

No. 736,259.

PATENTED AUG. 11, 1903.

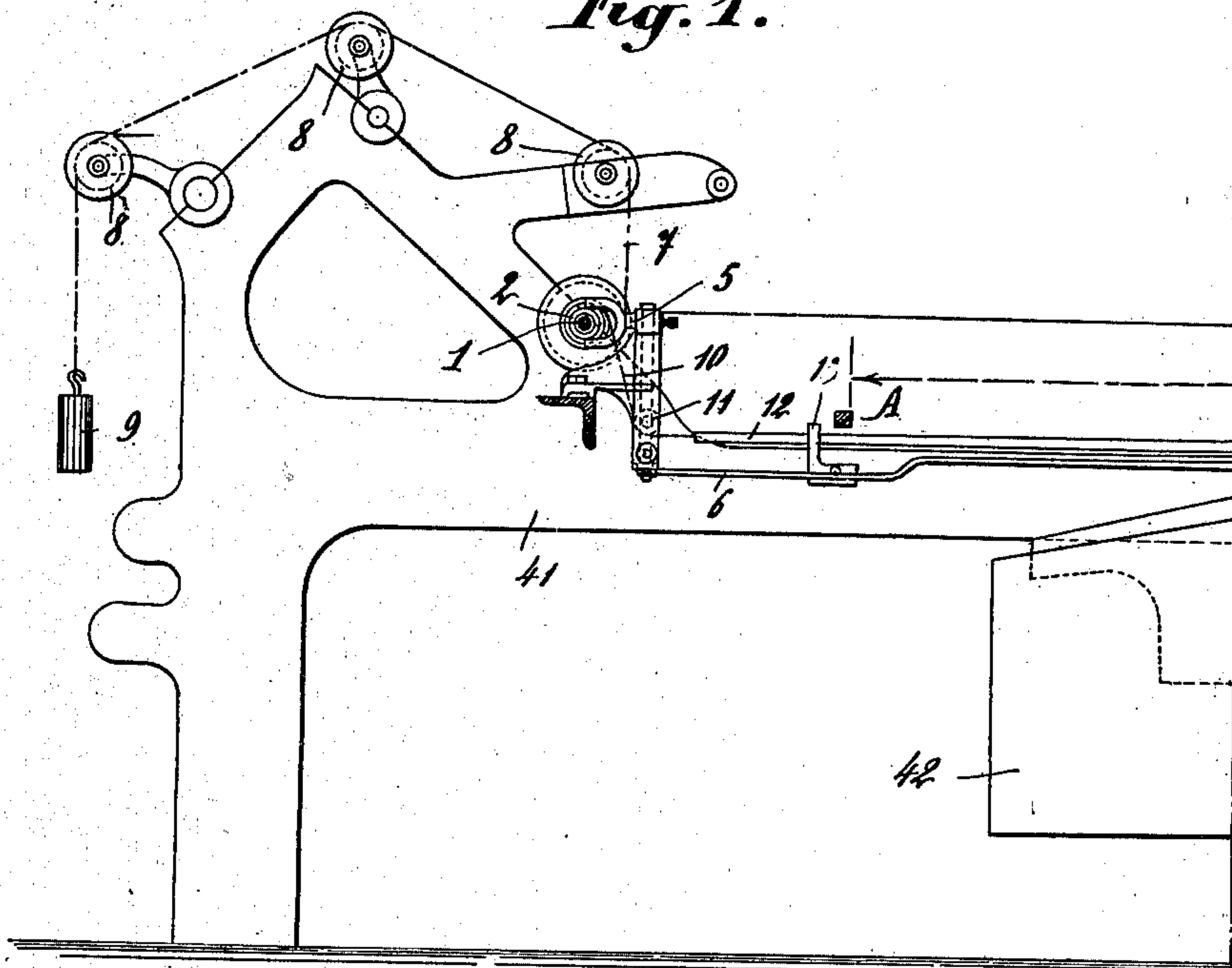
F. HOUGET & A. BECKER.  
SELF ACTING MULE.

APPLICATION FILED MAR. 27, 1902.

