(No Model.) 2 Sheets—Sheet 1.

J. E. TYNAN.

MACHINE FOR DOUBLING AND TWISTING THREAD.

No. 321,924. Patented July 7, 1885.

Fig. 1.

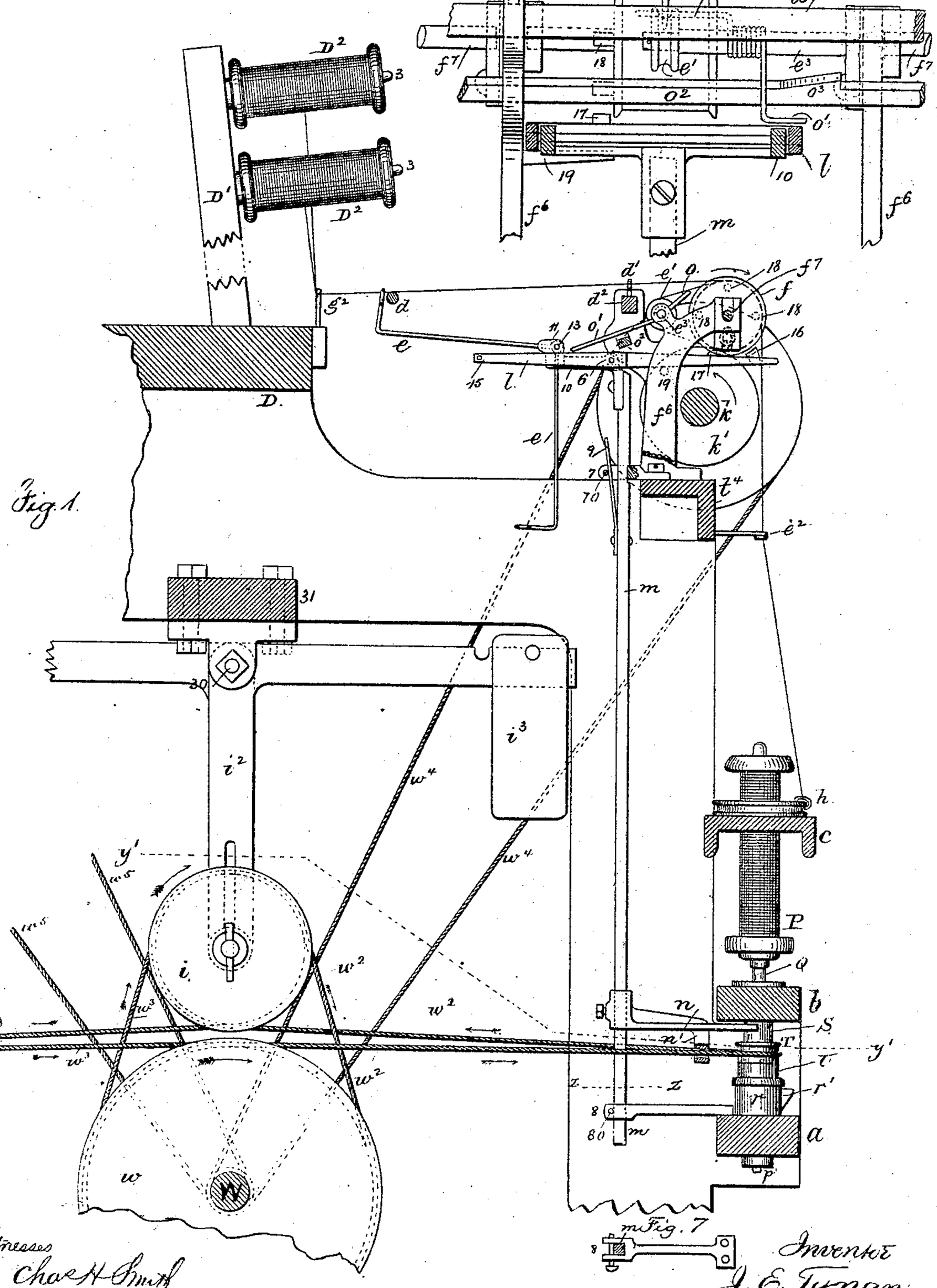


Fig. 2.

