4 Sheets—Sheet 1.

H. LOCKE.

Spinning-Machine.

No. 220,079. **Patented Sept. 30, 1879.**

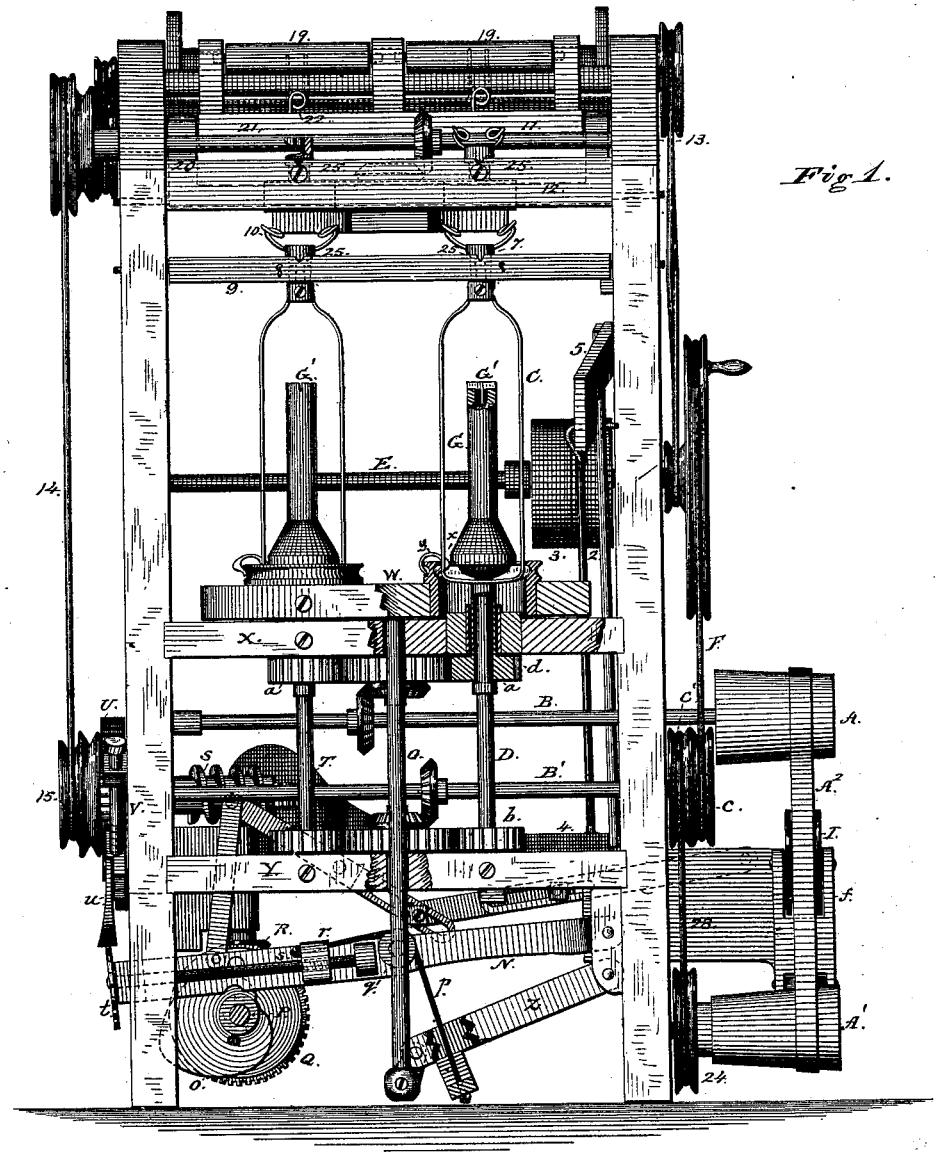


Fig 1.

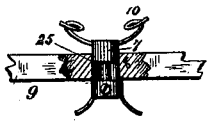


Fig 14.

Witnesses.

Harry King

A. C. Bradley

Inventor.

Harry Locke

J. W. F. Bell

his atty

4 Sheets—Sheet 2.

H. LOCKE.

Spinning-Machine.

No. 220,079. **Patented Sept. 30, 1879.**

Fig 2.