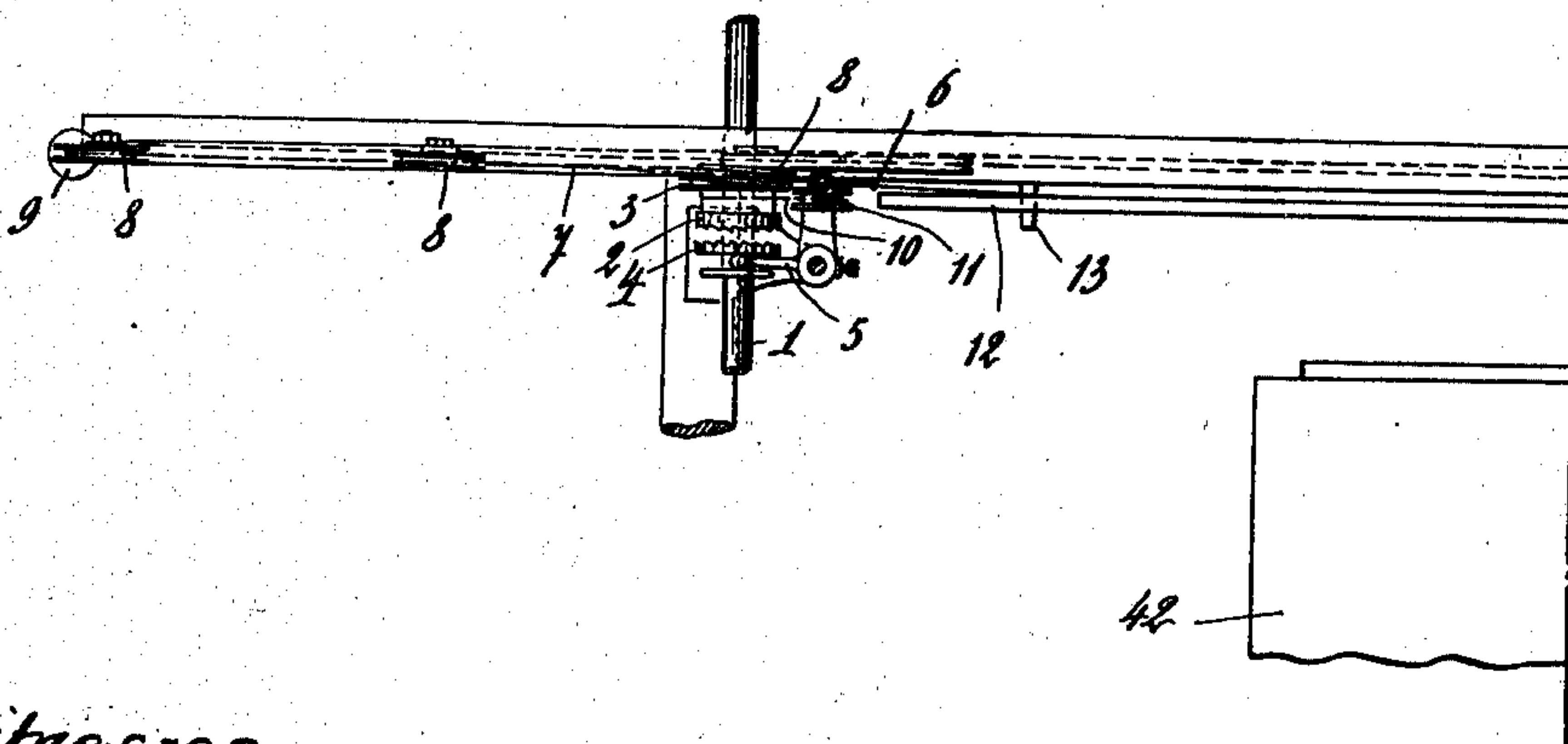
NO MODEL.

