M. MAMLOFF.

SELF ACTING MULE.

APPLICATION FILED AUG. 7, 1911.

1,054,855.

Patented Mar. 4, 1913.

2 SHEETS—SHEET 1.

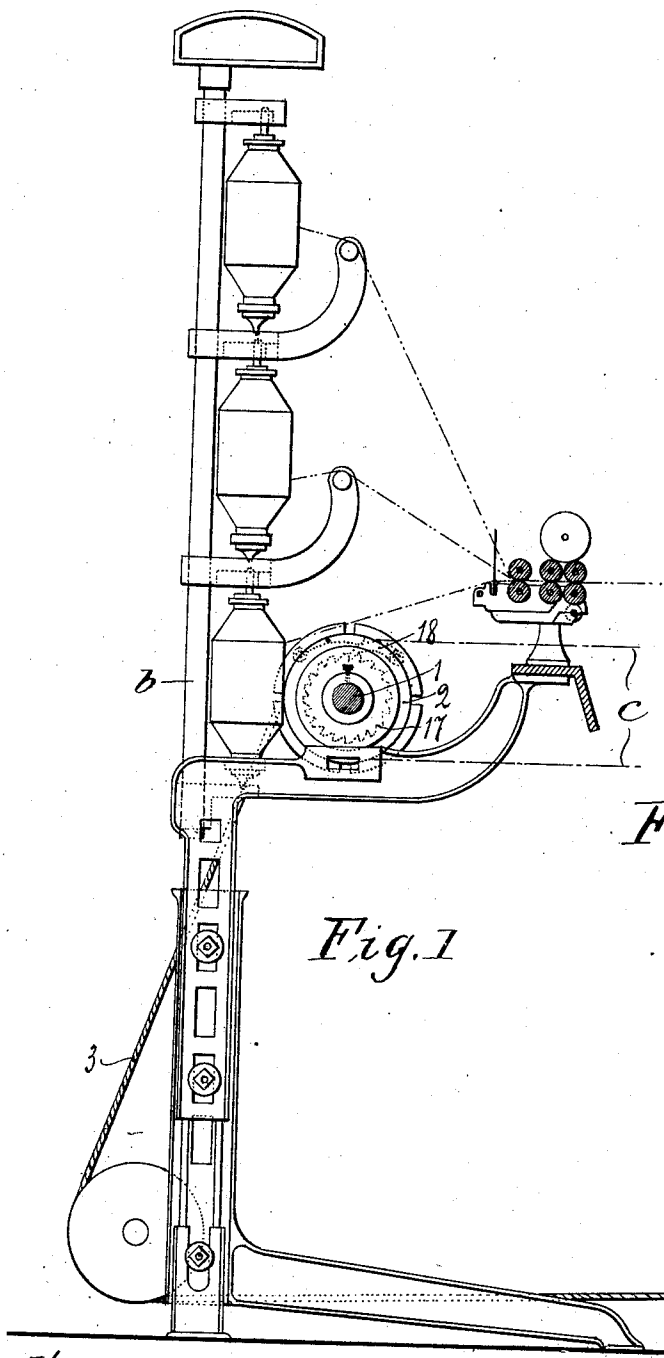

Fig. 1

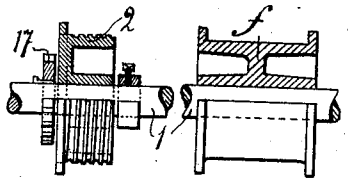

Fig. 3 Fig. 3a

Witnesses

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2 SHEETS—SHEET 2.