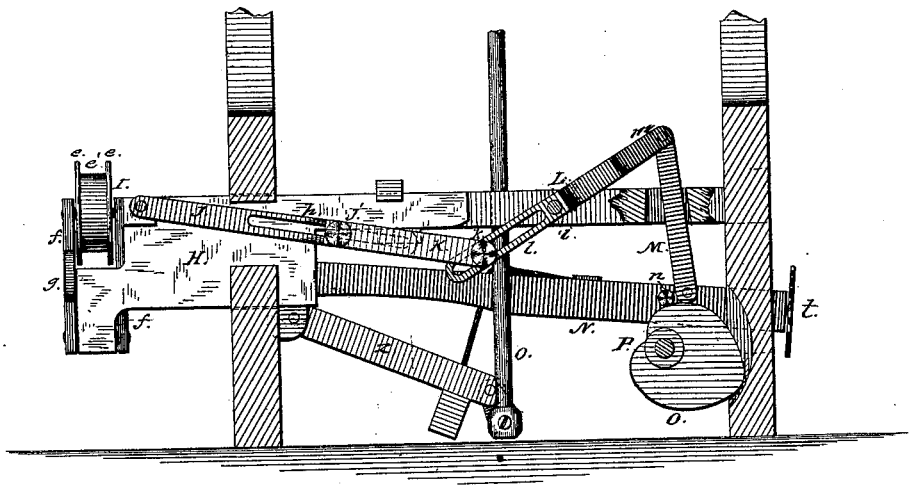
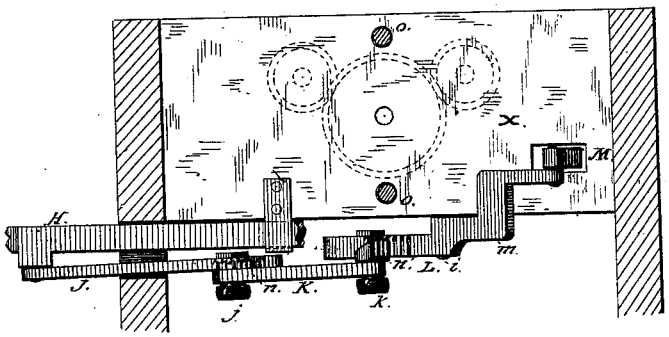


Fig 3.



Witnesses.

Harry King

A. C. Bradley

Inventor.

Harry Locke

by his atty

W. P. Bell

H. LOCKE.

Spinning-Machine.

No. 220,079. Patented Sept. 30, 1879.

Fig 4.

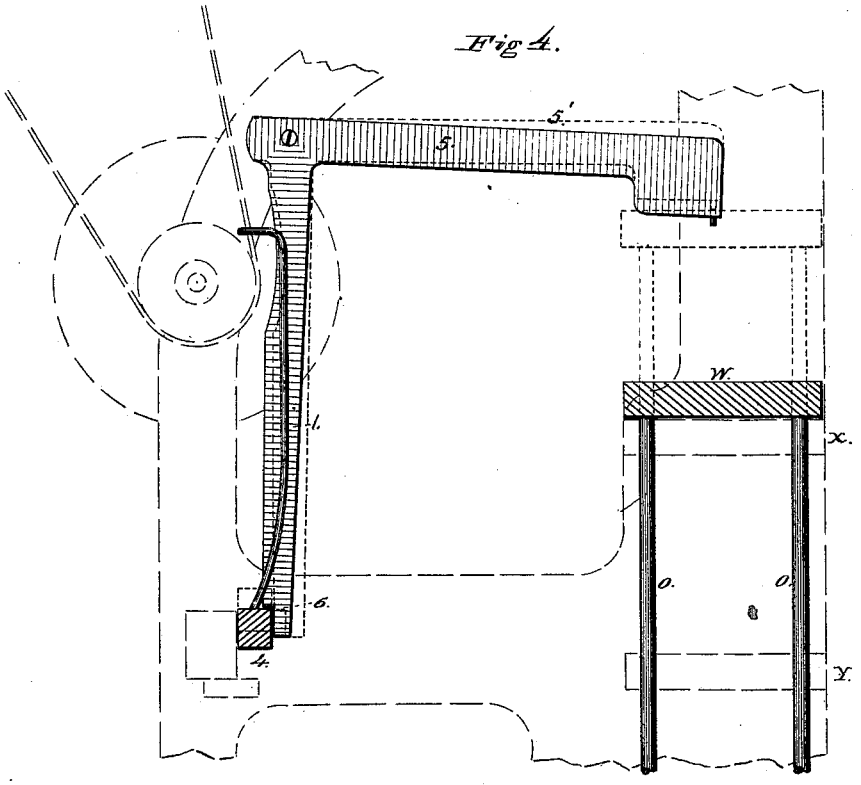


Fig 5.