Fig. 7.

Witnesses
Chas. H. Smith
J. Stahl.

Inventor
J. E. Tynan
per Lemuel W. Serrell
Atty

(No Model.)

J. E. TYNAN.

2 Sheets—Sheet 2.

MACHINE FOR DOUBLING AND TWISTING THREAD.

No. 321,924. Patented July 7, 1885.

Fig. 3.

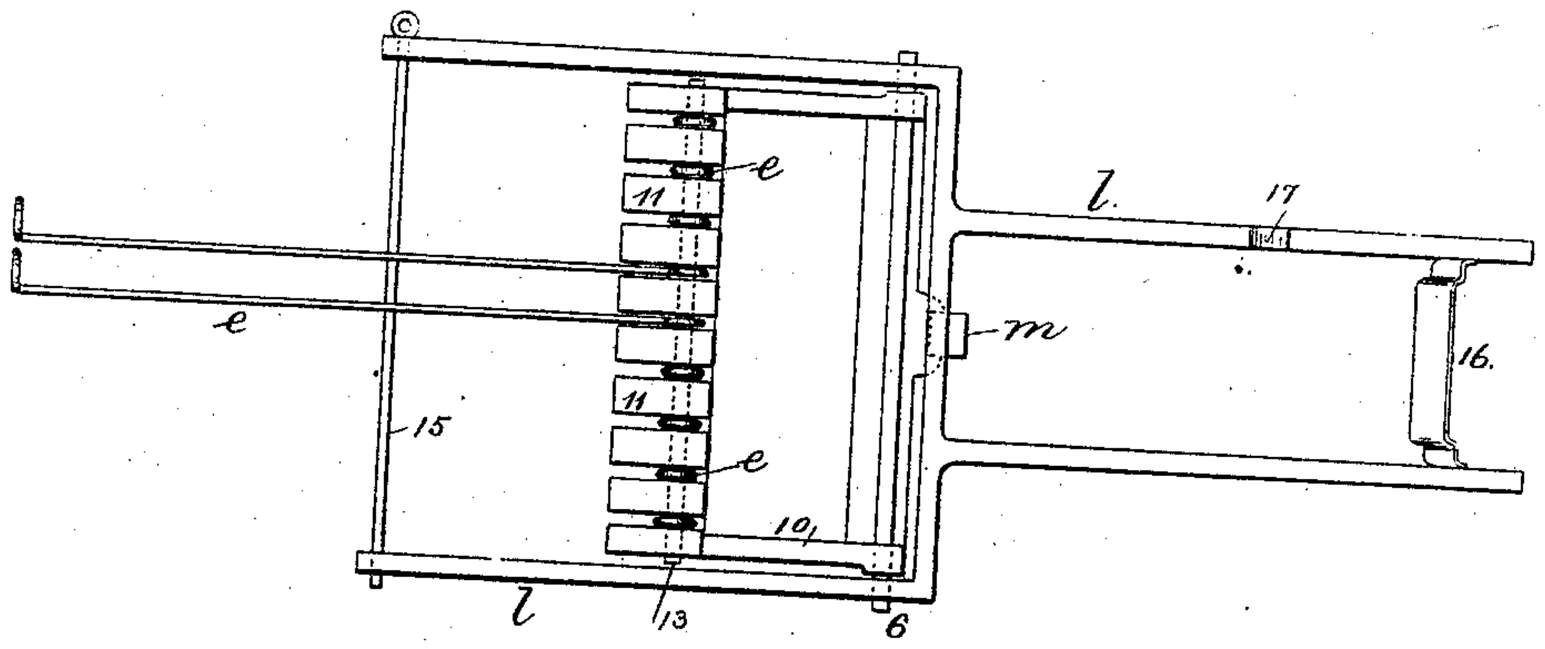
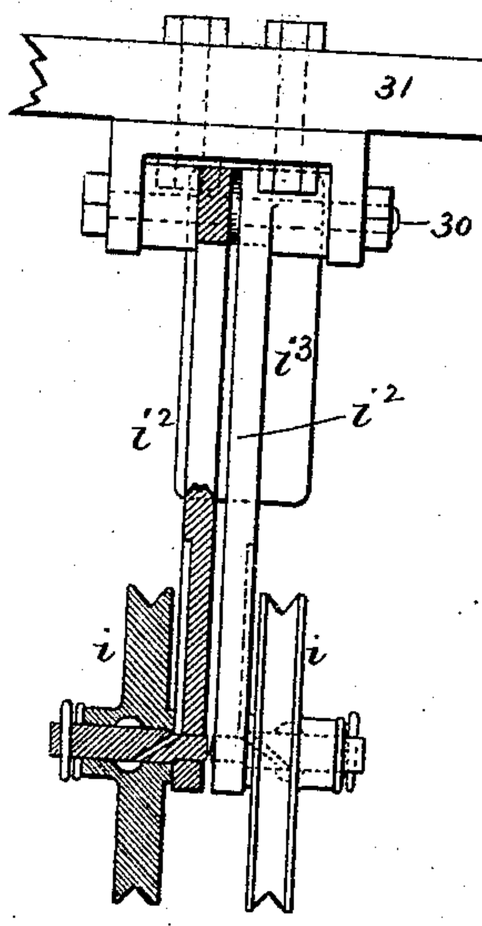


