P. VINDRIER.

SELF ACTING MULE.

APPLICATION FILED JUNE 27, 1910.

984,786.

Patented Feb. 21, 1911.

3 SHEETS—SHEET 1.

FIG-1

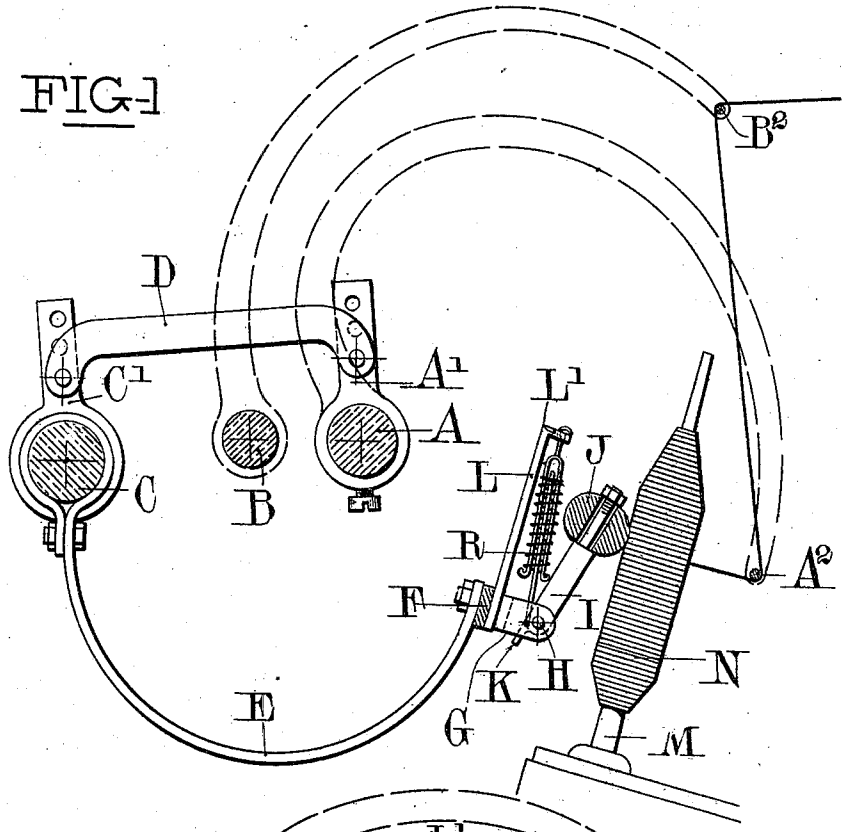
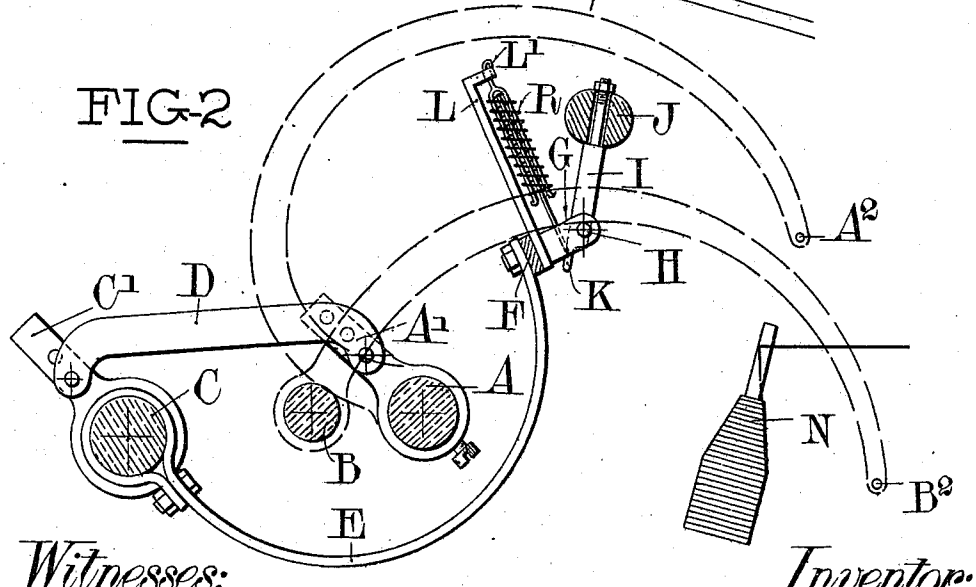


