A. BALL.

Machine for Winding Tubes and Rods with Wire.

No. 212,424 **Patented Feb. 18, 1879.**

Fig. 1.

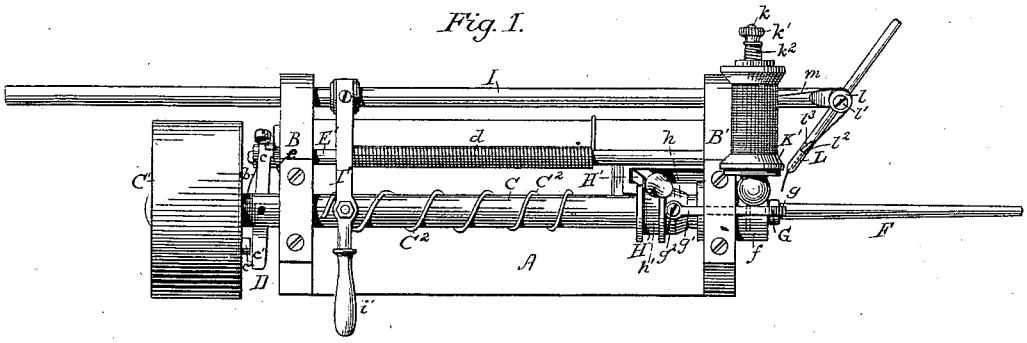

Fig. 2.

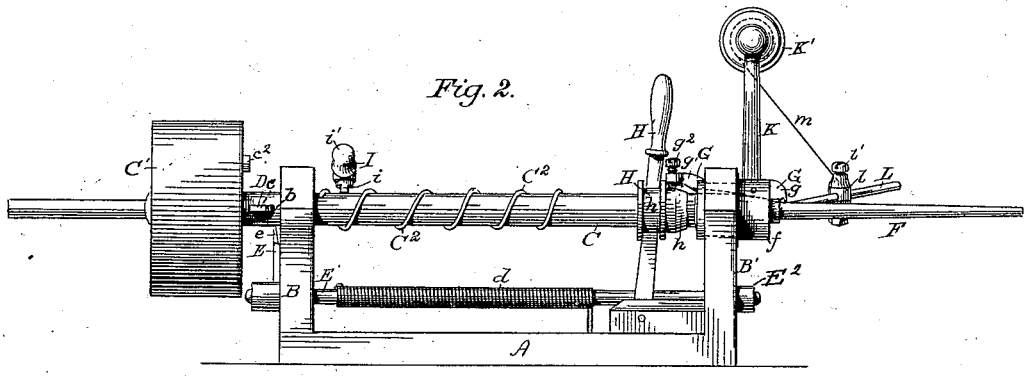

Fig. 3.

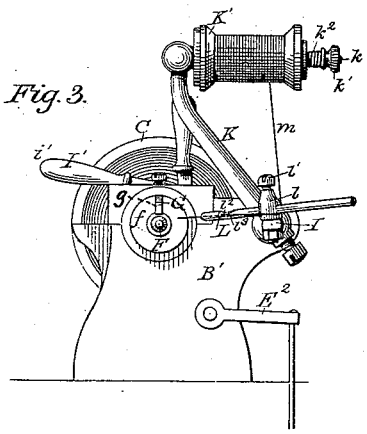

Fig. 4.

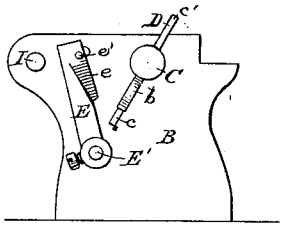

Fig. 5.

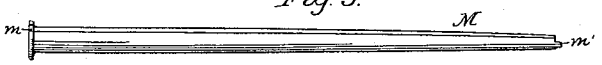

Fig. 6.

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UNITED STATES PATENT OFFICE.

ALBERT BALL, OF CLAREMONT, NEW HAMPSHIRE, ASSIGNOR TO SULLIVAN MACHINE COMPANY, OF SAME PLACE.

IMPROVEMENT IN MACHINES FOR WINDING TUBES AND RODS WITH WIRE.

Specification forming part of Letters Patent No. **212,424**, dated February 18, 1879; application filed March 23, 1878.

To all whom it may concern:

Be it known that I, ALBERT BALL, of Claremont, in the county of Sullivan and State of New Hampshire, have invented a new and useful Improvement in Machines for Winding Tubes and Rods with Wire; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The object I have in view is the production of a machine more especially designed for winding wire upon the Essex cop-tubes, but also adapted to be applied to wind wire upon tubes and rods generally, by which a great number of tubes can be wound in a short time and at small expense, the machine being at the same time compact and simple in construction; and my invention therein consists, first, in the means for feeding the wire to the tube and advancing it spirally upon the same, and, second, in the devices for holding the cop-tube in position to be wound with the wire, as fully hereinafter explained.

