J. F. WICKS.

Doubling and Twisting Machine.

No. 168,309. Patented Sept. 28, 1875.

*Fig. 1.*

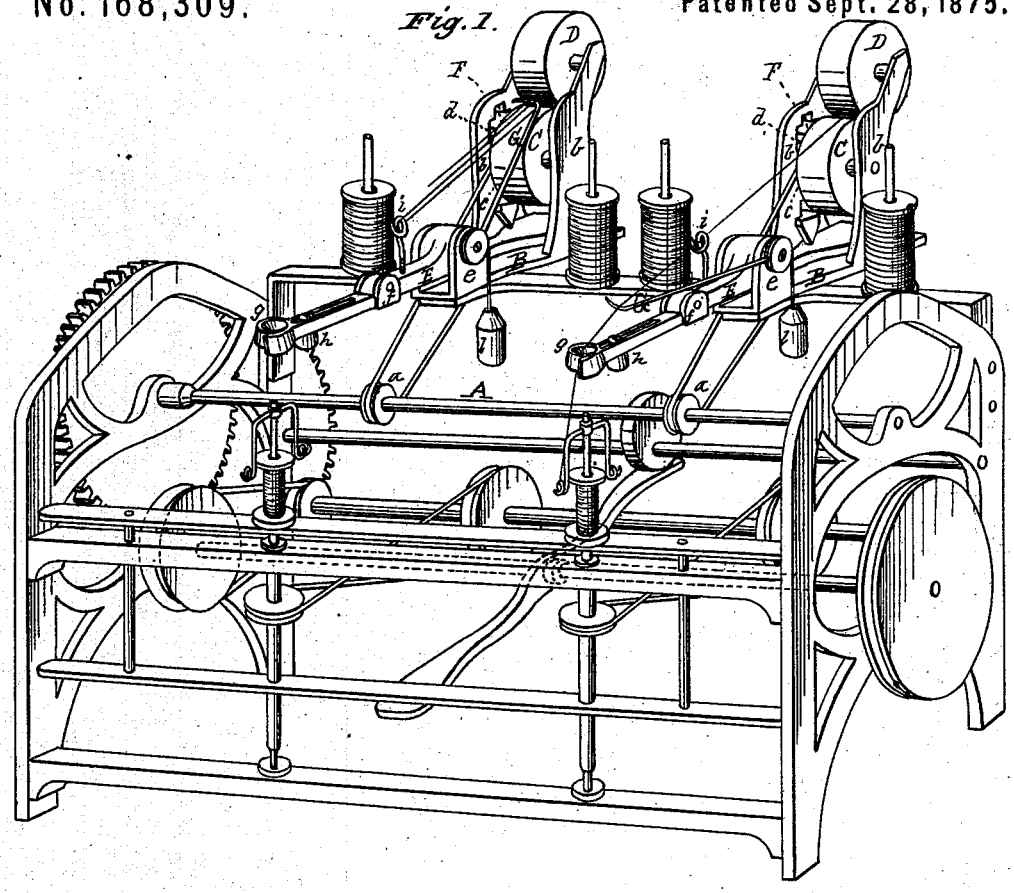
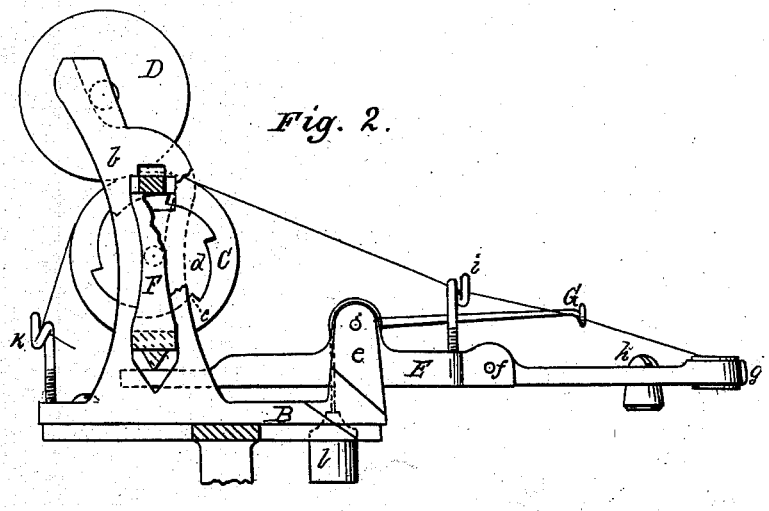



*Fig. 2.*

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## IMPROVEMENT IN DOUBLING AND TWISTING MACHINES.