FIG-2



Witnesses:

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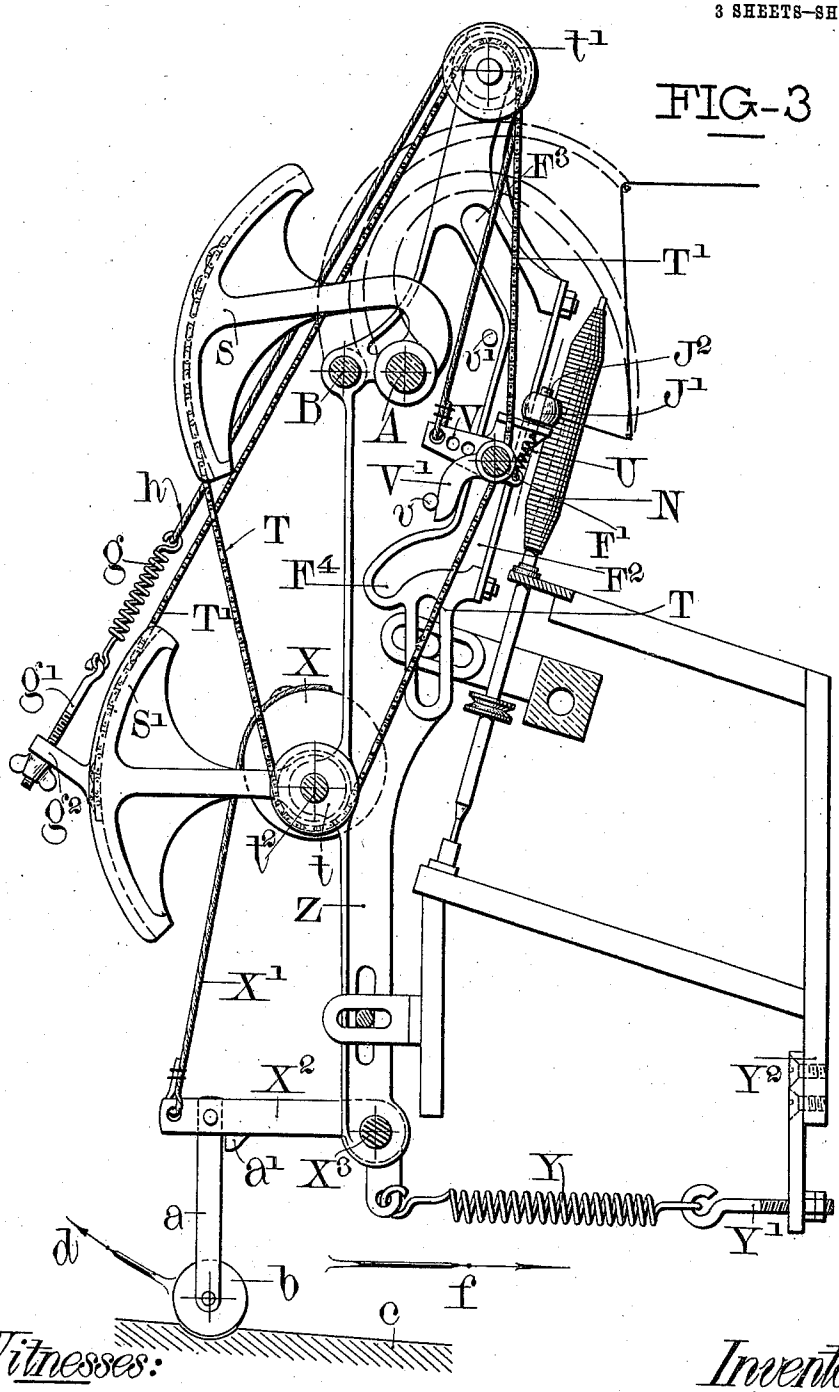
3 SHEETS—SHEET 2.