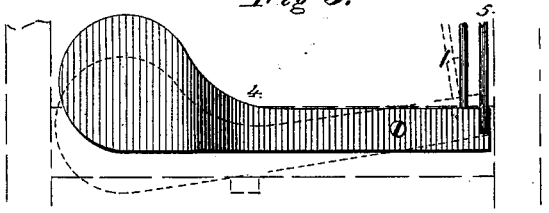


Fig 6.

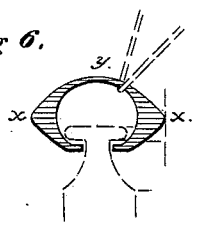
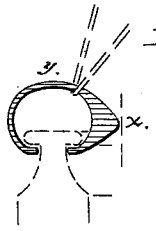


Fig 7.



Witnesses.

Harry King

A. C. Bradley

Inventor.

Harry Locke

by his atty

W. P. Bell

4 Sheets—Sheet 4.

H. LOCKE.

Spinning-Machine.

No. 220,079. **Patented Sept. 30, 1879.**

Fig 8.

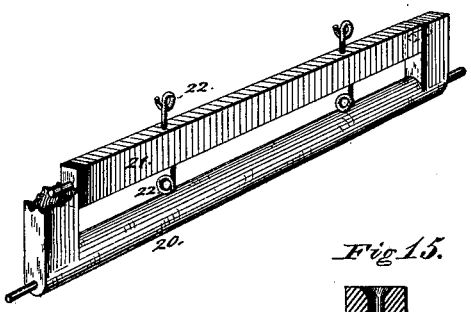


Fig 16.

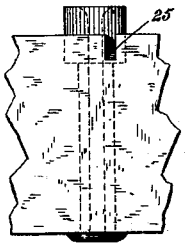


Fig 15.

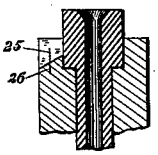


Fig 9.

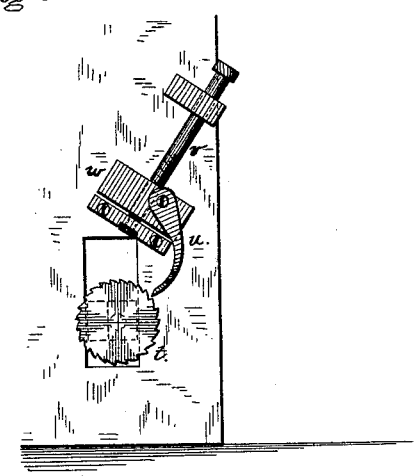


Fig 10.

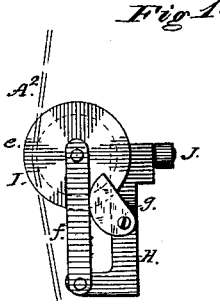


Fig 11.

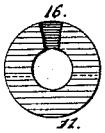
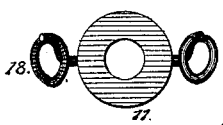


Fig 12.

Fig 13.



Witnesses.

Harry Knight.

A. C. Bradley

Inventor.

Henry Locke

by W. F. Bell

his Atty

UNITED STATES PATENT OFFICE.

HARVEY LOCKE, OF CHESTER, VERMONT.

IMPROVEMENT IN SPINNING-MACHINES.

Specification forming part of Letters Patent No. **220,079**, dated September 30, 1879; application filed May 1, 1878.

To all whom it may concern:

Be it known that I, HARVEY LOCKE, of Chester, in the county of Windsor and State of Vermont, have invented new and useful Improvements in Spinning-Machines, of which the following is a specification.

This invention relates to improvements in machinery for spinning yarns; and consists in the construction and arrangement of parts, which will be more fully described hereinafter in connection with the drawings, and then set forth in the claims.

In the drawings illustrating my invention, Figure 1 is a front elevation of the machinery, showing one half of the ring rail or carrier and the spindle and flier bearings in the section. Fig. 2 is a rear elevation, and Fig. 3 a top view, of the adjustable levers for regulating the twist of the yarn and speed of the spindles and fliers. Fig. 4 is a side elevation of the belt-shipping devices or stop-motion; Fig. 5, a front view of a portion thereof; Fig. 6, a front view of a traveler with two sides thickened; Fig. 7, a similar view of a traveler with but one side thickened; Fig. 8, a perspective view of the adjustable roving-steadying device; Fig. 9, a side elevation of the adjustable pawl and the ratchet for regulating the movement of the ring rail or carrier; Fig. 10, a side view of the belt tightener and shipper; Fig. 11, a top view, and Fig. 12 a horizontal cross-section, of one form of twisting-head; Fig. 13, a top view of another form of twisting-head. Fig. 14 is a vertical side elevation of the top or head 7 of the flier, part of the rail being broken away; Fig. 15, a vertical transverse section of upper portion of the twisting-tube with cutter in position; Fig. 16, a front elevation of the supporting-rail, showing the twisting-tube in position in dotted lines.