Specification forming part of Letters Patent No. **168,309**, dated September 28, 1875; application filed July 13, 1875.

*To all whom it may concern:*

Be it known that I, JOSEPH F. WICKS, of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Doubling and Twisting Machines; and I do hereby declare that the following specification, taken in connection with the accompanying drawings forming a part of the same, is a clear, true, and complete description thereof.

My said improvements are applicable to doubling and twisting machines as generally constructed.

It is well known to persons skilled in the manufacture of textile fabrics that very considerable loss is incident to the operation of twisting and doubling. This loss is varied in its character, and, although occurring at various stages in the operation of manufacturing, is chargeable squarely to imperfect operations of the "doubler." Commencing with the doubler itself, it is well known that whenever one of the yarns breaks there is a liability of an undue delivery of the broken end before it is discovered; or, when one breaks and the other continues to be delivered until broken by the drag on the flier, then this other end is liable to be gathered in by the next adjacent spindle. If discovered and properly corrected by the operative, the waste from the broken ends mainly constitutes the loss. If discovered and not fully corrected, by withdrawing the triple twist and commencing anew, with newly-joined ends, the yarn goes to the weaver, and either subsequently involves a loss represented by the time of the weaver and the loom, if the imperfect yarn be picked from the warp, or, if not attended to by the weaver at that time, (which is too often the case,) the loss appears in the form of goods known as "seconds." Various methods have heretofore been proposed, and to some extent practiced, with a view to reducing to a minimum losses of the character enumerated; but I know of none which practically obviate these difficulties. Stop-motions have been heretofore employed, involving the use of devices for lifting a top roller from a constantly-revolving roller, for preventing the action of the rolls upon broken ends; but these revolving rolls are liable to so engage with a broken end as to cause a continued draft of yarn from its bobbin. Others have involved the employment of a friction-drum located between the bobbins from which the yarns are delivered, and a thread-eye lever, through which the yarns pass on their way to the flier. When one yarn is broken, followed by the breakage of the remaining yarn, the thread-eye lever is tilted by a counter-weight, and engages with the mechanism which revolves the friction-drum and stops it. In operation these doublers are defective, in that it is impracticable to maintain a uniform degree of friction between the drum and the yarn, because the drum, being frictionally mounted on a spindle, is liable at times to be more or less easily rotated independently of its spindle than is desirable. Moreover, the drum must be clad with leather, or other similar material, in order that a good frictional surface may be afforded, and this leather, especially when used on woolen yarns, is liable to speedy wear, and requires frequent renewal. Then, again, with this device, no provision has been made for absolutely preventing the broken ends from being taken up by the adjacent spindles. It has also been heretofore proposed to independently drive the delivery-rolls by means of a constantly-revolving rod or roll, with which the lower delivery-roll frictionally engages, and to effect a stoppage of the delivery-rolls by mounting them in a swinging frame controlled by a stop-motion lever, through an eye in which the yarn passes, so arranged that when a yarn breaks the swinging frame removes the lower delivery-roll from contact with the constantly-revolving rod or roll. Such doublers require a complex arrangement of levers and weights, in order that proper frictional contact between the driving and driven rolls may be maintained, and in order that the swinging frame or standard may be properly controlled. The constantly-driven rod or roll, being located below the lower delivery-roll, is liable to catch lint and oil, and so have its frictional driving-power impaired, thereby resulting in irregular motion of the delivery-rolls and bad twisting. Moreover, the constantly-driven roll or rod is as liable to catch and wind up the broken end thereon as the bottom delivery-roll itself, if that roll were constantly driven.

In "throstle-frames," in which drawing-rolls are employed, the middle and rear rolls have been heretofore independently driven by means of cog-gearing and friction-clutch, and ar-

ranged to be stopped on the breakage of the roving; but in such drawing-frames the front or delivery rolls are continuously operated.

