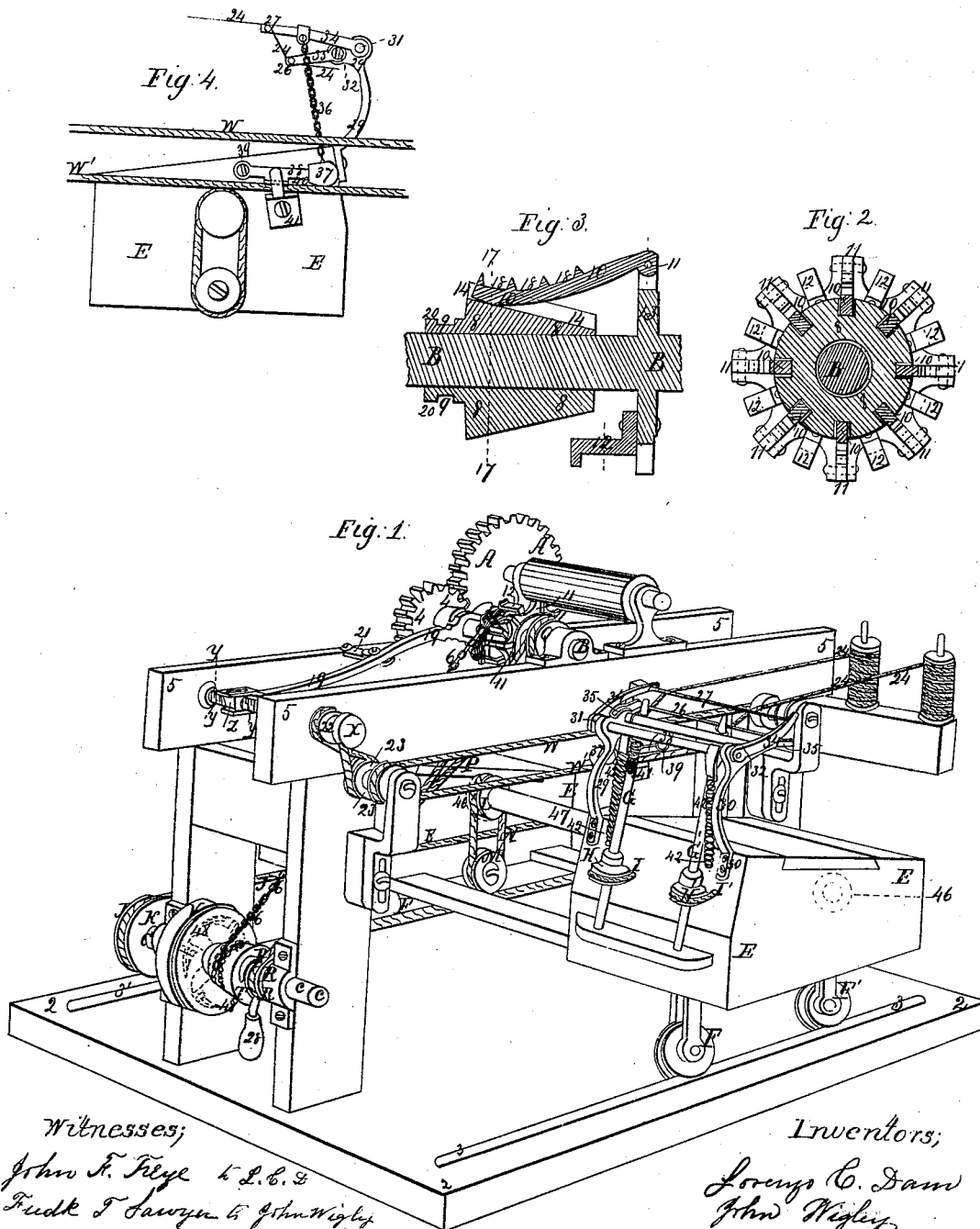


Dann & Wigley. Self-Acting Mule.

N^o 51,930.

Patented Jan. 9, 1866.



Witnesses;
John F. Faye L. L. C. S.
Fredd T. Sawyer & John Wigley

Inventors;
Lorenz C. Dann
John Wigley

UNITED STATES PATENT OFFICE.

LORENZO C. DAM, OF LOWELL, MASSACHUSETTS, AND JOHN WIGLEY, OF MILFORD, NEW HAMPSHIRE.

