No. 784,364. PATENTED MAR. 7, 1905.

J. E. TYNAN.

DOUBLING AND TWISTING MACHINE.

APPLICATION FILED APR. 8, 1904.

2 SHEETS—SHEET 1.

Fig. 7.

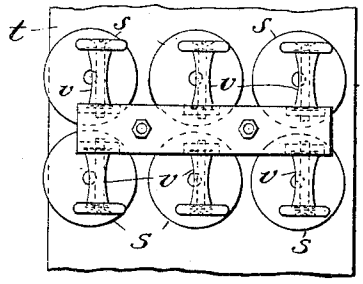


Fig. 6.

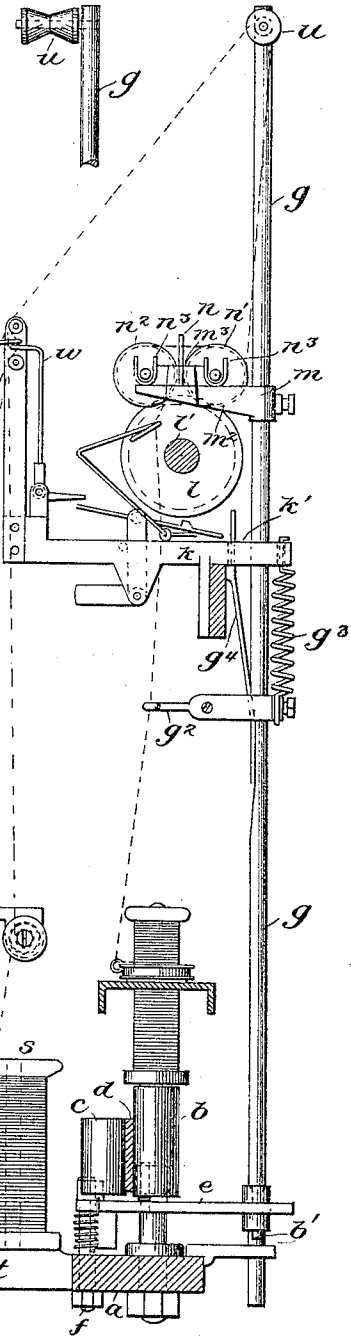
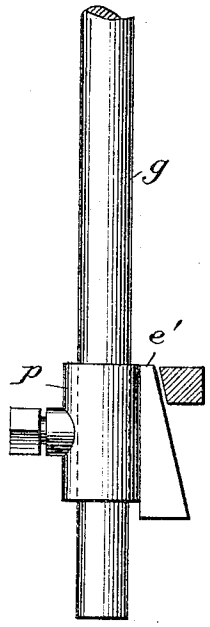


Fig. 1.

Fig. 5



Witnesses:

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Fig. 4.

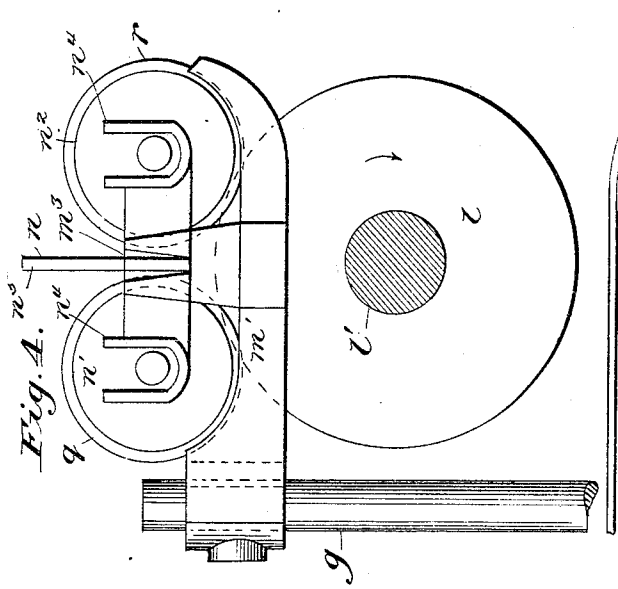


Fig. 2.