Fig. 2a

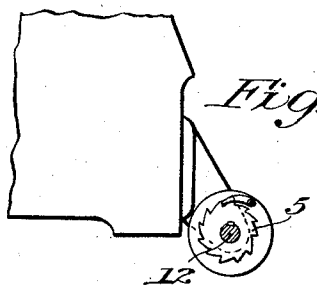


Fig. 4

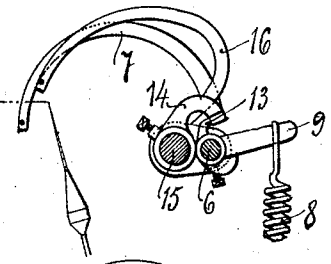
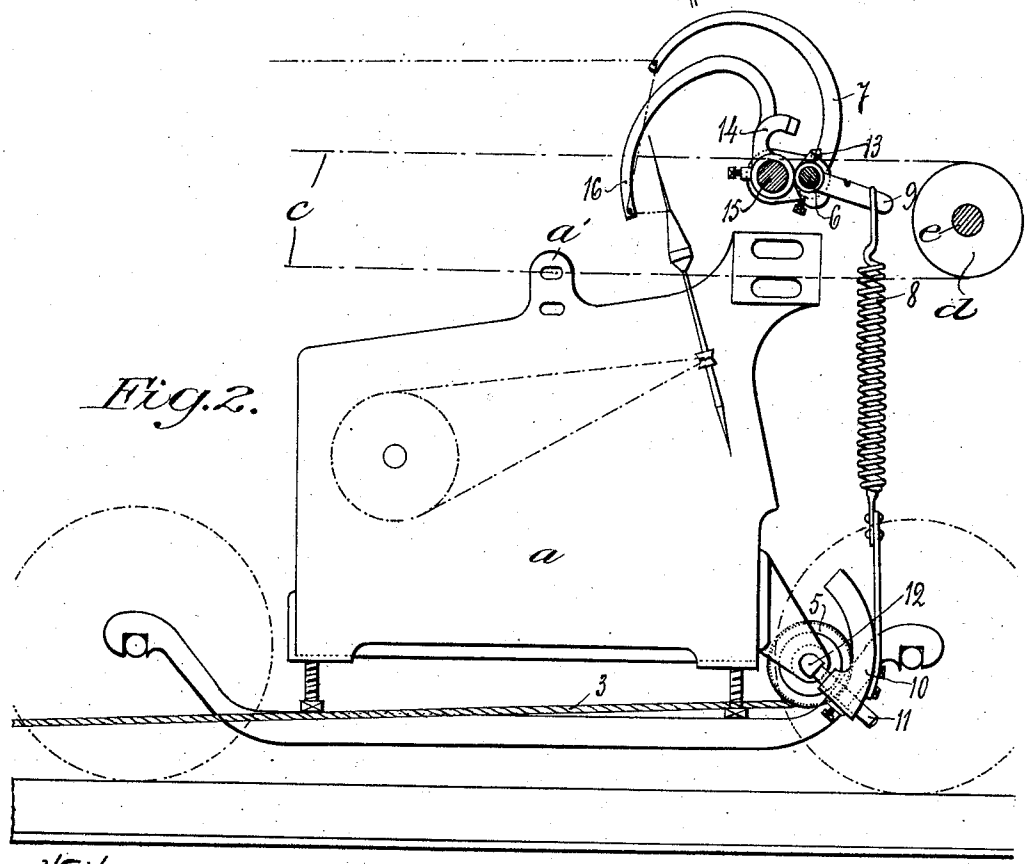


Fig. 2.



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UNITED STATES PATENT OFFICE.

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SELF-ACTING MULE.

1,054,855. Specification of Letters Patent. Patented Mar. 4, 1913.

Application filed August 7, 1911. Serial No. 642,840.

To all whom it may concern:

Be it known that I, MICHAEL MAMLOFF, a subject of the Emperor of Russia, residing at Rodniki Village, in the Government of Kostroma, Russia, have invented certain new and useful Improvements in or Relating to Self-Acting Mules, of which the following is a specification.

In the spinning of cotton by mule spinning machines it is very desirable to obtain closely wound spools or cops in order to obviate various disadvantages and defects in the finished spools or cops and also to enable as great a length of thread as possible to be wound into a spool or cop of a given size. For this purpose the spun yarn must be held taut during the operation of winding it onto the spools or cops and ordinarily this is effected in mule spinning machines by suitably raising the counter faller each time the carriage reaches the end of its stretch or traverse. The devices at present employed for effecting this operation are however unsatisfactory for several reasons, for example they do not insure that the tension shall be put upon the thread with the necessary gentleness and freedom from shock, nor that the tension shall be of the desired uniformity so that repeated breakages of the thread result, moreover they require the provision of special copping rails or templets either for the operation of the tension device itself or for the reduction of the tension during the short unwinding operation at the end of the stretch. These copping rails or templets which are arranged on the floor of the spinning mill inconvenience the spinners. Furthermore the entire apparatus needs constant attention as uncleanliness of the working surfaces of the rails or templets, one-sided wear of the rollers, etc., may give rise to unsatisfactory working. According to this invention these disadvantages are obviated by effecting the tensioning of the thread during the inward run or winding stroke of the carriage, yieldingly and without shock, from the shaft which pulls the carriage in, the tensioning of the thread being easily and conveniently regulated within any desired limits.

A construction of self-acting mule spinning machine embodying the invention is shown by way of example in the accompanying drawings.