Fig. 6.



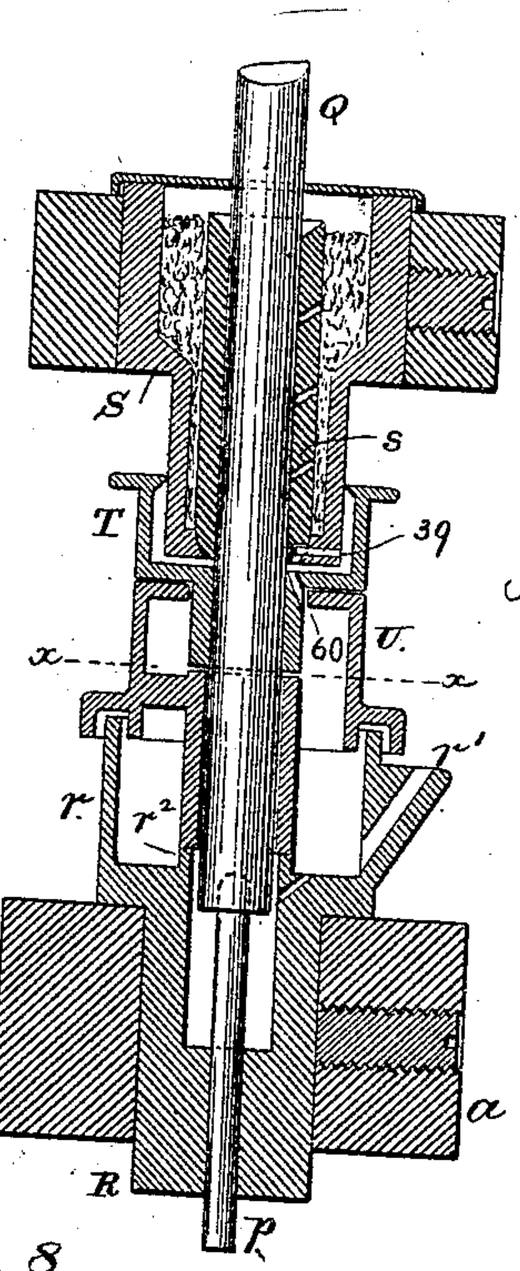


Fig. 4.

Fig. 5.