FIG-3



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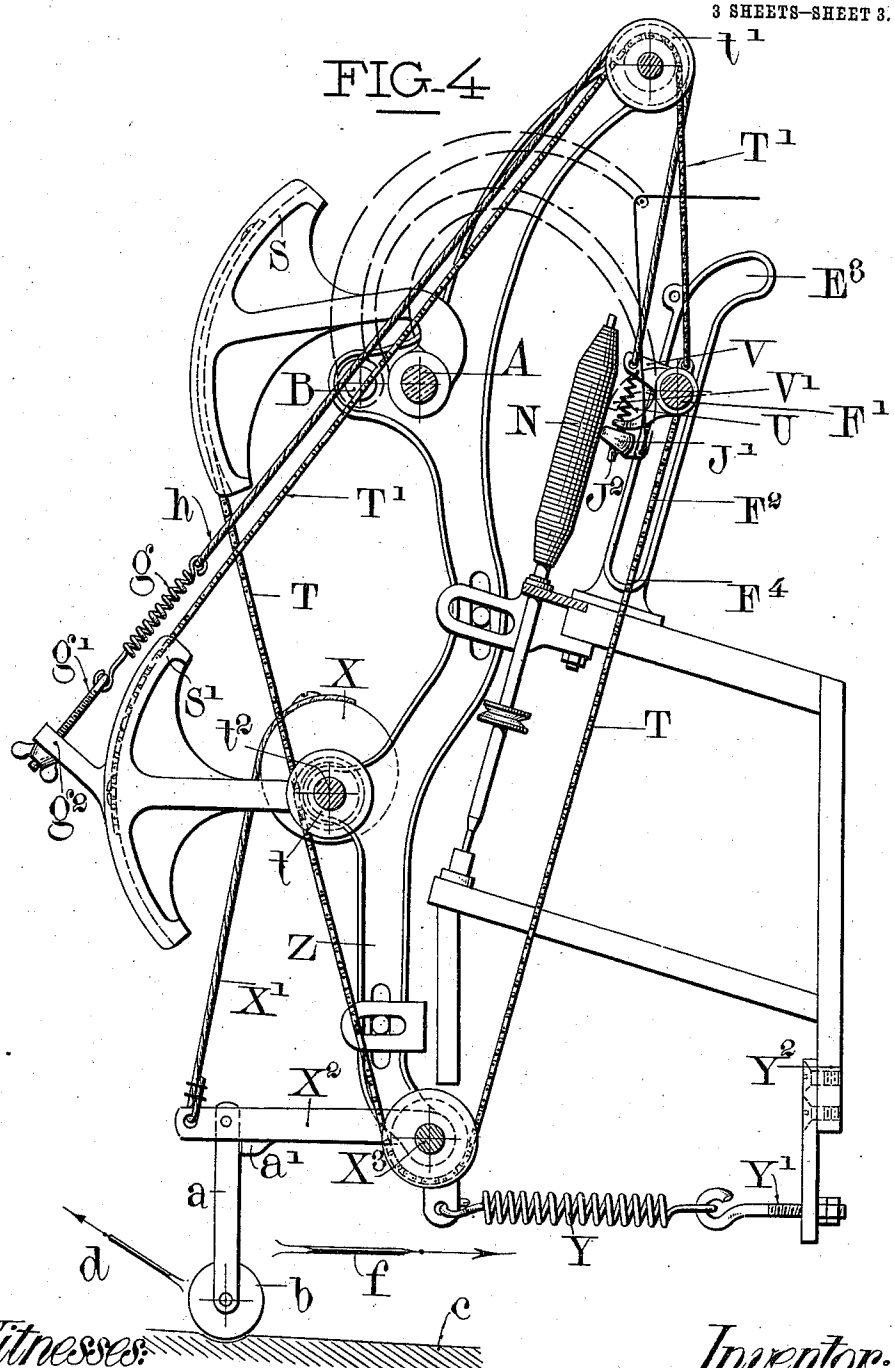
3 SHEETS—SHEET 3.

FIG-4



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UNITED STATES PATENT OFFICE.

PIERRE VINDRIER, OF LYON, FRANCE.

SELF-ACTING MULE.

984,786. Specification of Letters Patent. Patented Feb. 21, 1911.

Application filed June 27, 1910. Serial No. 569,156.

To all whom it may concern:

Be it known that I, PIERRE VINDRIER, a citizen of the French Republic, residing at Lyon, in France, have invented a certain new and useful Improvement in Self-Acting Mules, of which the following is a specification.

The present invention relates to improvements in self acting mules for the purpose of obtaining hard and compressed cops having for the same size a great deal more thread than ordinary cops. This result is obtained by the use of rollers which bear strongly against the cops during the winding and are separated therefrom during twisting which is done in the usual manner. For this purpose the supports of the rollers are fixed to a bar extending along the length of the machine and which takes all the movements of the shaft of the thread winding guide.