IMPROVEMENT IN SELF-ACTING MULES.

Specification forming part of Letters Patent No. 51,930, dated January 9, 1866.

To all whom it may concern:

Be it known that we, LORENZO C. DAM, of Lowell, in the county of Middlesex and State of Massachusetts, and JOHN WIGLEY, of Milford, in the county of Hillsborough and State of New Hampshire, have invented a new and useful Improvement in Self-Acting Mules; and we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters and figures marked thereon.

Figure I is a perspective view. Fig. II is a section of the cone on line 17, Fig. III, and end view of the same. Fig. III is a longitudinal section of the cone and the scroll; Fig. IV, faller-wire and nippers.

Our improvement relates only to that part of the mule that produces the cop or bobbin of yarn, commonly called the "wind" movement. The motions of the parts comprised in our mechanism bear a definite relation to and are timed with the movements of the spindles, both in their axial revolution and in their horizontal motion back and forth upon the carriage; but our improvement relates solely to those parts that act directly in forming or building the cop.

In the drawings those parts are omitted from the mule-head that relate to other functions of the machine.

The "build" or structure of the cop is a matter of great importance, as upon this depends the free and regular delivery of the filling when the cop is placed in the shuttle of a loom. The exterior form or outline should also be uniform in all of the bobbins or cops, as well as of a definite diameter, to correspond with the size of the cavity in the shuttle. It is also important that the strain upon the thread or yarn should be uniform throughout the whole extent of the wind, whether the yarn be running upon the bare spindle or upon the outer layers of the cop.

The "shaper," as it is termed in the common mule, gives the general shape or outline of the cop, but the equal tension of the yarn is maintained and regulated solely by the strain upon the yarn between the rollers and the spindles.

The mechanism devised by us for giving the wind produces an evenly-wound cop or bobbin that has not been subjected to undue tension.

When the mule is constructed in the man-

ner herein described it is very much simplified, many complicated parts are dispensed with, and the weight of the machine is reduced about three hundred pounds.

In Figure I the large gear A represents the mangle-gear, which furnishes the driving-power for the wind. This drives the gear 4 affixed to the horizontal shaft B, which extends across the frame-work 5 5, and has upon it the apparatus represented in Figs. II and III, which operates the wind and constitutes one of the main features of our invention.

The shaft B is so geared as to make four and a half revolutions to each stretch of the mule. It has upon it the expanding drum or changeable scroll, Figs. II and III. This consists of a flange, 13, affixed to the shaft B, and having eight arms or levers, 10 10 10, extending from it and working in grooves 14 of a cone, 8, which is fitted to traverse horizontally upon the shaft B, one end of each arm being jointed to the flange 13, as represented at 11. The outer edges of the arms 10 are grooved or notched spirally, as at 18 18 18, to receive the chain 6, which is taken up and let off from the winding apparatus, as hereinafter described. The cone 8 revolves freely upon the shaft B, and has at its large end a collar, 20, and circular groove 9, formed to receive the forked end of the lever 19, the fulcrum of which is upon the stand 21. The other end of the lever is provided with an attachment which holds the nut Z, having a thread to correspond with the horizontal screw Y, which extends across the frame 5 parallel with the shaft B, and has at one end the pulley 22, which is driven, by the band X, from the pulley 23. The cone 8 is placed close up to the flange 13 when the mule commences to build the cop 15, the free ends of the arms 10, which have a slight curve upward, resting in the grooves and forming nearly a straight or cylindrical drum. As the spindles G G' fill with yarn the cone 8 is drawn out from the ends of the levers or arms 10, and forms a scroll or cam for the chain 6 to wind upon, the length of chain taken up varying with the change of the circumference as measured upon the arms 10 around the grooves 18 18. The withdrawal of the cone 8 from the arms 10 is effected by the lever 19, one end of which plays in the groove 9, while the other end traverses upon the revolving helix Y. The screw is work-

by a small belt, X, by means of the tension of the yarn 24 as it winds on the spindles G G'.