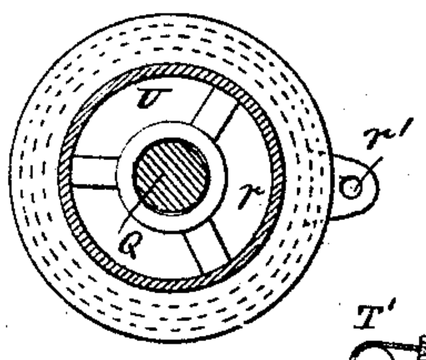
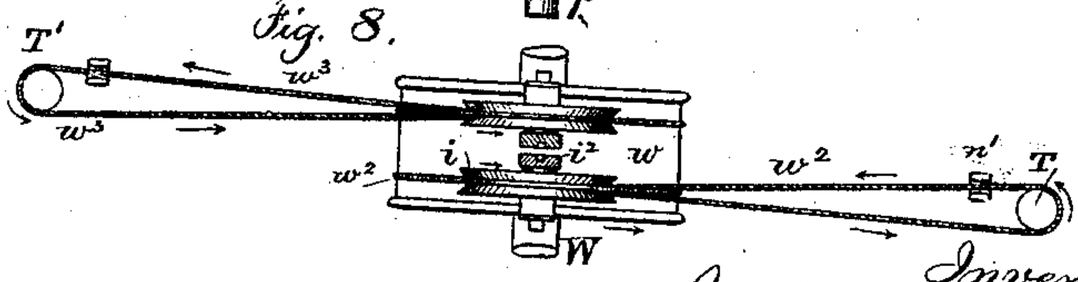


Fig. 8.



Witnesses
Chas. H. Smith
J. Stahl.

Inventor
J. E. Tynan
per Samuel W. Serrell
Atty

UNITED STATES PATENT OFFICE.

JOSEPH E. TYNAN, OF PATERSON, NEW JERSEY.

MACHINE FOR DOUBLING AND TWISTING THREAD.

SPECIFICATION forming part of Letters Patent No. 321,924, dated July 7, 1885.

Application filed October 10, 1883. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH E. TYNAN, of Paterson, in the county of Passaic and State of New Jersey, have invented an Improvement in Machines for Doubling and Twisting Thread, of which the following is a specification.

My present invention is an improvement upon the devices set forth in my application for Patent filed October 12, 1882, and upon my patent No. 279,674. I provide a peculiar stop-motion, whereby the rotation of any one spindle is prevented if either thread leading to the spindle breaks at any place between the spools and the bobbin. I also provide a peculiar hanging tightener to each belt for applying to such belt a uniform tension, and for allowing the belt to be put into place or removed with facility, and for rendering it unnecessary to make the belt of the accurate length, as heretofore required.

In the drawings, Figure 1 is a vertical section of the doubling and twisting machine through the rails and driving-shaft. Fig. 2 is a rear view of the feed and guide rollers and their supports, the beam and arms being partly in section. Fig. 3 is a plan of the frame and beam. These last two figures are in larger size than Fig. 1. Fig. 4 is a vertical section of the rails, socket, bolster-socket, bolster, and pulleys, the spindle and pin being in elevation. The illustration is on a larger scale than the other figures. Fig. 5 is a plan of the loose pulley at the line *x x* of Fig. 4. Fig. 6 is an elevation of one tightening-pulley and its lever and a section of the adjacent pulley. Fig. 7 is a section at the line *z z* of Fig. 1, showing the support for the drop-bar; and Fig. 8 is a sectional plan in smaller size at the line *y' y'* of Fig. 1, showing the direction in which the bands are passed around the pulleys.

The spindle-rails *a b* and ring-rail *c*, and the spool-rail D and creel D' are of ordinary construction. The creel D' for the creel-pins 3 and spools D^2 is adapted to hold the desired number of spools. I have in Fig. 1 only shown two spools, but the apparatus is to be adapted to bringing together and twisting any desired number of threads, as common in doubling and twisting machines.

In Fig. 3 I have represented nine faller-wires adapted to the threads from nine spools, but only two of such wires are raised to the position required when in use.

The threads pass beneath a guide-wire, g^2, and through eyes or hooks at the outer ends of the fallers *e* over the bar *d;* thence to the eye *d'* on the bar d^2 to the feed-roller *f*, around the same, and around the smaller guide-roller *e';* thence around the feed-roller *f* again and down through the eye e^2 to the ring-traveler *h*, and thence to the bobbin. The guide-wires g^2 are preferably horizontal and of a length sufficient for all of the threads to be passed under that lead to one pair of rollers. The L-shaped end of this guide-wire is fastened to the frame of the machine.