In order to have a very regular pressure along the whole length of the cop it is necessary that the displacements of each roller is effected along a line parallel to the axis of the cop, during the operation of winding, and that they separate sharply at the ends of its stroke in order to have no action during twisting. These different movements can be obtained in different ways, the annexed drawings show by way of example three methods of producing said movements.

Figure 1 is a diagrammatic view of the most simple manner of carrying out the invention, in this figure it is assumed the carriage is shown in the winding position. Fig. 2 is a view of the same arrangement in the twisting or spinning position. Fig. 3 illustrates an improved arrangement by which the rollers are displaced parallel to the axis of the cops during winding. Fig. 4 is a modification of construction for obtaining the same result.

Referring firstly to Figs. 1 and 2. A is the ordinary actuating shaft of the thread guide or faller A^2 and B the actuating shaft of the twist thread guide or counter-faller B^2 which are given the usual movements. C is a supplementary shaft connected to the shaft A by two levers C^1 A^1 and a link D; these two shafts are thus united in their movements. On the shaft C are fixed, at intervals, supports E which sustain a bar F extending along the length of the apparatus. On this bar the carriers for the rollers for compressing the cops during winding, are fixed. These roller carriers are each constituted by a bracket G on which is articulated at H a rod I the upper cylindrical extremity of which forms the axle for a roller J of glass, aluminium, or other material. The lower end of the rod I is provided with an extension K to which the one end of a spring R is attached the other end of which is attached to an arm L^1 of a rod L fixed to the bar F. By these means the roller bears constantly upon the cop irrespective of the thickness of the latter and the winding point of the thread. The rollers J can bear directly on each cop, or can be placed between them, at the same or at slightly different levels. During winding as the thread is wound on the spindles M to form the cops N the rollers J which are at the level of the point of winding, bear sufficiently forcibly on the cops by the tension of the springs R. The wound material is thereby compressed and consequently for a given size, cops made by means of the improved device are harder and contain more thread than ordinary cops. During twisting the shaft A of the thread winding guide oscillates and takes the position shown in Fig. 2 thereby shifting the shaft C and consequently also the supports E. The rollers J are brought out of contact with the cops and twisting of the yarn is effected in the usual manner. At this moment the counter-faller comes into action, acting as a tension compensator and according to greater or smaller diameter of the cop, it rises or falls in the same manner as in known apparatus.

The principle of the invention being thus indicated it will be shown how it can be applied in different manners. For instance, as the bar F describes a curvilinear movement around the shaft A (Figs. 1 and 2) the pressure of the rollers J is not uniform on the whole length of the cops. To obtain regularity of pressure it is necessary to displace the roller bearers parallel to the axes of the spindles for which purpose one of the devices shown in Figs. 3 and 4 can be employed. Further in self acting mules the faller is lowered at the correct moment by the traction of a chain driven by friction gear, its rising movement being governed by springs or counterweights. If it is required to adapt the invention to existing machines, it is necessary to increase the power of the lifting springs so that they can lift the additional weight, it can also be understood that the chain and the friction gear have not sufficient power to operate the faller. To

overcome these difficulties the rising movement of the bar is effected by a spring actuated shaft. During spinning and backing off the action of the springs is suppressed as they can only act during winding.