A A^1 are conical pulleys, connected by a belt, A^2, and the smaller diameters of these pulleys are in the outer end of one and the inner end of the other. The pulley A is upon a shaft, B, which is geared to the pinions *a* of the fliers C. The pulley A^1 is connected, by a belt or otherwise, to the shaft B′, which is geared to the pinions of the spindles D. These shafts and pulleys may be driven by a belt, F, from the driving-shaft E, extending therefrom to a pulley, *c*, on the shaft B′; but the mode of imparting motion is not of the essence of this invention.

The bobbins G are secured upon the spindles in any approved manner. The fliers C have sleeves *d*, which encircle but do not touch the spindles, and extend to and are rigidly connected with their pinions *a*, so that the motion of the spindles and fliers may be independent; and I so arrange the gearing that the fliers may run faster or slower, but preferably slower, than the spindles, in order that the yarn may be wound as it is drawn and twisted more uniformly and perfectly.

The speed of the fliers and spindles is regulated by the following mechanism, viz: A slide, H, is arranged to be moved in the framework of the machinery, and this slide carries a pulley, I, which is constructed with flanges *e e*, forming a peripheral groove, *e′*, in which works the belt A^2, connecting the conical pulleys A A^1. It may be here stated that this pulley I is hung between the arms of a forked lever, *f*, which is pivoted to the slide H, Fig. 10, and a cam, *g*, is arranged upon said slide to bear against the forked lever *f* in such manner as to constitute the said lever and pulley a belt-tightener. To the slide H is attached, by one end, a lever, J, the other end of said lever having a slot, *h*, therein. This lever is connected by a link, K, to a lever, L, and in the end of said lever L, to which the link *k* is attached, is a slot, *l*. The link K is adjustably connected to the levers J and L by set-screws or equivalent adjusting devices, *j k*, extending through it to the slots in the said levers, in such manner that by moving the set-screws the leverage may be increased or diminished, so as to lengthen or shorten the stroke of the slide. The lever L is pivoted at *i* to the framing of the machine, and its end *m* is bent, and extends upward and forward, and is jointed to a rod, M, the other end of which is jointed to a lever, N. This lever N is fulcrumed to the framing, and bears upon its side, near the rod M, a pin or projection, *n*.

O is a heart-shaped cam upon a revolving shaft, P, which acts against the pin *n* on the lever N, to raise and lower said lever, and by so doing the slide H is moved in and out or back and forth through the medium of the system of rods and levers described, carrying

the belt A^2 with it. The extent of this movement or stroke is regulated by the connecting-link K and its set-screws *j k*, and scales *n n'* are placed upon the levers J L to govern the adjustments.

The connection of this system of levers with the operating mechanism of the spindles and fliers having been before described, it becomes obvious that the adjustments of the levers will affect the speed of said spindles and fliers. The scales *n n'*, in governing the adjustments of the levers, are proportioned to the twist and draw desired to be given the yarn.

Motion may be imparted to the cam O by means of a bevel-gear wheel, Q, on its shaft P, which wheel Q meshes with a pinion, R, on a vertical shaft bearing a gear-wheel, T, Fig. 1, and this wheel T engages a worm-shaft, S, on which is a gear-wheel, U, that meshes with a pinion, V, on the shaft B', from which shaft the above-described gearing receives its motion.

W is the ring rail or carrier, supported upon rods *o*, which rods pass through and are supported in the bolster frame or rail X and step-rail Y, and have their lower ends jointed or journaled to a swinging lever-frame, Z. The lever-frame Z is hung to the framing of the machine, and it is raised to elevate the ring rail or carrier by means of an attached cord or chain, *p*, extending over a pulley, *q*, on the lever N, and secured to a nut, *r*, moving on the screw-rod *s*. This screw-rod, to move the nut, is rotated by means of a pawl, *u*, engaging a ratchet, *t*, on the said rod as said rod is raised by the motion of the lever H and the other described mechanism. This pawl *u* is adjustable, so as to turn the ratchet any number of teeth, by a set-screw, *v*, working upon the pawl-carrier *w*. (See Fig. 9 for details of the pawl-and-ratchet mechanism.)