The shaft *k* is revolved by suitable power, and it is provided with rollers *k'*, one over each of the spindles, and upon this roller *k'* the feed-roller *f* rests, and it receives its motion from this roller *k'* by the frictional contact resulting from the weight of said feed-roller *f;* and I remark that the axes of the feed-rollers *f* are in open-jaw bearings *f'* in the standards f^6, and the guide-roller *e'* is upon an arm or shaft, e^3, extending out from the standard f^6.

I have shown a belt, w^4, as the means for communicating motion from the shaft W to the shaft *k*, but gearing might be employed for the purpose. w^5 is the belt for giving motion to the shaft *k* on the opposite side of the machine.

The threads passing around the feed-rollers *f* rest upon the lower rollers, *k'*, and thereby the threads are fed along gradually and passed to a bobbin and twisted before they are wound upon said bobbin. The amount of twist given to the threads depends on the relative speeds of the feed-rollers and spindle, and by changing the speed of the shaft *k* the twist can be varied without changing the speed of the spindle.

The beam *l* is in the form of an open frame pivoted upon a T head or frame at the upper end of the drop-bar *m* by the pivots 6. This drop-bar *m* is guided by and slides in the forks 7 and 8, and retained therein by cross-pins 70 and 80, and it carries at its lower end a friction finger or brake, *n*, that rests upon the pulley of the spindle when the bar *m* drops, and also a belt-shifter, *n'*, that moves the belt from the fast to the loose pulley, hereinafter more fully described, to stop the rotation of the spindle if a thread breaks. These forks 7 and

8. and the removable pins 70 80, allow either of the drop-bars to be taken out without stopping the machine, which is very advantageous in making repairs.

The side of the drop-bar *m* is slightly notched near the fork 7, to set upon the upper edge of the fork and be supported thereby, and the spring 9 presses the notch of the drop-bar toward its support, so that when the drop-bar is pressed back against the action of the spring the notched portion will slip off its support and the bar *m* drop.

At the upper end of the drop-bar *m*, and pivoted to the T-head thereof, there are arms or a frame, 10. Extending to the rear and between them, and parallel with the T-head, there is the notched bar 11, having a wire, 13, passing through it. The faller-wires *e*, having eyes at their ends, are in the notches of this bar 11, and the wire 13 passes through the eyes and forms pivots, upon which the drop-bars can swing.

The beam *l* is in the form of a light frame extending as arms at each side of the fulcrum 6, and has across its open ends a movable pin, 15, beneath the faller-wires *e*. It also has at the other end the lifter and thread-holder 16, and there is a tooth, 17, upon the frame near the feed-roller *f*, and upon the feed-roller *f* there are one or more stop-pins, 18. There is also upon the standard f^6 a fulcrum or pin, 19, that is below the beam *l*. This beam *l* is balanced so that the end near the feed-rollers is slightly the heaviest, and in the normal position it is usually supported by the said pin 19 and by the pivots 6.

To prepare this part of the apparatus for use, the pin 15 is withdrawn, and as many of the fallers *e* as there are threads to be doubled are raised from their hanging position below their pivot-pin 13, and the pin 15 reinserted below them. The threads are passed through the eyes at the ends of these fallers, and by such threads such fallers are supported after the threads have been passed around the upper feed-roller and drawn up with the usual tension. If either thread breaks between the roller *f* and the spool, the faller *e* that was supported by that thread drops and rests upon the wire 15. The weight and leverage of the faller cause the beam *l* to turn upon its pivots, and the front end rises, bringing the tooth 17 into the path of one of the pins 18 on the roller *f*, and such pin strikes the tooth with a blow, and the movement is sufficient to push the drop-bar *m* off its support at the fork 7, and as said drop-bar *m* descends the pivots of the beam *l* at the T-head also descend, and the fulcrum 19 supports the beam, and it is swung to a sufficient inclination for the lifter 16 to raise the feed-roller *f* off the roller *k'* and stop the revolution of such roller *f* and the drawing of thread off the spools until the thread is joined and the parts restored to their normal condition. The descent of the drop-bar *m*, carrying with it the belt-shifter *n'*, which removes the driving-belt from the fast to the loose pulley, and the finger or brake *n*, resting upon the fast pulley, stops the revolution of the spindle. In this position the lifter 16 acts against the thread and holds the same as well as lifting the feed-roller around which the thread is coiled, thereby preventing the thread unwinding or the twists of the thread passing up around the roller *f* to the portions of the threads between the roller *f* and spools; hence the broken thread is more easily seized and joined. The surface of this lifter may be cloth or elastic material.