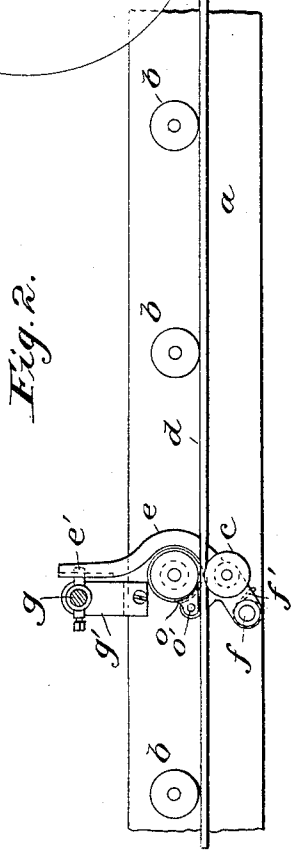
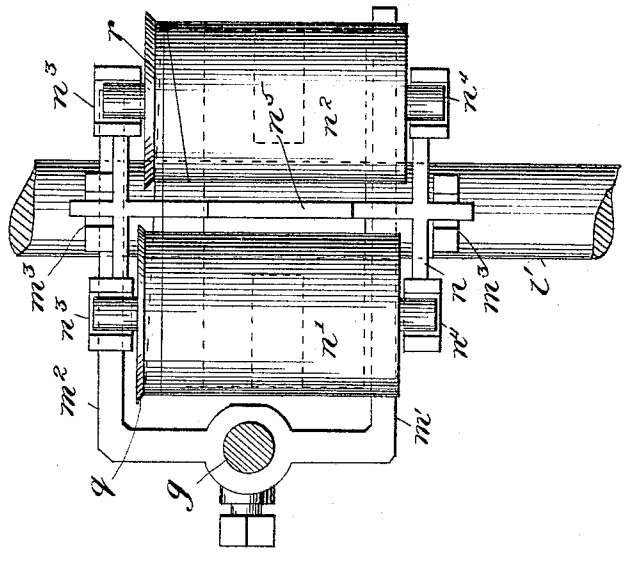


Fig. 3.



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No. 784,364. Patented March 7, 1905.

UNITED STATES PATENT OFFICE.

JOSEPH E. TYNAN, OF PATERSON, NEW JERSEY.

DOUBLING AND TWISTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 784,364, dated March 7, 1905.

Application filed April 8, 1904. Serial No. 202,251.

To all whom it may concern:

Be it known that I, JOSEPH E. TYNAN, a citizen of the United States, residing at the city of Paterson, in the county of Passaic and State of New Jersey, have invented a new and useful Improvement in Doubling and Twisting Machines, of which the following is a specification.

My invention relates to that class of twisting-machines in which two or more threads are doubled and twisted together and laid upon a bobbin on a spindle by means of a ring and traveler.

The objects of my invention are to obtain a simple and effective method of driving the spindle and stopping it when a thread breaks or when the spindle is to be stopped to doff the bobbin and to brake the feed-rollers of the machine to stop their momentum when they have been moved from their driving means.

A further object is to prevent the several laps of thread upon the feed-rollers from catching in each other and to make it easier for the operator to pass the threads around the rollers.

In the drawings, Figure 1 is a vertical end view of a spindle and its driving means and the feeding mechanism and stop-motion relating thereto. Fig. 2 is a plan view of the spindle and its driving and stopping mechanism. Fig. 3 is a plan view of the thread-feeding mechanism. Fig. 4 is a vertical end view of the thread-feeding mechanism. Fig. 5 is a detail view of part of the stop-motion mechanism relating to the spindle. Fig. 6 is a detail view of the doubling-guide that forms the several single threads into one thread, and Fig. 7 is a plan view of the bobbins for the single threads with their supports and guides.