2 SHEETS—SHEET 1.

*Fig. 1.*



*Fig. 3.*



Witnesses  
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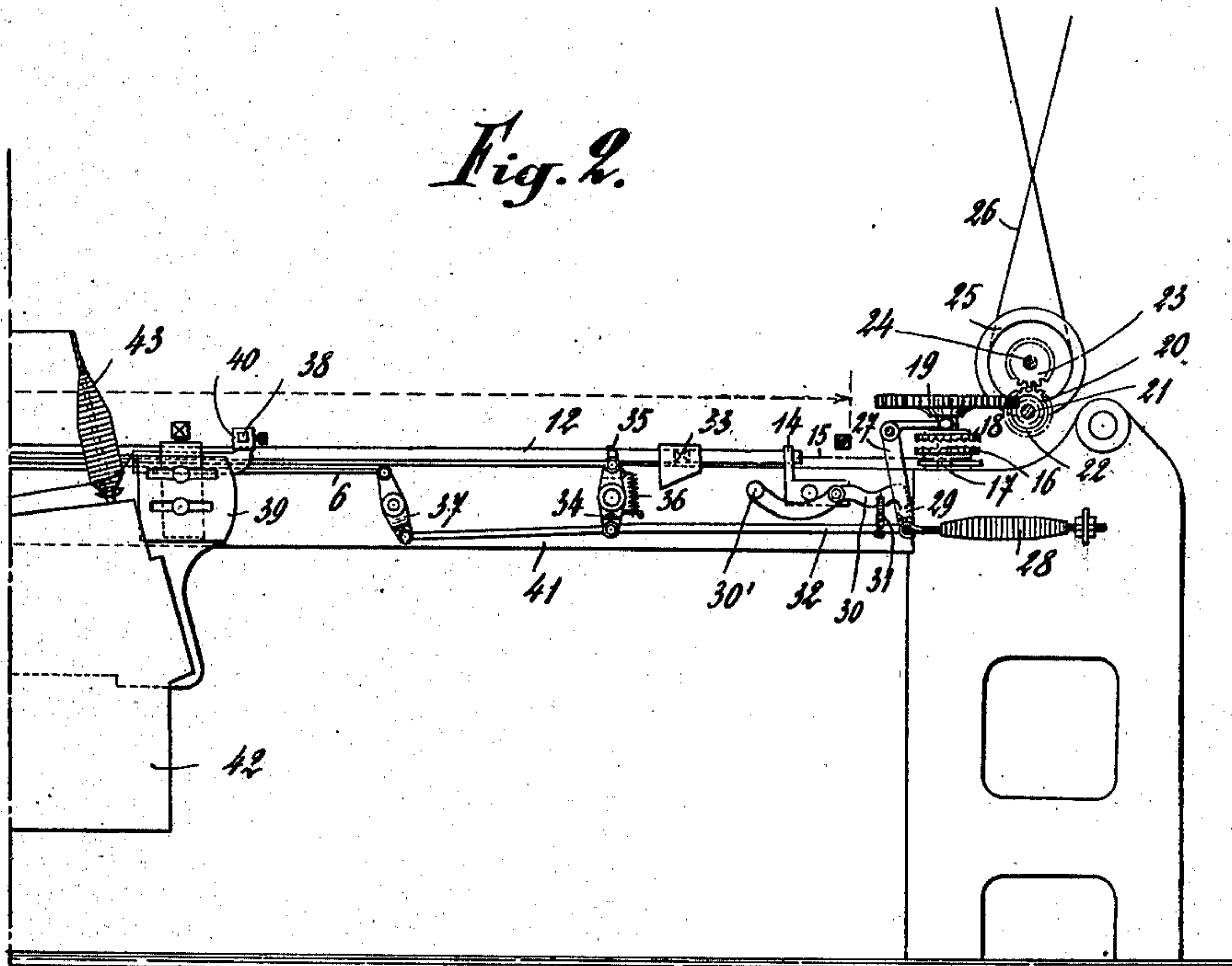
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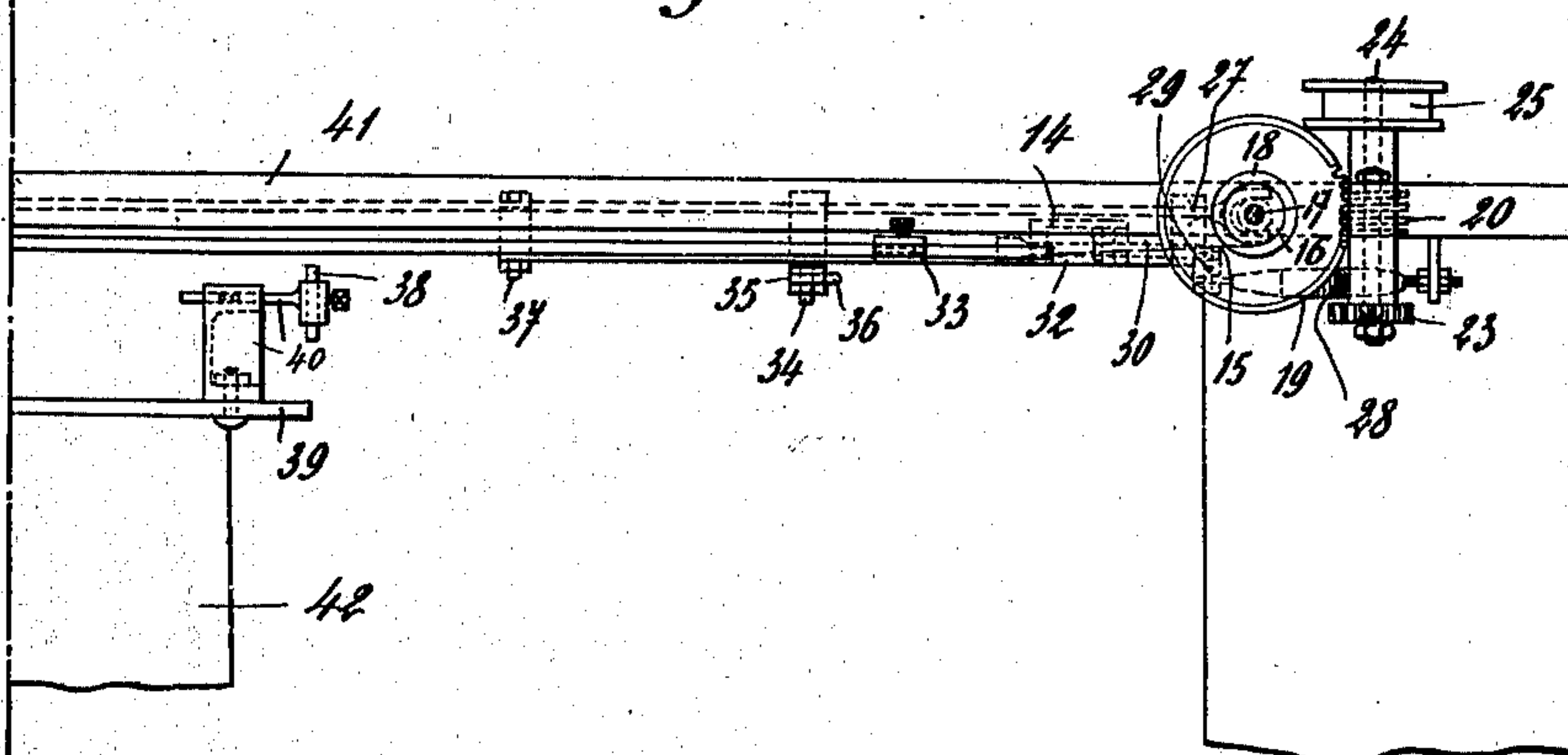
NO MODEL.

