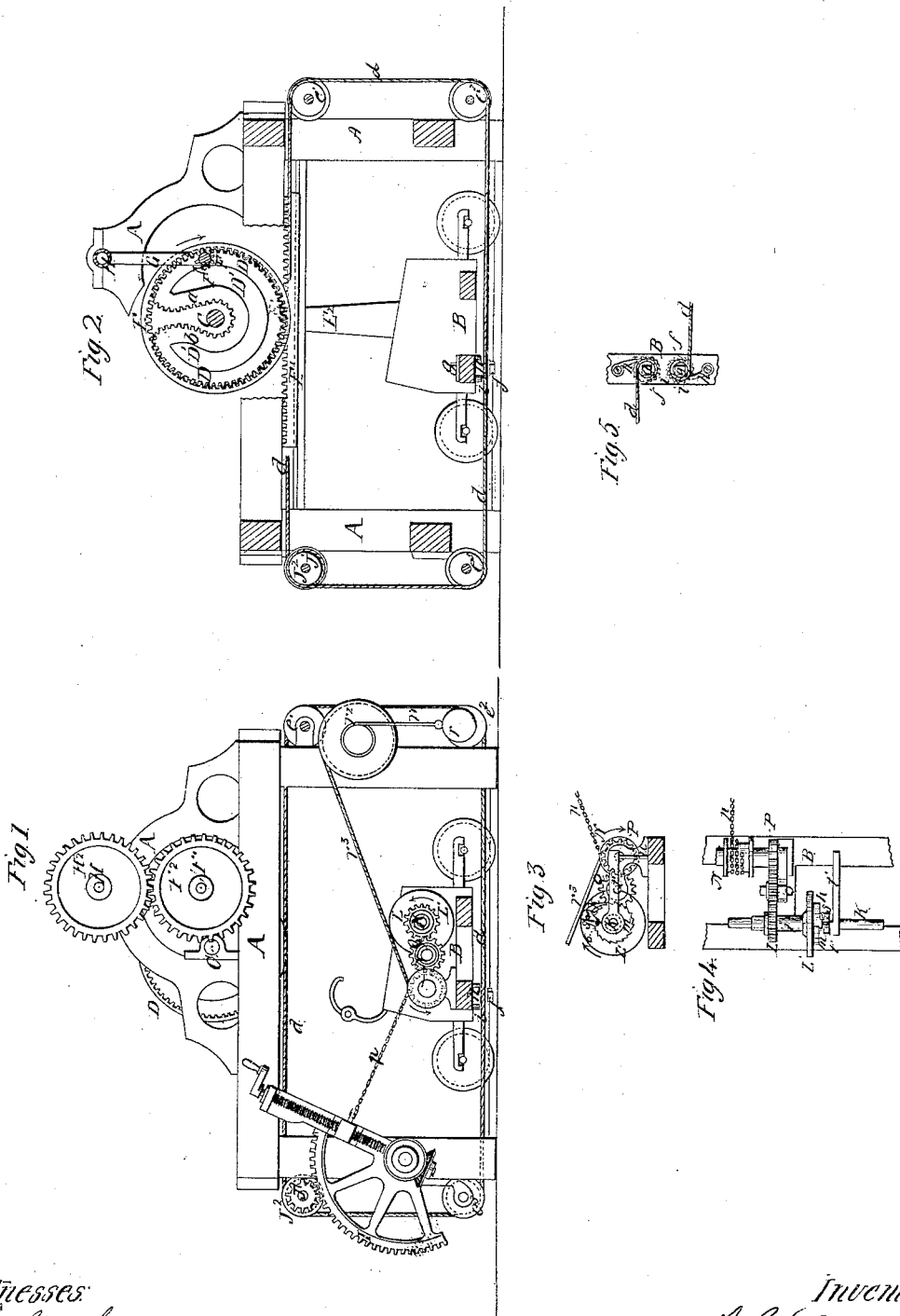


A. G. Cumstock.
Spinning Mule.

N^o 49,861.