Throughout the drawings similar letters indicate similar parts.

The spindle-rail of the machine is shown at *a*. This rail is sustained by the usual uprights, which I have not thought it necessary to show. The spindles *b* are mounted in the rail and form a straight line along its entire length. The shaft *h'*, which receives power in some usual manner, is to convey driving power to the spindles. A belt *d*, driven by the pulley *h* upon the shaft *h'*, runs in a straight line along the side of the machine adjacent to said row of spindles. This belt passes around a carrier-pulley (not shown) at the end of the machine farthest from the pulley *h* and while returning to the pulley *h* runs in a straight line adjacent to a similar row of spindles upon a spindle-rail (not shown) on the opposite side of the machine. In front of each spindle *b* and with the belt *d* running between them is a pressure-pulley *c*, mounted on the spring-actuated hinged lever *e* and held by the actuating-spring of said lever against the belt *d*, so as to press said belt against the spindle *b*. The lever *e* is hinged upon the stud *f* and is actuated by the coiled spring *f'*. The lever *e* carries the pin *o'*, upon which is loosely mounted a brake *o* for the spindle *b*. A wedge *e'* to act upon the lever *e* is secured to the adjustable collar *p* upon the rod *g*. The lower end of the rod *g* passes through a hole in the plate *g'*, secured to the rail *a*. The rod *g* is capable of vertical movement. It carries at its top the feed-roller-lifting bracket *m*, and the spring g^3 tends to force the rod upward. A latch g^4, secured to the rod *g*, locks against the bottom of the faller-bracket *k*, and when thrust from its place by the stop-motion mechanism will move backward in the slot *k'* in the bracket *k*.

The faller stop-motion mechanism is similar to that shown in former patents granted to me, so I deem a brief outline of its method of operation sufficient. The fallers *w* are supported by the threads. On the breakage of a thread a faller *w* falls inward, swinging on its pivot, and by the effect of its weight upon a toothed lever forces the tooth of the lever into an opening in the revolving roller *l*. The revolution of the roller *l* forces the toothed lever backward against the latch g^4, the latch g^4 is thrust backward, the spring g^3 raises the rod *g*, the wedge *e'* actuates the lever *e* against the force of the spring *f'*, and the lever *e*, swinging on the stud *f*, moves the pressure-pulley *c* away from the belt *d* and moves the brake *o* against the spindle *b* to stop its momentum. The relation of the hinge

of the lever e and the pressure-pulley c and brake o upon the lever is such that a single movement of the lever moves the pressure-pulley from the belt and the brake toward the spindle at the same time. The brake o has a concave surface to match the convex of the spindle, and owing to its being loosely mounted on the pin o' its entire concave surface beds against the spindle. The pressure of a pulley c is merely sufficient to press out the film of air from between the spindle b and the surface of the belt, and such air being so excluded the belt drives the spindle. There is not sufficient effect produced by such pressure upon the belt to force the film of air from between the belt and the adjoining spindles. When the rod g is forced downward, the latch g^4 springs under the bracket k and the spring f' is free to actuate the lever e, thereby moving the brake o away from the spindle b and pressing the pressure-pulley c against the belt d to drive the spindle.

The friction-driving roller l is driven by the shaft l', which receives its power in some usual manner. The feed-rollers n' and n^2 normally rest upon the roller l; but the parts of the rollers that carry the threads project beyond the roller l and have flanges on their ends to guide the threads, as at q and r. Each of these flanges extends around the circumference of the end of its respective roller. The feed-roller-lifting bracket m, carried by the spring-actuated rod g, has arms m' and m^2, and each of these arms is provided with a forked bearing m^3. The rollers n' and n^2 are mounted in the removable bracket n, resting in the forked bearings m^3 on the arms m' and m^2 of the roller-lifting bracket m. The bracket n has forked bearings n^3 and n^4, in which are confined the gudgeons of the roller n^2 and forked bearings n^3 and n^4, which confine the gudgeons of the rollers n'. The arm m^2 of the bracket m extends under and in proximity to the forked bearings n^3; but the arm m' of the bracket m extends directly beneath the rollers n' and n^2. The gudgeons of the rollers n' and n^2 that are confined in the forked bearings n^3 and n^4 run clear of the bottom of the forked bearings, depending on the forked bearings when running for lateral support only.