2 SHEETS—SHEET 2.

*Fig. 2.*



*Fig. 4.*



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# UNITED STATES PATENT OFFICE.

FERNAND HOUGET, OF VERVIERS, AND AUGUSTE BECKER, OF STEMBERT,  
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## SELF-ACTING MULE.

SPECIFICATION forming part of Letters Patent No. 736,259, dated August 11, 1903.

Application filed March 27, 1902. Serial No. 100,186. (No model.)

*To all whom it may concern:*

Be it known that we, FERNAND HOUGET, manufacturer, residing at Verviers, and AUGUSTE BECKER, manufacturer, residing at Stembert, in the Kingdom of Belgium, subjects of the King of Belgium, have invented certain new and useful Improvements in Self-Acting Mules, of which the following is a specification.

This invention relates to an improved apparatus adapted to be used in connection with the spinning of yarns or threads on self-acting mules.

It is known that in self-acting mules after the delivery of a given length of roving at a speed corresponding to the speed or movement of the carriage the feeding-rollers remain at rest while the carriage moves farther, thus giving to the roving the required draw and twist. At the end of the outward travel of the carriage the twist of the thread is completed by the spindles continuing to revolve at an increased speed in such a manner that on account of the shortening of the threads it is necessary to cause the carriage to return slowly. When the necessary twist is obtained, the thread is wound on the spindles, with the exception, however, of a length of about two and one-half inches, which remains left between the point of the spindle and the feeding-roller when the carriage is completely re-turned, which length of thread, as readily understood, has received the same twist as the thread wound on the spindle. This well-known mode of operation has the following consequence: At the point where the roving or thread is pressed between the feeding-rollers a point is formed, the degree of which depends upon the value of the twist imparted to the thread. If the said point is too accentuated, the thread has a tendency to break at said place. When now the carriage moves out again, the above-mentioned length of thread which has not been wound upon the spindles previously is subjected to a new drawing and twisting operation. However, as it has already been twisted it is adapted to resist to the above supplemental drawing action during the first step of the

twist; but as soon as the remaining and untwisted portion of the thread has received the same degree of twist as the already twisted portion the latter is no more capable of resisting to this new drawing action, which is further combined with the vibrations of the point of the spindle. The said new drawing action now results in weakening in an unavoidable manner the portion of the thread which has previously not been wound on the spindle and in giving to said portion a supplemental twist, owing to the well-known fact that in a thread having inequalities in thickness the thinner portions are proportionately more twisted than the thicker portions.

The apparatus to which this invention relates has for its special object to avoid, first, the above-mentioned formation of points in the thread; second, that the portion of thread comprised between the point of the spindle and the feeding-roller receives a greater twist than the other portions of the thread. With this object in view our novel apparatus causes the ordinary operation of the self-acting mule to be modified as follows: When the drawing is effected and the spindles are rotated at an increased speed, the feeding-rollers are caused to deliver slowly a given portion of roving in such a manner that the thread is no more constantly maintained at the same place between the feeding-rollers and that the formation of points at said place is absolutely avoided. As the thread at this moment is already strongly twisted, the twist passes over to the supplementally-delivered roving, which is thus preserved from a complete drawing in such a manner that said portion of the thread remains thicker, and thus receives less twist than the already finished portion of the thread. At the following outward travel of the carriage the said supplemental portion of the thread, which is followed by a new portion of roving corresponding to a new stretch and possessing no twist whatever, transmits a part of its twist to said roving, and when the new roving or thread possesses the same thickness and the same twist as the portion of thread which has not been previ-



ously wound the new thread is subjected to the drawing and twisting operation in the same proportion as the other portion in such manner that a uniformly-twisted thread is produced having everywhere the same thickness.

We are aware that it has already frequently been proposed to deliver a certain quantity of untwisted thread or roving to the stretch at a given moment; but so far as we are aware the said delivery has never been effected in the above-stated conditions with a view of avoiding the formation of points in the thread.

Referring to the annexed drawings, Figure 1 is a side view of a first part of a self-acting mule, showing that portion of the frame which is provided with the feeding-rolls and a part of the carriage. Fig. 2 is a side view of the remaining portion of frame and carriage. Figs. 3 and 4 are two top views corresponding to Figs. 1 and 2.

On the feeding-roll of the mule or on its axle 1 is mounted loosely the one half, 2, of a clutch or coupling, which half forms one with a cylindrical portion and a grooved pulley 3. The other half, 4, of the clutch or coupling is likewise mounted upon the feeding-roll or on its axle 1 and slides on a feather fixed thereto. Half-coupling 4 is adapted to be put at a given moment into engagement with half-coupling 2 by the oscillation of a forked double lever 5, operated by a link or rod 6, which is actuated, as described later.

One end of a chain 7 is secured in the groove of the pulley 3 of the half-coupling 2, in which it winds, and thence passes over three pulleys or rollers 8, a weight 9 being secured to its other extremity. A second chain 10 winds in the opposite direction upon the cylindrical part which connects the half-clutch 2 to its grooved pulley 3.