In the drawings, Figure 1 is a top view of the machine; Fig. 2, a side elevation; Fig. 3, an end view; Fig. 4, a separate view of the clutch and operating devices for connecting and disconnecting the loose pulley with the mechanism. Figs. 5 and 6 are views of the cop-tube before and after being wound with wire.

Like letters denote corresponding parts.

The frame of the machine is preferably made with a bed-plate, A, from the ends of which rise short standards B B′, and upon this base and in the standards are mounted the operating parts. C is a shaft, journaled in boxes in the standards B B′, and extending a short distance outside of these standards. Upon one end of the shaft C is sleeved the loose pulley C^1, connected by a belt or cord, when the machine is in use, with the power. A clutch-lever, D, is passed through a slot in the shaft C, and pivoted therein just inside of the loose pulley. A leaf-spring, *b*, throws the end *c* of the lever inwardly, and the other end, c^1, outwardly, so that as the pulley revolves this end c^1 strikes against a stop, c^2, on the inner side of the pulley.

A shipper-arm, E, is keyed to the end of a rock-shaft, E^1, journaled in the standards B B′. This rock-shaft has a spring, *d*, wound upon it between the standards, which acts to throw the shipper-arm E into the path of the revolution of the end *c* of the clutch-lever. The shipper-arm moves close against the outer face of the standard B, and a small stop on the standard prevents the arm from being thrown farther toward the shaft C than is necessary to interfere with the revolution of the clutch-lever. The shipper-arm has an inclined or beveled path, *e*, Fig. 4, formed on its face, and a pin, *e′*, at the upper end of the incline.

It will be seen that when the inwardly-projecting end *c* of the clutch-lever reaches the incline *e*, as the shaft C is revolved through the loose pulley, it will be moved outwardly against the pressure of the spring *b*, and as the end *c* of the clutch-lever moves upwardly and outwardly upon such incline, the other end, c^1, in contact with the stop c^2, will be moved inwardly until it is thrown out of contact with such stop, and the shaft C will then be disconnected from the pulley. The pin *e′* prevents the clutch-lever from being carried over the shipper-arm by the momentum of the parts, and always insures the stopping of the shaft C at exactly the same point in its revolution.

By turning the rock-shaft E^1 and moving the shipper-arm out of the path of the end *c* of the clutch-lever, the spring *b* will throw the end c^1 again into contact with the stop c^2, and the shaft C will be connected with the pulley, and will remain connected to and moved by the same so long as the shipper-arm is held in its outward position.

At the opposite end of the rock-shaft E^1 from the shipper-arm outside of the standard B′ is secured a shipper-lever, E^2, which is connected in use by a rod with a foot-lever, by which the rock-shaft can be turned against the pressure of the spring *d*, which throws it in the opposite direction.

Upon the enlarged end or head *f* of the shaft C, which is journaled in the standard B′ and projects a short distance outwardly from the same, is mounted the mandrel F, projecting centrally from and forming an extension of the

shaft. This mandrel is preferably made tapering and of about the length of a cop-tube, which it is designed to receive and carry.

The cop-tube is held upon the mandrel by a clamping-lever, G, having a notch in its outer end, *g*, which fits over the flange on the bottom of the tube. This clamping-lever is pivoted in the head *f* of the shaft, extends through the standard B′, and has its inner end, g^1, bent upwardly, and provided with an adjusting-screw, g^2.

Upon the shaft C, just inside of the standard B′, is sleeved a spool, H, having a groove, *h*′, in which a clutch-lever, H′, works, to move the spool upon the shaft, and provided with a beveled end, *h*, projecting toward the standard B′.

The lever H′ is intended to be moved by hand, but it can be connected with a treadle and operated by foot; and by sliding the spool H along the shaft toward the standard B′ the beveled end *h* will be forced under the inner end, g^1, of the clamping-lever G, and the outer end forced down upon the mandrel. By turning the screw g^2 the lever G can be adjusted to hold securely a cop-tube when the spool H is slid under its end g^1. If a solid rod instead of a tube is to be wound with wire, a suitable chuck would be attached to the head of the shaft C in the place of the mandrel.

I is a guide-rod, which slides through rearward extensions of the standards B B′, and has secured to it, between the standards, a guide or tracer, I′. This tracer I′ projects from the guide-rod across the machine, and is provided with a tracing-pin, *i*, on its under side, directly over the shaft C, and resting upon such shaft; and this tracer-arm can be raised and lowered by moving its end *i*′.