The bobbins containing the threads to be doubled and twisted are shown at s. These bobbins stand upright on the board or bracket t, which is secured to the frame of the machine, and the threads are drawn from the heads of the bobbins, around the guides v, through the fallers w of the stop-motion mechanism, and after being doubled in the guide u pass to the feed-rollers n' and n^2, from which the double thread is fed through the guide g^2 to the spindle b, and after being twisted by said spindle is laid by the ring and traveler upon the bobbin on the spindle b.

When the parts are to be stopped and the rod g rises, carrying upward the bracket m, the bracket m lifts the bracket n, resting in the forked bearings m^3, and the bracket n would in turn lift the rollers n' and n^2, resting in the forked bearings n^3 and n^4, were it not for the fact that the gudgeons of the rollers n' and n^2 that rest in the forked bearings n^4 are normally clear of the bottom of the forked bearings to such an extent that before the upward motion imparted by the bracket m to the bracket n can cause the rollers to be lifted, the brake-arm m' of the bracket m itself strikes against the peripheries of the rollers n' and n^2 and in its upward movement lifts that end of the rollers against which it strikes bodily. As the brake-arm m' and the bracket m travel upward at the same speed and to the same distance, the gudgeons of the rollers in the forked bearings n^4 do not at any time reach the bottom of the forked bearings, but the whole weight of that end of the rollers is sustained by the brake-arm m'. The arm m^2 of the bracket m of course likewise rises with the bracket, lifting the bracket n, and the bracket n, through the agency of the forked bearings n^3, lifts the ends of the rollers bearing in said forked bearings through the fact that said forked bearings are closed at the bottom, the bottom of the forked bearings striking and raising the gudgeons of the rollers. When the rod g has risen to its height, the rollers n' and n^2 are clear of the driving-roller l, the gudgeons on one end of each roller resting in the forked bearings n^3, and the periphery of the other end of each roller supported by the brake-arm m' of the roller-lifting bracket m. The effect of the brake-arm m' striking the peripheries of the rollers and lifting them thereby is to check the momentum of the rollers as soon as they are lifted clear of the driving-roller l. Owing to the brake-arm m' coming into contact with portions of the rollers distant from that part thereof about which the threads are wrapped, the braking of the rollers does not lock the thread upon them and the thread is free to slide around the rollers as it is pulled back from the twisting-spindle by the operator in "piecing up" the threads. It is to accomplish this object that I have only one brake-arm and apply it to the ends of the rollers farthest from the threads. The brake-arm raises the ends of the rollers with which it comes in contact, and the opposite ends of the rollers are raised by elevating their gudgeons. In running at high speeds, such as is necessary in making silk weft, known as "tram," in which there is very little twist required, usually not more than two or three turns to the inch, this is a great advantage, as the rollers n' and n^2 are usually of heavy material, and their momentum would otherwise cause them to continue to revolve, and thereby cause much waste of material and loss of time in adjusting the threads. As the bracket n is removable from the machine for

the purpose of passing threads around the rollers n' and n^2 while they rest in the bracket, the forked bearings n^4 are closed at the bottom, so that when the bracket is removed from the machine the gudgeons of the rollers may rest in the forked bearings n^4 as they do in the forked bearings n^3.