The free extremity of the chain 10 passes under a roller 11 and is secured to a sliding rod 12, this rod being carried in small supports 13, Fig. 1, 14, Fig. 2, in which it slides. To the other end of this rod 12 is also fixed a chain 15, which winds upon a half-coupling 16, mounted loosely on a short shaft 17 at the opposite end of the frame from the couplings 2 4, Fig. 1. A second half-coupling 18, which is capable of sliding on this short shaft 17, is provided with a groove or neck and carries a worm-wheel 19. This wheel 19 gears constantly with a worm 20, keyed on a transverse shaft 21, which also carries a pinion 22. This pinion 22 gears with a second pinion 23, keyed on another shaft 24, which carries a driving-pulley 25. This driving-pulley 25 receives the motion from the actuating-gear of the mule by means of a belt 26, so that during the running of the driving-pulley the two pinions 22 23 rotate continuously.

Half-coupling 18 is held out of engagement by a forked lever 27, which is subject to the pull of a spring 28. The said forked lever 27 carries a snug 29, which when the half-coup-

lings 16 18 are in engagement is caught by the hook of a pivoted catch-lever 30, subject to the pull of another spring 31. In this way the half-couplings 16 18 are held in engagement, and the action of the spring 28 of the forked lever, which tends to move them out of engagement, is prevented. The pivoted catch-lever 30, just referred to, has at the opposite end to its catch-hook a tailpiece 30'. This tailpiece 30' is adapted to be depressed by a nose 33, forming part of a cam-like collar fixed on the sliding rod 12, this depression effecting the lifting of the catch-hook of the catch-lever 30, thus allowing the spring 28 of the forked lever 27 to effect the disengagement of the half-couplings 16 18.

The forked lever 27 is operated by a coupling-rod 32, by which it is connected to two rocking levers 34 37, pivoted at suitable points of their length to the head-stock. The first of these rocking levers 34 carries at its upper end a small rocking hook or catch 35, normally held in the catching position by a spring 36.

We provide an adjustable striker 38, fixed on the framing 39 of the carriage by means of suitable supports 40. When during the travel of the carriage this striker 38 comes against the hook or catch 35 of the first rocking lever 34, it rocks this lever when the movement is from left to right, (outward travel of the carriage.) When the movement is from right to left, (return of carriage,) the small hook or catch 35 on the rocking lever 34 yields and allows the striker 38 to pass. The spring 36 of the rocking catch 35 then returns it to catching position. The second of the rocking levers 37 is connected to the other extremity of the rod 6, which operates the forked double lever 5, that effects the engagement of half-couplings 2 4, as before described.

All the parts described are fixed to the framing 41 of the head-stock, with the exception of the striker 38, which is placed on the carriage 42, and thus has a reciprocated movement imparted to it.

Let us assume that the parts are in the positions they occupy at the moment when the carriage 42, carrying the cops 43, moves out. The feed-roller 1 has just fed the roving, and the drawing and twisting commence and continue normally until the striker 38 catches the hook or catch 35 on the rocking lever 34 and rocks this lever, which, through the intermediation of the coupling-rod 32 and of the spring-pulled forked lever 27, connected thereto, puts the half-couplings 16 18 into engagement. The half-coupling 18, being driven by the driving-belt 26 and the intermediate gearing—viz., the pinions 23, 22, worm 20, and worm-wheel 19, before mentioned—and rotating continuously, imparts its motion to half-coupling 16. This latter winds up chain 15 and pulls the sliding rod