The carriage E of the mule is driven in the usual manner, the trucks F F' running upon the rails 3 3, which rest upon the floor 2. A small part of the carriage is represented in the drawings, two spindles only being shown. In the working-mule there are several hundreds of spindles, and the combined strength of all the yarns is sufficient to actuate the regulating apparatus. The rollers that deliver the yarn, as well as other parts that do not relate to the wind, are omitted in the drawings. A long cylinder or drum revolving upon the bearing 7 within the box of the carriage E drives the whirls and spindles H G by means of the band I. The speed of the spindle G is changed by the tension of the yarn or thread 24, which passes, previous to its being wound up, over the faller-wire 27 and under the faller-wire 26. These wires and their connections with the regulating-band W W are constructed as follows: Several brackets, 29 30, are affixed to the traversing-carriage E, and have at the top two joints, 31 32, from which extend the arms 34 and 35. The upper one, 34, carries the horizontal wire 27, called the "counter-faller," and the lower one, 35, carries the wire 26, called the "building-faller." Both of these wires extend the whole length of the carriage.

To the arm 34 of the counter-faller a chain or wire, 36, is fastened, which extends downward and takes hold of the weight 37, which is attached to the free end of the arm 38. At the other end is the fulcrum 39, attached to the end of the carriage. There is also a small stud or knob, 41, affixed to the carriage just below the friction or holding plate 40, which is on the lower edge of the arm 38, these parts 40 and 41 being intended to act as nippers and take a firm hold of the cord or band W', thus attaching it at certain times to the carriage and causing the cord to move at the same velocity as the carriage.

When the cop or bobbin begins to fill upon the bare spindle G the spindle is at the greatest speed, and as the yarn 24 is wound upon it in a conical form the velocity of the spindle is reduced by the tension of the yarn upon the counter-faller 27. When the speed of the spindle is too great the counter-faller 27 is drawn down to a point at which the nippers 40 41 will take hold of the belt W and carry it forward with the carriage until the speed of the spindle is reduced, this diminution of speed being effected by the movements of the pulley X, the screw Y, and the lever 19, the forked end of which withdraws the cone 8 from the hinged arms 10, thus reducing the circumference (as measured around the grooves 18) and taking up less length of the driving-chain 6. The band P winds up the chain 6 upon the scroll T as it is let off from the arms 10 of the changeable drum 8 10, the motion being communicated to the pulley R upon the shaft C by the pulley Q upon the shaft B.

The shaft C at the front of the frame is made in two parts, the common clutch-box V 48 being situated near the middle, and having on one side the scroll or cone T, the friction-weight 28, and the pulley R, and on the other side the pulley K, which drives the band J. The pawls in the part 48 take hold of the teeth or projections in the part V when turning forward, and when running in the other direction they drop over them without communicating motion.

When the mule begins to wind the yarn 24 upon the spindle G the chain 6 is all off the expansion-drum 8 10, and is wound up around the scroll drum or cone T in front of the frame. The power is transmitted from the shaft B, by means of the chain 6, to the shaft C in front of the frame, and from C to the cylinder or drum 46 inside of the carriage E by means of a band or belt, J, carried by the pulley K on the shaft C; thence by the side of the frame over the loose pulley M, and around the pulley L at the end of the carriage; thence around loose pulleys at the back of the frame and return.

The pulley L above the loose pulley M is affixed to the horizontal shaft 47, which drives both of the cylinders 46 46', the position of these cylinders being upon opposite sides of the mule-head.

The spindles G are driven by short bands I I' that pass around the cylinder.

The speed of the shaft B is uniform, while that of the shaft C is variable, and its velocity depends upon the position of the cone 8 and the consequent size or diameter of the expansion-drum 8 10, the position of the arms 10 depending, as before stated, upon the strain or tension of the yarn that is being spun.

The intermediate dogs, 12 12, near one end of the expansion-drum, are intended to give a strong tension upon the yarn at the point or small end of the cop.

What we claim, and desire to secure by Letters Patent, is—

1. The expansion-drum formed by the cone and hinged arms or their equivalents, substantially as herein described and for the purpose specified.

2. The combination of the expansion-drum with the scroll-cam T and the pulley K, or their equivalents, by which the velocity of the cylinder that drives the spindles is increased or diminished as required.

3. The combination of the faller-wires and the attached nippers with the bands, pulleys, screw Y, and lever 19, or their equivalents, for moving the cone 8 to the right or left at the right time, and to such a distance as may be necessary to impart the requisite velocity to the cylinder 46.

LORENZO C. DAM. [L. S.]
JOHN WIGLEY. [L. S.]

In presence of—
J. F. FRYE,
GEO. D. WOODMAN.