Still another method has been heretofore proposed of checking the delivery of yarn from the rolls of a doubler after an end has been broken, which involves, in connection with a constantly-revolving bottom roll, a tab controlled by a lever which, when the yarn breaks, allows the tab (composed of cloth or leather) to enter between the delivery-rolls from the rear on top of the lower roll and beneath the yarn, thus preventing the yarn from being directly acted upon by the lower roll. In this machine, however, the lower roll, constantly revolving, is liable to engage with the down-hanging broken end, and wrap itself therewith, resulting in waste, and requiring nearly, if not quite, the same watchful care as if no stopping device was employed.

It is a fact long conceded that the well-known roller-beam doubler produces better results in doubling than any other class of machines; but with this machine, as heretofore constructed, the roller-beam cannot be controlled by a stop-motion at each spindle without stopping the entire machine, except the stop-motions be arranged as heretofore mentioned, so as to lift an individual top roll from the constantly-revolving bottom roll, as already referred to, and then they would be open to the objections already cited. In connection with the roller-beam doubler it has also heretofore been proposed (and, perhaps, to some extent practiced) to employ a stop-motion which, on the breakage of the thread, will throw the band from the spindle. This latter method, however, provides in no manner for so controlling the roller-beam as to prevent further delivery of the yarns, because the rollers continue to revolve, nor for so controlling the broken ends that they cannot be taken up by adjacent spindles.

Doubling-machines embodying my improvements operate with all the desirable advantages of the roller-beam doubler, and at the same time they prevent undue withdrawal of yarn from the delivery-bobbins after an end is broken, and also so control the broken ends as to practically render it impossible for them to be taken up by adjacent yarns and spindles.

My invention consists, mainly, in the combination, with each spindle, of independently-driven delivery-rolls, which are mounted in fixed standards, and a stopping mechanism, whereby, on the breakage of the threads, both of said rolls will be prevented from revolving, and thus absolutely prevented from unduly withdrawing yarn from the delivery-bobbins.

My invention further consists in the combination, with each spindle, of a stop-motion lever and an end-controller, which, when a break of the yarns occurs, carries the broken ends backward and away from the spindles independently of the stop-motion lever.

My invention further consists in the combination, with a bed-plate provided with means for attaching it to the frame of a doubler and standards, of two rolls and a stop-motion lever, both with and without an end-controller, said combination constituting an attachment to be made and sold for application to doublers already in use.

To more particularly describe my invention, I will refer to the accompanying drawings, in which—

Figure 1 represents in perspective a doubling-machine embodying my improvements. Fig. 2 represents on an enlarged scale, partially in side view and partially in section, the portion of the machine containing my invention, and adapted to be made and sold as an attachment applicable to ordinary doublers.

In the drawings I show a machine with the spindles, fliers, copping-rail, and driving mechanism not unlike those in ordinary use. The shaft A, however, is a feature to be introduced into the ordinary frame when fitted to operate with my improvements. This shaft may be provided with band-pulleys opposite each spindle, as at *a*, or, what is preferable thereto, it may be provided with a small tin cylinder extending its whole length. B denotes a bed-plate such as I make when my device is intended for sale as an attachment to doublers. In that case it is slotted longitudinally for adjustment to a convenient portion of the frame of the machine. It is provided with two sets of standards. Those at *b* serve as supports for the delivery-rolls. The lower roll C is provided with axial studs, which have bearings in suitable holes in the standards. The top roll D has also axial studs, which have their bearings on inclined lateral surfaces on the inner sides of the standards, so that at all times it presses with its full weight upon the bottom roll. This upper roll, when in position, has its axis sufficiently to the rear of the axis of the botton roll to be self-maintained in its position with relation to the bottom roll. The bottom roll has a cord or band pulley, as at *c*, located on its axial stud, between one end of the roll and the adjacent side of one of the standards. Outside of this pulley is a ratchet-wheel, as at *d*, which is also secured to the axis of the lower roll. A belt-cord from the shaft A passes around the pulley *c*, and imparts to the bottom roller the requisite movement, the upper roll being meantime revolved by frictional contact with the lower roll.

E denotes the stop-motion lever. It is pivoted to the standards *e* on the bed-plate, and extends from a point beneath the lower roll to the spindles. The front portion of this lever is jointed, as at *f*, so as to admit of its being raised for the removal of the flier and bobbin from the spindle. This portion of the lever carries the pot-eye, as at *g*. The pot-eye arm, as heretofore employed, has been so jointed as to admit of this upward movement, and my invention does not, therefore, relate to making

the front end of the stop-motion lever jointed, as shown. The jointed front end of the stop-motion lever is longitudinally slotted, and is provided with an adjustable weight, as at *h*, for effecting a proper counterpoise of the lever. A thread-eye, at *i*, is inserted into the lever near the joint.

