra supply of spinning solution when it is desired to produce slubs or portions of the yarn which are of greater diameter than normal, is mounted directly on the casing of the pump 10. This means, which can be considered as an auxiliary pump, includes a casing or chamber 21 and a plunger 22. In addition to the main portion 22 of the plunger, there is a piston 23 on the end of the plunger and a ball bearing 24 between the piston and the plunger. The piston fits the inside of the chamber 21. It is also guided in the chamber by means of a threaded top 25. The movements of the plunger up and down inside the chamber are availed of to provide the necessary intermittent irregular supply of additional spinning solution. There are two ball valves 26 and 27 which permit the spinning solution to move only in the direction of the outlet port 16. In order to carry the spinning solution from the inlet port 15 to the inside of the chamber 21, a passage 28 is bored in the casing of the regular pump 10 and in the chamber 21 to connect the lower end of the inside of the auxiliary pump with the inlet port. The ball valve 26 is seated at the end of this passage 28 at the bottom of the chamber and is held near its opening by a guard 29. It will be obvious that whenever the solution is being drawn into the chamber from the inlet portion 15, the ball valve 26 will rise against its guard 29 and permit the solution to enter the chamber. Whenever the plunger 22 is descending in order to force the spinning solution out of the chamber, the ball valve 26 will return to its seat and

prevent the solution from returning through the passage 28 to the inlet port. When the piston is thus descending the spinning solution passes out through the lateral passage 30, past ball valve 27 and auxiliary port 31 into the semi-circular passage 14 and the outlet port 16. The ball valve 27 is pressed upwardly by a compression spring 32 against a shoulder in one side of the lateral passage 30, so that except when the piston 22 is descending, the ball valve will cut off the chamber from the outlet port 16.

In order to keep the guard 29 in its proper position on top of the ball valve 26 and in order that the piston may be operated properly, there is a compression spring 33 on top of the guard 29 extending upwardly and remaining at all times in contact with the bottom surface of the piston. This compression spring tends to push the piston and plunger upwardly at all times. The mechanism for limiting the upward movement of the plunger in response to the pressure of the compression spring 33, and the mechanism for giving the plunger downward and irregular, intermittent movements, will now be described.

The driving means for the regular pump 10 are availed of to cause the movements of the plunger. The downward movements of the plunger are obtained from an irregular toothed wheel 34 shown in Fig. 4. The teeth on this wheel may be of varying height and may be spaced irregularly so that the time and extent of movement of the plunger may be made irregular in any desired manner. This irregular toothed wheel is mounted on the drive shaft 19 beside the worm wheel 18 and the two revolve together, turn for turn.

The mechanism for transmitting the indications of the irregular toothed wheel 34 to the plunger 22 is carried by a bracket 35 shown in Fig. 1. Mounted vertically in this bracket is a push rod 36, the lower end of which is adapted to engage the teeth and spaces on the periphery of the irregular toothed wheel. The upper end of this push rod engages the lower side of one arm of a rocker arm 37 pivoted on the bracket intermediate its ends. This rocker arm may be pivoted at any of say three pivot points 38. The purpose of this multiplicity of pivot points is to enable the stroke of the plunger to be varied in speed and magnitude. The other end of the rocker arm overlies the upper end 39 of the plunger 22. This upper end of the plunger is given a curvilinear surface for mechanical efficiency. Under the push rod end of the rocker arm is located a set screw 40 mounted in the bracket 35. This serves to limit the upward movement of the plunger 22 under the pressure of the compression spring 33. This set screw can be adjusted by means of a nut 41. It will be obvious that by increasing the height of any tooth on the wheel 34, the degree of thickness of any given slub 42 can be increased, and that by changing the spacing of the teeth the spacing of the slubs can be changed. Thus it is seen that the frequency of the slubs corresponds to the number of teeth on the wheel 34, and the shape and magnitude of the slubs to the shape and magnitude of the teeth. Thus the periphery of the wheel serves to determine the denier design and any desired design can be obtained.

The construction of the pump having been set forth, its operation will now be described. The spiral gear 17 by its revolution revolves the shaft 19 and the worm wheel 18, together with the toothed wheel 34. The regular pump is caused to operate by rotation of its body 11, thereby

causing delivery of the normal amount of spinning solution to the outlet port 16. Simultaneously the rotation of the irregular toothed wheel 34 will cause intermittent and irregular upward movements of the push rod 36, which tipping the rocker arm 37, will depress the plunger 22, causing ejection of extra spinning solution from the chamber 21 through the lateral passage 30, past the ball valve 27, through the auxiliary outlet port 31, into the passage 14 and the outlet port 16. As soon as the push rod 36 passes off a tooth on the wheel 34, the compression spring 33 will push the piston 23 and the plunger 22 upwardly until the rocker arm engages the set screw 40. This upward movement of the piston 23 and plunger 22 causes additional spinning solution to be drawn from the inlet port 15 into the chamber 21. This cycle of operation is repeated intermittently and with varying extents of movement of the plunger to produce the various slubs 42 shown in Fig. 5.