The parts before described by me may be used without the detector or stop device next described, but I prefer to use both stops, especially in machines that twist as well as double.

The detector *o* is preferably made of wire, a coil of which passes around the axis e^3 of the guide-roller *e'*, and the short upper end extends across under the threads as they pass from the guide-roller *e'* to the roller *f*. This detector is shown by dotted lines in Fig. 2. The tail or rear end *o'* of this detector *o* is the heaviest, and it is slightly above the beam *l* when the thread is in its normal condition.

If the traveler leaves its ring or breaks, the thread between the bobbin P and the guide-roller *e'* suddenly becomes slack, and the back end *o'* of the finger *o* drops upon the beam *l*, and is of sufficient weight to press down the back end and raise the tooth 17 into the path of one of the pins 18 on the roller *f*, and this pushes back the beam, unlatching the drop-bar *m*, and allows the same to act as before described, and stops the feed and the spindle simultaneously.

In machines where ring-travelers are employed there is considerable waste of material where the ring-traveler breaks, or is thrown off, because the winding ceases, but the feed and the twisting continue; hence the loose thread is usually twisted up into a knot that becomes waste, and sometimes becomes twisted in with contiguous threads. My improvement prevents this. If the bobbin P becomes so full of thread that said thread touches against the ring-traveler *h* and carries the same around with it the winding will cease and the slack thread produces a stoppage of the feed-roller and spindle, as aforesaid.

The bobbin P and the ring and traveler are of ordinary construction. The spindle Q is recessed at its lower end and supported by a spring-wire step, *p*, passing up through the oil-cup *r* into such recess in the spindle. This spring-step forms the pivot or bearing upon which the spindle is rotated, and it springs or yields should there be any tendency of the spindle to bind or to vibrate in consequence of the bobbin not being true.

There is a bolster-socket, S, in the rail *b*, through which the spindle passes, and within this bolster-socket there is a tubular bolster, *s*, having a lower end that is a segment of a sphere. This passes into a similarly-shaped opening at the lower end of the bolster-socket

S, so as to form a tight joint to prevent the escape of lubricating material, but to allow the spindle to rotate and vibrate in other than a true axial position, as its lower end may move more or less laterally as the spring-step *p* yields to any extraneous force, such as the rotation of an untrue or unbalanced bobbin. This prevents the vibration being communicated to the step-rails of the machine.

A small pin at 39 may be introduced to prevent the bolster *s* rotating with the spindle. Usually there will be cotton waste or other fibrous material in the bolster-socket S, to prevent the escape of oil down between the bolster *s* and socket S; but should any oil escape it passes into the hollow pulley T, and may be allowed to run through a hole, 60, in the hub of the same into the lower oil-cup. The pulley T is fast upon the spindle, and the pulley U is loose, and its tubular hub is around the spindle, but in the oil-cup *r;* hence it is always lubricated, and the bottom flange of the loose pulley U forms a cover to the oil-cup, and at one side of such oil-cup there is a hole, through which the oil is supplied, as at *r'*. The weight of this loose pulley is supported at the lower end of the hub of such pulley by a rib or bearing, r^2, formed on the socket *r*, and when the drop-bar *m* descends, as before described, the brake-finger *n* rests on the pulley T, and by friction prevents it or the spindle rotating, and at the same time the belt is shifted from the fast to the loose pulley.

The main driving-shaft W is provided with pulleys *w*, one to each spindle. The belt or band w^2 passes around this pulley *w*, also around the tightener-pulley *i*, and to the pulley upon the spindle. The tightener *i* is upon one arm of the bent lever i^2, and there is a weight, i^3, upon the other end of such lever to apply the necessary force to keep the belt tight. The pivot-pin 30 for this bent lever is in a jaw-block fastened to the under side of the rail 31. By this construction I am able to put on a new belt or band without stopping the machine, because it is only necessary to move the lever of the tightener and slip the belt sidewise upon the pulley *i*. One pivot-pin, 30, and jaw I usually make to hold two levers and tighteners, as shown in Fig. 6, the arms and weights passing off in opposite directions, so that one tightener acts with the belt w^2 to one spindle, and the other acts with the belt w^3, going off in the opposite direction to the spindle on the other side of the machine.