Figure 1 is a longitudinal vertical section through the driving head of the machine, the controlling and driving mechanisms with which this invention is not concerned being omitted for the sake of clearness. Fig. 2 shows the traveling mule carriage with some parts of the improved apparatus. Fig. 2^a is a detail view of a modification of Fig. 2. Fig. 3 is a detail view of the drum for actuating the counter faller. Fig. 3^a is a detail view of the pulley for actuating the mule carriage. Fig. 4 shows the faller wire, counter faller and adjacent parts in other positions than those seen in Fig. 2.

The mule carriage *a* is run to and from the driving head *b* by means of an endless rope or band *c* which travels over an idle pulley *d* mounted to the right of the carriage on a fixed shaft *e* and over a driving pulley *f* (Fig. 3^a) which is fixed to a driving shaft 1 journaled in the driving head *b*, said band being connected to a projection *a'* on the mule-carriage *a* in any suitable manner.

Fixed upon the shaft 1 which actuates the carriage is a drum 2 to which is attached one end of a cord or chain 3 passing over a guide roller 4 and the other end of which is connected to a second drum, or cord pulley 5 mounted to rotate in bearings on the mule carriage. The diameter of the drum 2 is larger than that of the pulley *f* so that when the carriage runs inwardly and the thread is being wound the cord 3 is wound upon the drum 2 rather more quickly than the carriage moves, so that the pulley 5 is gradually rotated through a fixed angle clockwise. This angular movement is transmitted to the shaft 6 of the counter faller 7 preferably through an elastic intermediate member such as a helical spring 8 or the like, the upper end of which is connected to an arm 9 of the shaft 6, while its lower end is connected either to the pulley 5 itself or to a lever, or a segment, rigidly or adjustably attached to the pulley.

In the construction of apparatus shown by way of example in the drawing the lower end of the spring 8 is connected to a segment 10 which is adjustably mounted upon a radially extending arm 11 on the shaft 12 of the pulley 5. By moving the segment 10 along the arm 11 the travel of the lower end of the spring 8 during the running in and out of the carriage can be regulated within any desired limits, that is to say the amount of tension of the spring 8 can be varied, while by moving the upper end of the

spring along the arm 9 the position of the upper end of the spring can be altered in relation to the shaft 6.

After the carriage has been run in the faller wire 16 rises and the counter faller 7 simultaneously sinks into the position shown in Fig. 4. In order to secure the faller wire in this position during the stretch or spinning operation the arm 9 is provided with a stop or lug 13 which engages a hook-shaped finger 14 fixed on the shaft 15 of the faller wire 16. During the short unwinding operation at the close of the stretch, in which the faller wire moves downwardly, the finger 14 again releases the stop 13 and the tensioning device can once more come into action. The stop 13 may obviously be fixed as an independent part of the shaft 6 of the counter faller, and the finger 14 may form part of the faller 16.

The arm 9 may be fixed on the shaft 6 of the counter faller 7 so that it can be moved only with this shaft, or the same may be arranged upon the said shaft in such a manner, that it can be rotated clockwise only with this shaft, whereas the latter can be rotated in the same direction for a fixed angle independently of that arm. In this case it will be possible to raise by hand the counter faller 7 also then, when the arm 9 is held in the position shown in Fig. 4 by the coaction of the finger 14 on the shaft 15 and the lug 13 on the arm. This raising by hand of the counter faller may be necessary some time for instance in the case when the threads from some or all the spindles are to be twisted together.

To compensate for the lengthening of the cord 3 which takes place in time, or to avoid the resulting necessity of coiling an undue amount of the cord around the drum, it is convenient to arrange the drum 2 or the pulley 5 angularly adjustable upon the corresponding shaft so that when desired the operative length of the cord 3 can be shortened by adjustment of the drum 2 of the pulley 5 through a fixed angle. Figs. 1 and 3 illustrate by way of example one arrangement of this kind. In this case the drum 2 is freely mounted on its shaft 1 and adjacent to the drum there is keyed upon the shaft a ratchet wheel 17 with the teeth of which a pawl 18 pivoted to the drum 2 engages and which permits of the rotation of the drum 2 in the direction necessary to shorten the cord. Instead of the arrangement described the drum 2 itself may be provided with teeth or a ratchet wheel may be rigidly connected thereto, the pawl 18 being pivoted on an arm keyed on the shaft 1. It is also obvious that the arrangements described as applied to the drum 2 may if desired be applied to the pulley 5 as shown in Fig. 2a.

The segment 10 is eccentrically arranged in relation to the pulley 5 as shown in Fig. 2, so that when the carriage runs in the action on the spring 8 gradually increases and the upper or topmost windings of each conical layer of thread will consequently be wound upon the spindles with especial tension; a feature of considerable importance. While the carriage is pursuing its course to and from the creel frame the pulley 5 rotates in all only about 90° in one direction and the other and it may therefore be replaced by a sector or segment or a lever arm fixed on the shaft 12. In the case of a sector or a segment these may be so constructed that the tension of the spring increases in the desired degree with the approach of the carriage to the frame. The drum 2 may have a smooth external surface or be provided with grooves for the cord, as shown.