In the arrangement shown in Fig. 3 the rollers J^1 are supported on a bar F^1 movable in a guide F^2 in a direction parallel to the axis of the cop N. The descending movement of the bar F^1 is produced by the rocking of the shaft A of the thread winding guide, by means of chains T traveling over pulleys t and attached to sectors S fixed on the shaft A. Its rising movement and its return to the descending movement are produced by chains T^1 passing over pulleys t^1 and attached to sectors S^1 keyed on a shaft t^2 carried by the support Z of the mule. On the shaft t^2 cams X are keyed on which are fixed chains X^1 each connected to a bent lever X^2 pivoted at X^3 and under the action of a spring Y the tension of which can be regulated by means of a screw hook Y^1 fixed to the carriage of the spinning mule. On the horizontal arm of the bell crank lever X^2 an arm a is articulated carrying a roller b traveling on an inclined rail c. The arm a can turn freely on the lever X^2 in the direction of the arrow d but cannot turn upon the lever X^2 in the opposite direction since its movement in that direction is prevented by the abutment a^1 on the lever X^2. Consequently when the arm a is deflected in the direction of the arrow d, as it will be when the carriage moves in the direction of the arrow f, it no longer supports the lever X^2 which can then move downward under the tension of the spring Y. But when the arm a is deflected in the direction contrary to the arrow d, namely when the carriage is moving in a direction contrary to the arrow f, the arm a and lever X^2 act as a rigid whole and the downward movement given to the lever X^2 by the spring Y is limited by the bearing of the roller b on the rail c and consequently the spring Y cannot cause such downward movement of the lever X^2 as would have any material effect on the chain X^1. A shallow recess is made at a suitable place in the rail c to receive the roller b in order to enable the arm a to take more readily a position perpendicular to the rail in the position intermediate of its two movements. Consequently traction of the chain T^1 is produced which causes the bar F^1 to ascend.

The pressure of the rollers J against the cops N is obtained by an arm V fixed on the shaft F^1 and actuated by a chain h which is attached to one of the sectors S^1 by means of a spring g given suitable tension by means of a screw g^1 traversing a lug g^2 cast on the sector. The rollers J^1 can oscillate around the bar F^1 to which they are connected by springs U intended to compensate the various thicknesses of the cops and the parallel positions of the spindles. The upper end of the guide F^2 is curved as at F^3 which is for the purpose of drawing back the roller immediately it no longer has contact with the cop, at the same time that an arm V^1 fixed to the bar F^1 abuts against a stop v^1. This mechanism prevents the rollers from rocking under the action of the spring U and causes them normally to lie against the cops at the commencement of winding. A stop v is also provided at the bottom of the guide F^2 which is terminated by a part F^4, having a different curvature to that of the part F^3 for the purpose of disengaging the rollers at the end of the course.

In the arrangement described the compressor roller is behind the cop, but the same result can be obtained by arranging it in front as shown in Fig. 4. In this case the roller J^1 has preferably a conical point J^2 surmounted by a helicoidal cushion, the conical point being intended to determine the position of the thread being wound the helicoidal slope of its rising part being for the purpose of giving the thread a slight vertical reciprocating movement facilitating the tightening of the cops. In this construction the various movements are produced in the same manner as in Fig. 3. The same reference letters indicate the same parts.

What I claim as my invention and desire to secure by Letters Patent of the United States is:—

1. In a self acting mule the combination with the winding and twisting devices thereof, of means connected to the winding device for compressing a cop during the winding operation and for rendering said compressing means inoperative during the operation of the twisting devices.

2. In a self acting mule the combination with the winding and twisting devices thereof, of means for compressing a cop and means co-acting with said winding devices for moving said compressing means in a path parallel to the longitudinal axis of the cop during the winding operation.

3. In a self acting mule the combination with the twisting and winding devices thereof the latter including a rocking shaft, of a shaft adapted to move in unison with said rocking shaft, a cop pressing roller in operative connection with said latter shaft, means co-acting with said shafts for holding said roller in resilient contact with the surface of a cop during the winding thereof and for rendering said compressing roller inoperative during operation of the twisting devices.

4. In a self acting mule the combination with the twisting and winding devices thereof the latter including a rocking shaft, of a shaft adapted to move in a plane parallel

to the axis of the cop in unison with said rocking shaft, a cop pressing roller in operative connection with said latter shaft, and means co-acting with said shafts for holding said roller in resilient contact with the surface of a cop during winding thereof, and for rendering said compressing roller inoperative during operation of the twisting devices.

5. In a self acting mule the combination with the twisting and winding devices thereof, the latter including a rocking shaft, of a shaft adapted for movement in a plane parallel to the axis of the cop, in unison with said rocking shaft, a cop pressing roller, resilient actuating members in operative connection with said shafts for moving said roller in a path parallel to the longitudinal axis of the cop and means co-acting with said shafts for resiliently pressing the roller against the surface of the cop during the winding operation, and for deflecting the path of movement of the roller at the end of its operative course and for rendering said compressing roller inoperative during the action of the aforesaid twisting devices.

In witness whereof I have signed this specification in the presence of two witnesses.

PIERRE VINDRIER.

Witnesses:
JEAN GERMAIN,
GUILLAUME PIOCHE.