It is most advantageous to make the doubling and twisting machine double, with a range of spindles on both sides. I am able to use with this machine only one shaft, W, with the pulleys *w* or a long drum, and to take off the bands w^2 w^3 for the pulleys T T' in opposite directions, as shown in Figs. 1 and 8, because the two portions of the band w^2 or w^3 that pass off nearly horizontal form a loop that can be turned either side up, and hence the spinning and winding will be in the same direction on the thread because the loops of the belts are turned in one direction along on one side of the machine, and in the other direction along on the other side of the machine, as indicated in the diagram, Fig. 8.

In my machine the tighteners act independently upon each belt to maintain the proper tension, and the stop mechanism does not act to tighten or loosen the belts.

Beneath the detectors *o* there is a rod, o^2, passing along through openings in the frame. There are upon this rod lifters in the form of inclines o^3, one to each detector, and this rod o^2 is movable endwise, so that all the detectors in the doubling and twisting machine can be simultaneously lifted and held out of action when the machine is being prepared for use or during the stoppage for removing bobbins. This detector-lifter is to be moved endwise by hand or otherwise, or it may be revolved or moved laterally to lift the detector out of action, if desired.

I claim as my invention—

1. The combination, with the drop-bar *m*, belt-shifter, spindle, and pulleys, of the T head or frame at the upper end of the drop-bar, the beam pivoted upon the same, having a tooth, the feed-roller having pins or stops, means for revolving the feed-roller, and the pivoted fallers for the threads, substantially as set forth.

2. The combination, with the drop-bar, belt-shifter, brake or finger, spindle, and pulleys, of the T head or frame at the upper end of the drop-bar, the fallers pivoted upon said frame, and the beam pivoted upon such T head or frame and provided with tooth 17 and the lifter 16, and the feeding-roller and mechanism for rotating the same, substantially as set forth.

3. The combination, with the feed-roller *f*, having a stop or pin, 18, the driving-roller *k'*, and means for rotating the same, of the pivoted beam *l*, having the tooth 17 and lifter 16, the drop-bar and its T head or frame supporting the beam, the fallers, and the fulcrum 19, substantially as set forth.

4. The detector *o*, in combination with the feed-roller *f*, having pins 18, means for rotating said roller *f*, the pivoted beam provided with a tooth and lifter, the fulcrum 19 and drop-bar, the spindle, and the ring and traveler, substantially as set forth.

5. The combination, with the drop-bar, belt-shifter, spindle, and pulleys, of the T head or frame, the pivoted beam, the fallers, the detector *o*, the fulcrum 19, the feed-roller *f*, and means for rotating the same, substantially as set forth.

6. In combination with the detector *o* and pivoted beam, the detector-lifter o^2 and the feeding-roller, substantially as set forth.

7. The combination, with the removable drop-bar *m* and the belt-shifter, spindle, and pulleys, of the forks 7 and 8 and the pins passing across the forks to retain the drop-bar, but allow of its removal, substantially as set forth.

8. The combination, with the creel-pins for supporting the spools and the mechanism for doubling and feeding the thread, of the winding-spindle and its spool, the former provided with a fast and loose pulley, a belt for rotating the same, a shipping device for said belt, a detector acting against the doubled thread, fallers, and mechanism, substantially as set forth, whereby the feed, the spinning, and the winding mechanism are simultaneously stopped through the intervention of the detector or the dropping of a faller, substantially as specified.

9. The combination, with the feeding and winding mechanism, of a pivoted beam, a detector, a drop-bar, and stops acting upon the feeding and winding mechanism and brought into operation by either the breaking of the thread or the accumulation of the thread on the spool or bobbin, substantially as specified.

Signed by me this 1st day of October, A. D. 1883.

JOSEPH E. TYNAN.

Witnesses:

GEO. T. PINCKNEY,

WILLIAM G. MOTT.