12, which in its turn pulls chain 10. This latter, being thus unwound from the cylindrical portion of the half-coupling 2, to which it is fixed, imparts a slow movement of rotation to the latter. The rocking lever 34, which carries the catch or hook 35, has in its rocking movement communicated its motion to the second rocking lever 37, which by means of the rod 6, which operates the forked double lever 5 for the half-couplings 2 4 and of this forked double lever 5, has put these half-couplings 2 4 into engagement. Thus the clutches or couplings at each end of the machine have been simultaneously thrown into engagement by the same movement. Half-coupling 2 turns slowly. It imparts its motion to the half-coupling 4, which by means of its fixed feather rotates the feeding-roll 1, which delivers a certain quantity of roving. This quantity is regulated by the position of the cam-like collar 33 on the sliding rod 12 and which collar is capable of being shifted or adjusted on this rod. The sliding rod 12 in moving from left to right brings the inclined surface of the cam-like collar 33 in contact with the tail of the pivoted catch-lever 30. This latter at the engagement of the half-couplings 16 18 has hooked or caught the snug 29 of the spring-pulled forked lever 27 of these half-couplings, and has thus kept them engaged. The nose of the cam-collar 33, bearing on the tail 30' of the pivoted catch-lever 30, disengages the hook of this lever from the snug 29. The forked operating-lever 27 of half-couplings 16 18 being now pulled by its spring 28 resumes its original position and disengages the half-couplings 16 18. Half-coupling 2 is returned to position by the counterweight 9, attached to chain 7, which chain was wound up during the rotation of this same half-coupling. At the same time chain 10, which has been unwound, winds up, pulls the sliding rod 12 and chain 15, and returns half-coupling 16 to its original position. During the return of the carriage the striker 38 again comes against the hook or catch 35 on the rocking lever 34, which yields without this time operating the rocking lever to which it is attached. The carriage 42 reassumes its starting position to commence a new stretch. The support 40 of the striker 38 being capable of adjustment in the direction of the travel of the carriage it follows that the delivery of the supplementary roving can be effected during the outward travel and the return of the carriage 42 and while the carriage remains motionless at the end of its travel—that is to say, at the moment which is judged favorable for the purposes of the thread to be produced. By changing the relation of the two pinions 22 24, before referred to, the speed of delivery of the roving can be regulated at will. Finally by shifting the cam-like collar 33 upon the sliding rod the length of the roving delivered can be regulated. The apparatus conse-

quently allows of regulating with the greatest facility the moment of delivery, the speed of delivery, and the quantity to be delivered, and this independently of the general working of the mule.

The apparatus above described likewise presents the advantage when warp-threads have to be produced of permitting the suppression of the slight movement of recoil or of return of the carriage usually allowed with the object of preventing the breakage resulting from the strong tension developed in the thread in twisting after the complete outward travel of the carriage. In point of fact by the delivery of a certain quantity of roving at the desired moment during the twisting this slight recoil becomes unnecessary. Thus the output is greatly increased, since the stretch instead of diminishing is increased by the quantity of thread furnished to it at the proper moment.

What we claim is—

1. In a self-acting mule, in combination, the framing of the head-stock, the feeding-roll, the carriage, an adjustable striker mounted on the carriage, a lever rocking on the framing of the head-stock and on which lever the said striker is adapted to act, an actuating-gear, a coupling adapted to be clutched with said gear by the action of the striker of the carriage upon the rocking lever, a second coupling mounted on the feeding-roll, a transmitting device connecting the two couplings in such a manner that at the moment the striker clutches the first coupling with the actuating-gear, the feeding-roll is rotated by aid of the second coupling so as to deliver a certain quantity of roving and a cam-like collar mounted on the transmitting device and adapted to throw the couplings out of gear, substantially as described and for the purpose set forth.

2. In a self-acting mule in combination, the framing 4 of the head-stock, the feeding-roll 1, the carriage 42, a rocking lever 34 pivoted to the head-stock, one half-coupling 4 sliding on the feeding-roll, a lever-transmitting device 5, 6, 37, connecting said half-coupling with the rocking lever 34, a second half-coupling 2 rotating freely on the feeding-roll 1, a pulley 3 forming part of said half-coupling 2, a weighted chain 7, 9, acting on said pulley 3, a half-coupling 16, a second chain 10 and a rod 12 connecting the second half-coupling 2 to the half-coupling 16, a shaft 17 on which the said half-coupling 16 is mounted, a gear 19, 20, 23, 24, a half-coupling 18 mounted on shaft 17 and actuated by said gear, means holding said half-coupling 18 disengaged from half-coupling 16, a rocking lever 34, a rod connecting said rocking lever to the means holding half-coupling 18 disengaged from half-coupling 16, an adjustable striker 38 placed on the carriage 42 and adapted to clutch the couplings 2, 4, and 16, 18, when acting on the rocking lever 34, means



such as a lever 30, 30' to hold the couplings  
in engagement after the striker has rocked  
the rocking lever 34 and means such as a  
cam-like collar 33 adapted to release the le-  
5 ver 30, 30' at a given moment and to throw  
the couplings out of gear, substantially as de-  
scribed and for the purpose set forth.

In witness whereof we have hereunto set  
our hands in presence of two witnesses.

FERNAND HOUGET.  
AUGUSTE BECKER.

Witnesses:

I. T. LE COSTE,  
A. VIANCE.