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Witnesses:
J. W. Coombs
G. W. Reed

Inventor:
A. G. Cammoch
per Brown Beemer & Co
attorneys

UNITED STATES PATENT OFFICE.

ALEXANDER G. CUMNOCK, OF LOWELL, MASSACHUSETTS.

IMPROVEMENT IN SELF-ACTING MULES FOR SPINNING.

Specification forming part of Letters Patent No. 49,861, dated September 12, 1865.

To all whom it may concern:

Be it known that I, ALEXANDER G. CUMNOCK, of Lowell, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Self-Acting Mules for Spinning; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side view of a mule-head and vertical section of the carriage illustrating my invention. Fig. 2 is a vertical section of the mule-head and carriage. Fig. 3 is an opposite side view of the spindle-driving mechanism from that shown in Fig. 1. Fig. 4 is a plan view corresponding with Fig. 3. Fig. 5 is a plan view showing the manner in which the rope which drives the quadrant-gear is attached to the carriage.

Similar letters of reference indicate corresponding parts in the several figures.

The first part of this invention relates to the employment of a mangle-wheel for producing the movement of the mule-carriage; and it consists in giving the inside gearing and guard of this wheel such a curvature as to produce such a movement of the carriage that the quadrant-gear employed to produce the winding-on movement of the spindles may be driven by the movement of the carriage not only without the use of a friction-brake or binders to check the said winding-on movement as the carriage strikes in, but also without a scroll, thereby much simplifying the construction of the mule.

Another part of my invention has for its object the driving of the whole of the spindles on either side of the mule-head from one common horizontal cylinder instead of by means of several vertical drums, as is the common practice, and to dispense with a clutch on the horizontal shaft which runs the whole length of the carriage; and to this end it consists in a novel method of obtaining the rotary movement of the aforesaid shaft on which I arrange the two cylinders, one on each side of the mule-head.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is the frame of the mule-head.

B is the carriage.

C is the horizontal shaft working in fixed bearings in the mule-head frame and carrying the mangle-wheel D and a spur-gear, E, (shown dotted in Fig. 2,) which gears with the horizontal rack E', attached to the carriage by an upright piece, E², for the purpose of driving the same.

F is the pinion for driving the mangle-wheel, fast on a shaft, F', which works in bearings in a yoke, G, which swings from the shaft H, from which motion is communicated to F' by means of spur-gears H² F². The internal gearing of the mangle-wheel and the internal surface of the guard D', which is secured thereto for guiding of the shaft F' and keeping the pinion F in gear, instead of being straight on both sides near the reversing-points of the same, as shown at *a* in Fig. 2, as is customary in the mangle-wheels used in mules, are made with a rounded curve, as shown at *b*, near the extremity, at which the reversal of the carriage, after running in, is effected. The object of this curvature is to make the distance traveled by the pinion in the gearing at *b* greater than in the mangle-wheel of the old form, and thereby to cause the carriage to move up gradually slower before it strikes in. In this way I dispense not only with the scroll, but with a friction-brake and binders, by making the mangle-wheel itself perform the duty of the scroll, friction-brake, and binders, and obtain the necessary reduction of the velocity of the carriage and spindles as the carriage strikes in directly from the mangle-wheel.

I is the quadrant-gear, applied in the usual manner at one side of the mule-head, near the front thereof.

J is the pinion which drives the said gear, fast on a horizontal shaft, J', which works in fixed bearings at the front of the mule-head. This shaft J' has also firmly secured upon it a drum, J², around which are taken several coils of a rope, *d*. One portion of this rope extends downward from the said drum and under a pulley, e³, attached to the lower part of the front of the mule-head, and its end is attached to the bottom of the carriage, and the other portion extends horizontally backward from the said drum over a pulley, e', attached to the upper part of the back of the mule-head; thence downward to and under a pulley, e², attached to the lower part of the back of the mule-head, and its end is attached to the car-