Of course, the adjustment of the pawl, or, in other words, the movement of the lever-frame Z, is proportioned to the rapidity of the speed of the fliers and spindles and the quantity of yarn to be wound.

It will be noticed in Fig. 1, right-hand side of said figure, that the flier is in very close contact with the ring, and that the traveler *y* projects into the ring beyond the flier, and has one or both of its sides thickened at *x*, in order to prevent it passing between the ring and flier, so that the flier regulates the speed of the traveler.

The advantages of employing a ring and flier in combination in place of a flier with the eye in its arm are, that it is easier to move the ring-rail and rings to wind the yarn on the bobbin than to move the spindle or fliers for the same purpose; also, giving a permanent bearing for the spindle near the bobbin, instead of the spindle passing through the bottom of the flier nearly the length of the bobbin, to wind the yarn on the bottom of the bobbin, allows a higher speed for the spindle without tremble.

In Figs. 1, 6, and 7 these travelers with thickened sides are fully shown. They may be made by attaching bits of solder to the side or sides of ordinary travelers.

On the driving-shaft E is a loose pulley, 3, and a fast pulley, 2. 1 is a belt-shifter, attached to one end of a weighted lever, 4, which is pivoted to the framing. 5 is an inverted L-shaped lever-catch, pivoted to the upper part of the framing at its angle, and having a notch, 6, in its lower end, that engages with the shifter-lever 4 to hold it down and keep the belt upon the fast pulley 2. The arm 5' of the lever 5 extends forward and over the ring-rail W, (see Fig. 4,) and as this ring-rail is raised to its highest position it comes into contact with said arm 5' and disengages the lever 5 from lever 4, shipping the belt to the loose pulley and stopping the machine, constituting thereby a stop-motion.

The top or head 7 of the flier is tubular, and shouldered at 8, and is secured in the hole in the supporting-rail 9, the shoulder 8 cutting well down into the hole in the rail, so as to prevent the yarn, &c., getting around the same between the shoulder and the hole, as shown in Fig. 15. The bearings of the twisting-heads may be similarly constructed for a like purpose.

The heads of the fliers may be provided with eyes 10, of wire, projecting laterally from opposite sides thereof, for use in twisting the roving in spinning slack-twisted yarn when the twisting-heads are not in use; but when spinning ordinary yarn I prefer to use separate twisting-tubes, as shown at 11. These tubes are geared together and driven in the same direction as the fliers by the shaft 13, which receives its motion from the shaft B' by a belt, 14, on a pulley, 15, on said shaft B'. These tubes may be set a little to one side of the axis of the flier-tubes, so as to strain the yarn and set its twist, by passing the yarn through one of the eyes of the flier-head as it passes to the fliers.

Two forms of twisting-tube heads are shown in Figs. 1, 11, 12. The tube 11 has a vertical slot, 16, for the passage of the roving into a horizontal slot, 17, extending a little beyond a central diametrical line, so as to keep the roving extended from the center or axis of the spinning-tube. (See Figs. 11 and 12.) The twisting-tube, by this construction, will be necessarily enlarged.

In Figs. 1 and 13 is shown a different and better form of twisting-tube head. The body 11 has projecting laterally from opposite points two wires, 18, in the ends of which are eyes, as shown. One wire and eye only may be used.

The roving may come directly from the roving-delivery rollers 19 to these twisting-tubes; or, better, there may be arranged between them a frame, 20, (see Figs. 1 and 8,) hung at its lower end upon journals let into the framing, so as to be capable of back-and-forth adjustment in the arc of a circle. This frame

supports a bar, 21, which is capable of being turned upon its axis in said frame, and carries wire or other eyes 22. These eyes are formed in opposite directions on opposite sides of the bar 21, which is reversible, so as to give a right or left twist, as desired, and the said eyes are scroll-shaped, in order to lead the twist toward the drawing-rollers. The approach of the twist to said rollers is regulated by the adjustment of the frame 20 toward or from them, and this mechanism serves to steady the yarn or roving, preventing its breakage and insuring proper twisting.

In regard to the location of the adjustable eyes, I do not wish to be confined to the exact distance from the twisting tubes or heads, so long as they are located between the twisting-tubes and delivery-rollers, with the centers of the eyes nearly in line with the centers of the top ends of the twisting-tubes and the delivery-rollers, as I wish to change the distance of the eyes from the top ends of the twisting-tubes for spinning fibers of different lengths, or spinning yarns of different size or twist, so as to allow the roving to be drawn more evenly.