F denotes a vertically-sliding bar, which is arranged to freely rise and fall in guides formed by openings in one of the standards *b*, adjacent to the ratchet-wheel *d*. The upper end of this bar is turned inward, and is arranged to engage with the teeth of the ratchet when not held at a certain height. The lower end of the bar also turns inward, and is normally supported by the rear end of the stop-motion lever.

When the front end of the stop-motion lever is held down by the tension of the yarns, the sliding bar is raised above the ratchet, and the rolls are free to revolve; but, on the contrary, when the yarn breaks and the outer end of the lever rises, the sliding bar falls, engages with the ratchet, and the rolls are stopped, the driving-cord slipping on the pulley.

The spools from which the yarn is to be drawn for twisting are located on pins or studs in the frame of the machine, on each side of the roll-standards. The yarn is passed through an eye, as at *k*, thence upward between the rolls, thence through the thread-eye on the stop-motion lever, thence through the pot-eye to the flier and spindle.

With the rolls thus constructed and combined with each spindle and a stop-motion, it will be seen that a desirable tension is attained, as between the rolls and the flier, by the weight of the top roll on both threads, and that, therefore, so far as quality of service is concerned, my doubler will operate equally as well as the roller-beam machine; and that, as the delivery-rolls are both stopped on the breakage of the threads, there can, by no possibility, be any undue withdrawal of yarn from the spools after the stop-motion has operated.

I will now describe the means whereby, after the yarns have been broken and the further delivery thereof ceased, the broken ends are controlled, so that they can, by no possibility, be taken up by adjacent arms or spindles.

My novel end-controller is shown at G. It consists of a light lever, which is provided with a lateral finger at its end for crossing the path of the yarns on their way from the rolls to the pot-eye, between the latter and the thread-eye on the stop-motion lever; or this lever, instead of having the lateral finger, may be provided with a thread-eye. This lever is pivoted to the outside of one of the standards *e* of the stop-motion lever, and is provided with a circular plate having a grooved edge, after the manner of a cord-pulley.

A weight, as at *l*, is secured to the lever by a cord occupying said grooved edge, so that when the outer end of the lever is not held down by a thread it rises and carries with it the broken ends, until they are thrown backward against the rolls, and they are there held securely against possible contact with adjacent yarns or spindles.

It will be seen that after the stop-motion has operated there is no adjacent moving mechanism with which the broken end may engage, and whereby it may be wastefully withdrawn. So far as relates to the adjacent yarns and spindles on either side, the end-controller is relied upon for holding the end securely.

For operating machines with my improvements on woolen yarns, I prefer that the top roll shall weigh about forty ounces, although a somewhat lighter weight will enable them to render good service on cotton, wool, or silk.

When one thread breaks, the flier continues its draft on the yarn as long as it has two threads in its eye; but when the sound thread arrives at or passes the eye of the flier, said thread also breaks, on account of the drag at flier and bobbin, and the stop-motion operates. The broken ends have, therefore, the same length when the break occurs between the rolls and the fliers, and can be directly pieced to the solid thread on the spindle.

Although I have shown my improvements as applied to machines having fliers, they are in every way applicable to ring-twisters, and have a special value in that connection, owing to the greater tendency in those machines for broken ends to be taken up by adjacent yarns and spindles.

Having thus described my invention, I claim as new and desire to secure by these Letters Patent—

1. In a doubling and twisting machine, the combination, with each spindle, of independently-driven delivery-rolls, mounted in stationary standards, and a stopping mechanism, substantially as described, whereby, on the breakage of the yarns of any spindle, its delivery-rolls will be prevented from revolving, substantially as set forth.

2. The combination, with each spindle in a doubling and twisting machine, of a stop-motion lever and an end-controller, substantially as described, whereby, on the breakage of the yarn, the broken end will be carried backward away from the spindles, and prevented from contact with adjacent running yarns and spindles, independently of the stop-motion lever, substantially as set forth.

3. The combination, with a bed-plate, provided with stationary standards, and arranged for attachment to the frame of a doubler, of delivery-rolls, mounted on the stationary standards, and a stopping mechanism, mounted on the bed-plate, connected with the rolls, and arranged to permit or prevent their rotation, substantially as described.

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