The details of construction of the improved apparatus may be other than as shown and described without departure from the invention, for example, the segment 10, Fig. 2, may be concentric instead of eccentric.

What I claim is:—

1. In an apparatus of the character described, the combination with a traveling mule-carriage, a counter faller pivoted on the carriage, and an oscillatory member mounted on the carriage and yieldingly connected to the counter faller, of a driving shaft, a driving member connecting the shaft and carriage, an actuating member for the oscillatory member, and means on the shaft for moving the actuating member faster than the driving member.

2. In an apparatus of the character described, the combination with a traveling mule-carriage, a counter faller pivoted on the carriage, and an oscillatory member mounted on the carriage and yieldingly connected to the counter faller, of a driving shaft, an endless band connected to the carriage, a pulley on the shaft for moving the band, a rope connected to the oscillatory member, and a drum on the shaft connected to the rope and of larger diameter than the diameter of the pulley.

3. In an apparatus of the character described, the combination with a traveling mule carriage, a counter faller pivoted thereon, and an actuating member on the carriage connected to said faller, of a driving shaft, moving means connecting the shaft to the carriage, a drum on the shaft, a flexible member connecting the drum and actuating member, the diameter of said drum being such that the flexible member is moved toward the shaft faster than the carriage, whereby the actuating member is moved through a fixed angle, for the purpose specified.

4. In an apparatus of the character described, the combination with a traveling

mule carriage, and a counter faller pivoted thereon, of a pulley journaled on the carriage, a flexible member connecting the counter faller and pulley, a driving shaft, means operated by the shaft for moving the carriage to and from the latter, a drum on the shaft, a flexible member connecting the drum and pulley, the diameter of said drum being such that the flexible member is wound on the drum at a greater speed than the speed of the carriage toward the shaft, whereby the pulley on the carriage is gradually partially rotated through a fixed angle, for the purpose specified.

5. In an apparatus of the character described, the combination with a traveling mule carriage and a counter faller pivoted thereon, of a pulley journaled on the carriage, a flexible member connected to the pulley and to an arm on the counter faller, means to regulate the tension of the flexible member, a driving shaft, means operated by the shaft for moving the carriage to and from the latter, a drum on the shaft, a flexible member connecting the drum and pulley, the diameter of said drum being such that the flexible member is wound on the drum at a greater speed than the speed of the carriage toward the shaft, whereby the pulley on the carriage is gradually partially rotated through a fixed angle, for the purpose specified.

6. In an apparatus of the character described, the combination with a traveling mule carriage, and a counter faller pivoted thereon, of a pulley journaled on the carriage, a segment adjustably connected to the pulley, a spring connected to the segment and to an arm on the counter faller, a driving shaft, means operated by the shaft for moving the carriage to and from the latter, a drum on the shaft, a flexible member connecting the drum and pulley, the diameter of said drum being such that the flexible member is wound on the drum at a greater speed than the speed of the carriage toward the shaft, whereby the pulley on the carriage is gradually partially rotated through a fixed angle, for the purpose specified.

7. In an apparatus of the character described, the combination with a traveling mule carriage, and a counter faller pivoted thereon, of a pulley journaled on the carriage, a ratchet connection between the pulley and its journal, a flexible member connected to the pulley and to an arm on the counter faller, means to regulate the tension of the flexible member, a driving shaft, means operated by the shaft for moving the carriage to and from the latter, a drum on the shaft, a flexible member connecting the drum and pulley, the diameter of said drum being such that the flexible member is wound on the drum at a greater speed than the speed of the carriage toward the shaft, whereby the pulley on the carriage is gradually partially rotated through a fixed angle, for the purpose specified.

8. In an apparatus of the character described, the combination with a traveling mule-carriage, a counter faller pivoted thereon, and a driving head mounted in front of the carriage, of a rotary shaft journaled in the head, a driving pulley fixed on the shaft, an endless band driven by said pulley and connected to the carriage, an oscillatory member mounted on the carriage, a flexible member connecting the counter faller to the oscillatory member, a drum fixed on the rotary shaft of smaller diameter than the diameter of the pulley, and a rope connecting the drum and oscillatory member.

In testimony whereof I affix my signature in presence of two witnesses.

MICHAEL MAMLOFF.

Witnesses:
KILIAN STEININGER,
L. HOLTZHAUER.