In addition to the other advantages already mentioned, it will be noted that the spinning solution which is added to the normal supply has a very short path of travel while going through the auxiliary mechanism, and that the same is not diverted from its regular path at any point outside the regular pump. The simplicity and adjustability of the device will be obvious to all.

What we claim is:

1. In a rayon spinning machine adapted to produce yarn of irregular denier, a pump adapted to deliver a uniform quantity of spinning solution, said pump having inlet and outlet ports, in combination with means mounted on the pump for delivering a varying quantity of spinning solution to the outlet port, comprising a chamber connected to the inlet and outlet ports, valve means in the passages from and to said ports connecting to the chamber and permitting flow only toward the outlet port, a plunger in the chamber, a spring pressing the plunger in one direction, an adjustable stop limiting the movement of the plunger in the direction in which it is pressed by the spring, means adapted to give the plunger irregular movement against the pressure of the spring, and unitary means adapted to drive the pump and said irregular moving means.

2. In a rayon spinning machine adapted to produce yarn of irregular denier, a pump adapted to deliver a uniform quantity of spinning solution, said pump having inlet and outlet ports, in combination with means mounted on the pump for delivering a varying quantity of spinning solution to the outlet port, comprising a chamber connected to the inlet and outlet ports, valve means in the passages from and to said ports connecting to the chamber and permitting flow only toward the outlet port, a plunger in the chamber, a spring pressing the plunger in one direction against a rocker arm, said rocker arm having an adjustable pivot point, an adjustable stop limiting the movement of the rocker arm in the direction pressed by the plunger spring, a wheel having a periphery shaped according to the desired denier design and adapted to transmit its peripheral contour into plunger movements in the opposite direction through the medium of said rocker arm, and unitary means adapted to drive the pump and said design wheel.

3. In a rayon spinning machine adapted to produce a yarn of irregular denier, a pump adapted to deliver a uniform quantity of spinning solution, said pump having inlet and outlet ports, an auxiliary pump for delivering a varying quan-

5 tity of solution to the outlet port of the first
named pump comprising a chamber connected to
the inlet and outlet ports, valve means in the
connection between said ports and said chamber
10 permitting flow only toward the outlet port, a
plunger in the chamber, means adapted to give
the plunger rapid, intermittent, irregular move-
ment in one direction to discharge solution
through the outlet port, means for moving the
15 plunger in the opposite direction, and means to
drive both of the pumps.

4. In a rayon spinning machine adapted to pro-
duce a yarn of irregular denier, a pump adapted
to deliver a uniform quantity of spinning solu-
15 tion, said pump having inlet and outlet ports, an
auxiliary pump for delivering a varying quantity
of solution to the outlet port of the first named
pump comprising a chamber connected to the
inlet and outlet ports, valve means in the connec-
20 tion between said port and said chamber permit-
ting flow only toward the outlet port, a plunger in
the chamber, means adapted to give the plunger
rapid, intermittent, irregular movement in one
direction to discharge solution through the out-
25 let port, means for moving the plunger in the
opposite direction, and unitary means to drive
both of the pumps.

5. In a rayon spinning machine adapted to pro-
duce a yarn of irregular denier, a pump adapted
30 to deliver a uniform quantity of spinning solu-
tion, said pump having inlet and outlet ports, an
auxiliary pump for delivering a varying quantity
of solution to the outlet port of the first named
pump comprising a chamber connected to the

inlet and outlet ports, valve means in the con-
nection between said ports and said chamber
permitting flow only toward the outlet port, a
plunger in the chamber, means adapted to give
5 the plunger rapid, intermittent, irregular move-
ment in one direction to discharge solution
through the outlet port, comprising a rocker arm,
one end of which acts against the plunger and
cam means having an irregular, peripheral con-
10 tour for operating a pusher rod to give the plunger
rapid, intermittent, irregular movement which
acts against the other end, means for varying
the discharge of the auxiliary pump, spring means
for moving the plunger in the opposite direction,
15 and unitary means to drive both of the pumps.

6. In a rayon spinning machine adapted to pro-
duce a yarn of irregular denier, a pump adapted
to deliver a uniform quantity of spinning solu-
20 tion, said pump having inlet and outlet ports, an
auxiliary pump for delivering a varying quantity
of solution to the outlet port of the first named
pump comprising a chamber connected to the
inlet and outlet ports, spring-pressed ball valve
means in the connection between said ports and
25 said chamber permitting flow only toward the
outlet port, a plunger in the chamber, means
adapted to give the plunger rapid, intermittent,
irregular movement in one direction to discharge
solution through the outlet port, means for mov-
30 ing the plunger in the opposite direction, and
means to drive both of the pumps.

GEORGE M. ALLEN.
HENRY J. McDERMOTT.