Efforts have heretofore been made to construct and operate machines in which threads have been drawn from the heads of bobbins to be doubled and twisted together into weft or tram. Such efforts have been induced by the fact that the drag on the threads in drawing them from bobbins on a creel and allowing the pull of the threads to revolve the bobbins, which is the usual method employed, is removed when the threads are drawn from the heads of the bobbins. As a result instead of being compelled to run a machine at a slow speed, owing to the great strain on the threads through their having to pull the bobbins around, this method of drawing the threads from the heads of the bobbins removes all limit as to speed so far as this particular feature of the operation is concerned; but a new limit to the speed at once became evident. Properly speaking, this new limit did not relate to the running of the machine, but to a practical difficulty at the time a thread should break and a spindle be stopped. On the breakage of a single thread and the consequent operation of the stop-motion the remaining threads would move so fast and so far before the feeding mechanism had ceased its operation that a finished thread, lacking the thread that had been broken, would travel beyond the feed-rollers and be wound upon the bobbin by the ring and traveler, or if the spindle were promptly stopped by a brake would gather and hang loose between the ring-traveler and the feed-rollers. It then became necessary for the operator before he could repair the threads to draw back all such imperfect product, pulling it back until he reached a finished thread that contained or was formed of the total desired number of threads The result, without dwelling on the extra time consumed, was a great loss of material, as all the threads so drawn back was waste. In the manufacture of silk, which material, as is well known, is costly, this item of waste made the operation of such machines at high speed undesirable. The aim of my present invention is to make it possible to draw the threads from the heads of the bobbins advantageously, gaining the possibility of the high rate of speed without the disadvantage consequent to it before. By applying a brake to the feed-rollers at the same moment that the stop-motion operates, thereby overcoming the momentum of the rollers, the travel of the thread is instantly checked, and the operator when he proceeds to repair the threads usually finds hanging from the guide u the end of the broken thread he is to repair. He is thus enabled to put the parts in running condition again with very trifling waste of material and little loss of time.

It is obvious that the upright position of the bobbins is not essential. The bobbins may be in a horizontal position and the threads nevertheless be drawn from their heads by means of suitable guides.

It will be noticed that the flange q on the roller n' and the flange r on the roller n^2 when the rollers are in position for running are out of alinement with each other. These flanges are to control the running-line of the threads on the rollers. The doubled thread from the guide u passes behind and under the roller n', being guided onto said roller at a point close to the flange q. The thread then travels to the under side of the roller n^2, the flange r controlling its running-line. After passing upward and over the roller n^2 the thread travels to the top of roller n' and behind and under said roller n'. While on the roller n' at this point, the line of the thread is controlled by the flange r of the roller n^2, so that it runs separate from the thread traveling from guide u to and under roller n'. After leaving roller n' the second time the thread travels to the under side of the roller n^2, up in front of, over, and down on the inside of said roller, running from that point through the guide q^2 to the ring traveler of the bobbin on the spindle b. Owing to the part of the feed-rollers around which the thread is wrapped overhanging the driving-roller l, the twist imparted to the thread by the spindle b is free to travel upward onto the feed-roller n^2 and in practice causes the thread as it is about to leave the roller n^2 to roll upon the roller, carrying it away from the previous wrapping of thread about the rollers, so that the thread leaving the roller n^2 to travel downward to the ring-spindle does not touch the thread passing the second time from the under side of roller n' to the under side of roller n^2. Heretofore when feed-rollers have been used in pairs with the threads wrapped about the rollers one or both of the rollers have been grooved to keep the wrappings of thread on the rollers from catching and locking in each other. In the present device I attain the same object without the grooves, while the loss of time of the operator in wrapping the threads in the grooves and the danger of several wrappings of thread getting in the same groove is done away with. In order to wrap the threads around the rollers n' and n^2, which at times is necessary, the operator for convenience proceeds directly contrary to the course the thread takes in running, beginning with the end of the finished thread from the bobbin on the spindle b. Lifting out the roller n^2, he passes the thread behind it, and then replaces the roller. Then lifting the bracket n, containing both rollers, by the upward extension n^5 he passes the thread