The shaft C is provided with a spiral guide, C^2, a little shorter than the cop-tube to be wound, extending from near the standard B toward the other standard. This spiral guide is of variable pitch, conforming to the pitch desired to be given to the wire upon the cop-tubes, and is constructed by winding a wire upon the shaft C, or by cutting a thread upon such shaft, or upon a casing secured to the shaft.

Upon the end of the guide-rod I outside of the standard B′ is mounted the spool-carrying arm K, which is adjustably secured to the rod by a set-screw, and projects upwardly from the same. This arm has on its upper end a rod, *k*, having a screw-threaded outer end, upon which turns an adjusting-nut, k^1, a spiral spring, k^2, being placed upon the rod between the nut k^1 and a washer placed against the wire-holding spool K′. By these means the tension of the wire can be regulated.

Upon the extreme end of the rod I is mounted a block, *l*, which can be turned around on its pivot and held rigidly at any desired point. Through this block is passed a wire guiding-arm, L, secured in the block by a set-screw, l^1, so that it can be moved forward and back in the block, and held in any position.

The end of the wire guide projecting toward the mandrel has an eye, l^2, bored centrally from its end back to a slot, l^3, cut in the same, and through the eye is threaded the wire *m*, after passing from the spool K′, under the other end of the arm L, and around one side of the block *l*. The wire guiding-arm L can be swung around to any desired position, so as to present the wire at the required point.

In use the machine is intended to be mounted upon a bench in convenient position for the operator, and the loose pulley connected to the shafting or to a foot-treadle, if desired. The shipper-lever E^2 is connected by a rod with a foot-lever situated beneath the bench. The wire projecting from the eye in the wire-guide (the rod I being moved to its outward position and the tracer-arm I′ being near the spool H) is fastened to the large end of a cop-tube, M, constructed as shown in Fig. 5. The wire may be secured in any convenient way; but I prefer to do this by pushing it into the angular slot *m* formed in the flange at the large end of the cop-tube or through a hole punched in this flange. The tube is then slipped upon the mandrel, and the arm I′ carried back at the same time to its starting-point, near the standard B. The clutch-lever H′ is then pushed toward the standard B′, and the lever G clamps the tube firmly in place on the mandrel. The shipper-lever E^2 is then pressed down and the machine starts. The operator raises the tracer-arm I′ just before the shipper-lever is pressed down, so as to wind the wire the desired number of times in close coils around the large end of the tube. The tracer-arm is then dropped, and the wire is wound on the tube in accordance with the spiral feed C^2 on the shaft, which the tracer follows. When the tracer reaches the end of the spiral the wire will be wound continuously in close coils upon the remainder of the small end of the tube till it reaches the end of the same, when it slips off and winds around the small projection *m*′ projecting from the tube. The shipper-lever E^2 is then released and the machine stops, the wire is cut, and the tube, wound as in Fig. 6, removed from the mandrel and another tube placed thereon and wound in the same manner. The wire fastens itself on the tube by winding around the projection *m*′, and after the wire is soldered to the tube in any convenient way this projection is cut off, and also the loose end of the wire at the large end of the tube, completing the cop-tube.

It will be seen that by this machine a great number of cop-tubes can be wound with wire in a short time and at small expense.

Having thus fully described my machine, what I claim as new therein, and desire to secure by Letters Patent, is—

1. A machine for wiring tubes wherein are combined a revolving mandrel to hold the tube, a shaft having a continuous spiral guide with convolutions identical with those intended to be wound upon the body of the tube, and a tracer-arm attached to a hand-lever to

stop at will the feed and regulate the feed of the wire to the tube, all substantially as described.

2. In a machine for wiring tubes, the combination of the mandrel-shaft having spiral guide with the sliding and rocking guide-rod carrying the wire-feeding devices and the tracer-arm attached to the said guide-rod and adapted to be raised from or dropped into engagement with the spiral guide, substantially as described, and for the purpose set forth.

3. In a machine for wiring tubes, the wire-guiding arm L, pivoted upon the end of a guide-rod, and having an eye, l^2, in its end, through which the wire passes, substantially as described and shown.

4. The combination of the sliding guide-rod I with the spool-carrying arm K and supporting-frame and the wire-guide L, substantially as described and shown.

5. The clamping-lever G, in combination with a sliding spool, H, for operating the same, and the mandrel F, substantially as described and shown.

6. The clamping-lever G, having screw g^2 in one end, in combination with the spool H, provided with beveled end h, and the lever H′, substantially as described and shown.

This specification signed and witnessed this 16th day of March, 1878.

ALBERT BALL.

Witnesses:
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E. N. HOLT.