I do not claim that the scroll-eyes operate to produce twist, but by their scroll shape that they facilitate the running back of the twist, by the yarn or roving being released from contact with the eyes at every revolution of the twisting-tubes, thus allowing a portion of the twist in the roving to pass above the eyes 1. By their scroll shape they change the place of contact of the yarn or roving with the eyes at every revolution of the twisting-tubes, thereby allowing a portion of the twist the roving to pass above the eye, provided in the screw is twisted in the proper direction.

In order that the yarn or roving may be readily removed from the twisting-tubes, grooves 25 are provided in their supporting-rail. The grooves 25 in the supporting-rail are to allow a convenient place for a cutter, 26, to cut the yarn after it is accidentally wound around the twisting-tube, thus allowing the yarn to come off easily.

The projecting bearing at the top of the tube is to prevent the yarn from drawing in between the shoulder of the tube and the hole in the supporting-rail.

A view of the groove in which the cutter is located is shown in Figs. 15 and 16.

The shaft B′ and the lower cone-pulley, A^1, are connected by a belt, 23, extending over pulleys c' and 24 on the two, respectively, whereby motion is insured for the said cone-pulley A^1.

The operation is as follows: The shafts B and B′ being revolved through the train of gearing described, the fliers and spindles revolve, and also the cam O. This cam at each revolution raises the lever N, which causes the pawl u to act upon the ratchet t and turn the screw-rod s, so as to advance the nut r and gradually raise the ring rail or carrier W, whereby the yarn is steadily carried up the revolving bobbins until they are filled, when the ring rail or carrier will have reached its highest position. At this point said ring rail or carrier comes in contact with and releases the catch-lever 5 from the weighted belt-shipper and stops the machine, when the filled bobbins may be removed and replaced with empty ones. The stroke of the slide H being adjusted, as described, through the system of levers shown in Fig. 2, the speed of the fliers and spindles is regulated, and the tension, draw, and twist of the yarn correspondingly governed, the belt A^2, being shifted on the cone-pulleys, automatically controlling the rapidity of revolution of the shafts B and B′, and consequently of the fliers and spindles.

The tension of the yarn may be varied by twisting it one or more times around the eyes of the twisting-heads. These twisting-tube or flier heads impart to the roving as it is twisted a pulling-and-slacking motion, owing to the location of the eyes as they revolve, and the position of the delivery-rollers with relation to the axis of the twisting-tubes or fliers, thereby drawing and twisting the roving more evenly.

The co-operation of the several parts having been fully set out hereinbefore, it is deemed sufficient to give only this general résumé of operation.

What I claim is—

1. A ring rail or carrier and mechanism, substantially as described, for reciprocating it, in combination with a belt-shipper lever and its controlling mechanism, the whole operating to constitute a stop-motion for spinning, as set forth.

2. The combination, with a series of fliers and spindles, of a series of adjustable levers and their connecting and operating mechanism, for imparting the required variable movements to said spindles and fliers, and a ring rail or carrier, the movements of the latter being in harmony with and controlled by the adjustments of said levers and their appurtenant mechanism, substantially as and for the purposes described.

3. In a spinning-machine, the combination of the slide H, provided with the flanged pulley I and belt-tightening devices f g, with the conical pulleys A A^1, belt A^2, and mechanism for reciprocating and controlling the movement of said slide, substantially as described, and for purposes set forth.

4. The combination, with the spindles and fliers and their rotating mechanism, of the conical pulleys A A^1, belt A^2, pulley I, slide H, pivoted and adjustable levers J L, their connecting-link K, rod M, and mechanism, substantially as described, for operating the same, whereby the relative speeds of the spindles and fliers are regulated, as set forth.

5. The combination, with the delivery-rollers and twisting-heads, of the adjustable guide-eyes interposed between the delivery-rollers and the twisting-heads, for the purpose specified.

6. The combination, with the delivery-rollers and twisting-heads or fliers, of a reversible bar carrying right and left eyes, interposed between the delivery-rollers and the tubes or fliers, substantially as described.

7. The combination of the shouldered twisting-tubes and the cutting devices with their supporting-rail, said rail being provided with holes for receiving and accurately fitting said tubes, and with recesses or grooves for the cutting devices, substantially as described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

HARVEY LOCKE.

Witnesses:

WILSON S. LOVELL,

ALBERT M. ALLBE.