riage. The rope *d*, thus having its two ends attached to the carriage and extending backward and forward from the latter and being coiled around the drum *J*², is caused by the movement of the carriage to give motion to the said drum, the shaft *J'*, and the pinion *J*, and the latter gives motion to the quadrant-gear as the carriage moves in either direction. The ends of the said rope are not attached directly to the carriage, but (as shown in Fig. 5) to two pulleys, *f f*, the vertical axles *g g* of which are fitted to turn in bearings in the bottom of the carriage; and these pulleys have secured to them ratchet-wheels *i i*, the teeth of which are engaged by spring-pawls *h h* attached to the bottom of the carriage. By turning the axles *g g* with a wrench or key the pulleys *f f* are made to tighten the rope *d* whenever necessary, and the tension is retained by the pawls and ratchet-wheels, and thus the use of scrolls or devices of a similar nature used on other mules for tightening the rope which drives the quadrant-gear are dispensed with.

K, Figs. 1, 3, and 4, is the horizontal shaft, which extends the whole length of the carriage, in which it is supported in suitable bearings, and carries the two cylinders, one on each side of the mule-head, for driving the spindles. These cylinders are similar to those used in ordinary throstle or bobbin and fly frames, and as their character is well understood and their representation is not necessary to illustrate my invention, they are not shown in the drawings.

L is a spur-gear secured to a loose sleeve, *l*, which is fitted to turn freely upon the shaft *K*, and to which sleeve there is also secured a disk, *L'*, carrying a pawl, *k*, which enters the teeth of a ratchet-wheel, *m*, firmly secured on the said shaft.

N is the drum on which is coiled the chain *p*, by which the running in of the carriage is made to produce the necessary rotary motion of the spindles to effect the winding-on operation. This chain is connected with the quadrant in the usual or any suitable manner. The shaft of the drum *N*, running in suitable bearings in the carriage, has firmly secured to it a spur-gear, *P*, which is geared by an intermediate spur-gear, *Q*, with the spur-gear *L* of the loose sleeve on the cylinder-shaft *K*. The teeth of the ratchet-wheel *m* are set in such a direction that as the drum *N* is turned in the direction of the arrows shown near it in Figs. 1 and 3 by the draft of the chain *p* produced by

running in the carriage, the gear *L* and attached disk *L'* turning in the same direction will cause the said pawl to turn the ratchet-wheel, and thereby produce the necessary rotary motion of the shaft *K*; but as the carriage runs out and the drum *N* and gears *L Q P* are turned in the opposite direction by the weight *r* strap *r'*, pulley *r*², and the rope *r*³, connected with the drum, the pawl will pass freely over the ratchet-wheel without interfering with the operation of the shaft while the latter is being driven by a belt and pulleys for the operation of twisting and drawing.

In order to avoid unnecessary friction of the pawl *k* upon the teeth of the ratchet-wheel while the carriage runs in, the spring *s*, which operates to press the pawl into gear while the carriage runs out, is bent around and made to clasp a stationary hub, *t*, which encircles and is concentric with the shaft *K*, and which is held stationary by means of an arm, *t'*, which is connected by a rod, *u*, with one of the rails of the carriage. This spring rests against the head of the pin 8 on which the pawl is hung, and enters between two pins, 6 and 7, attached to the heel of the pawl and acts upon the pin 6 to make the pawl engage with the ratchet when the carriage runs in; but when the disk *L'* turns in the opposite direction, as the carriage runs out, the friction of the spring upon the hub causes it to hang back against the pin 7, and so tend to draw the pawl out of contact with the ratchet.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The mangle-wheel *D*, having its inside gearing and guard constructed substantially as herein described, applied to a mule in such manner as that it is made to check the movement of the carriage and the winding-on movement of the spindles as the carriage strikes in without the use of a scroll, friction-brake, or binders.

2. Combining the shaft *K* of the carriage from which the spindles are driven with the drum *N*, on which the chain *p* from the quadrant-gear is wound by means of gears *L Q P*, a disk, *L'*, or its equivalent, a pawl, *k*, and a ratchet-wheel, *m*, the whole applied and operating substantially as herein specified.

ALEXANDER G. CUMNOCK.

Witnesses:

G. H. WELLMAN,

HORATIO G. F. CORLISS.