over and under roller n^2 under and over roller n', again over and under roller n^2, and under roller n', after which he can tie it to the ends of the single threads that are drawn from the bobbins s. The fact that the doubling-guide u is secured to the top of the rod g causes said guide u to rise with the rod g on the action of the stop-motion. As the lifting of the feed-rollers causes a certain amount of slackness in the threads at the time of stopping, it is an advantage to have the guide u rise and take up this slackness. The guide u is so adjusted that it delivers the doubled thread close to the flange q of the roller n', for the purposes I have hereinbefore described.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A plurality of bobbins containing threads to be doubled and twisted, said bobbins being so placed that their respective threads may be drawn from their respective heads, supports for the bobbins, suitable guides for the threads leading from the bobbins, a guide in which the threads are doubled, a feeding mechanism consisting of two driven rollers around which the double thread is passed, a twisting-spindle, and a stop-motion for the feeding and twisting mechanism, in combination with a brake, automatically brought into action at the time of the operation of the stop-motion mechanism, to bear against parts of the driven rollers distant from the wrappings of thread thereon, to stop the momentum of the rollers when they are separated from their driving means, for the purpose described.

2. The driving-belt d, adapted to drive a row of spindles, means for driving the belt, the spindle b, mounted inside of said belt, the vertical rod g, capable of vertical movement, the spring-actuated hinged lever e, having its hinge outside of the belt d and extending under said belt d to a point in proximity to the vertical rod g in combination with the pressure-pulley c, mounted on the lever e outside of the belt d, and adapted to press against the belt opposite the spindle b to drive the spindle, and means to cause the vertical movement of the rod g to move the lever e against the force of its actuating-spring.

3. A spindle, a driving-belt therefor and means for automatically forcing the belt against the spindle to drive the spindle, comprising a pressure-pulley upon a hinged lever, arranged to swing in a horizontal plane into and out of engagement with the belt at a point opposite the spindle, and actuated by spring-pressure to press against the belt to cause the belt to drive the spindle, in combination with automatic means to swing the hinged lever and carry the pressure-pulley from the belt, and a brake carried by the hinged lever arranged to engage the periphery of the spindle when the pressure-pulley is swung out of engagement with the belt.

4. A row of spindles placed in a straight line, a belt, adapted to run parallel with said row of spindles, means for driving the belt, a series of pressure-pulleys, one of said pulleys being in front of and having relation to each of said spindles, a series of hinged levers, each of said levers carrying one of said pressure-pulleys, and a series of brakes, one of said brakes being mounted on each of said hinged levers, the hinge of each lever, the brake upon the lever, and the pressure-pulley upon the lever, being so related to each other that when the lever is moved upon its hinge in one direction it will move the pressure-pulley from the belt and bring the brake into contact with the spindle, and when the lever is moved upon its hinge in the opposite direction it will move the pressure-pulley against the belt opposite the spindle to which it relates to drive the spindle, and remove the brake from the spindle, in combination with means for moving the hinged lever.

5. The roller l and means for driving the same, rollers n' and n^2, about which the threads are wrapped, said rollers having gudgeons and resting on and being driven by contact with the roller l, and bearings for the gudgeons of the rollers n' and n^2, those parts of the rollers n' and n^2 about which the threads are wrapped overhanging one end of the roller l, in combination with a brake-piece beneath and adjacent to those ends of the rollers n' and n^2 farthest from the wrappings of thread thereon, and means, brought into operation when the feeding mechanism of the machine is to be stopped, to raise such rollers from contact with the roller l, the ends of the rollers about which the threads are wrapped being raised by elevating the gudgeons of the rollers, and the other ends of the rollers being raised by the brake-piece coming into contact with and elevating their peripheries.

6. The feed-roller-lifting bracket m secured to the rod g and having the brake-arm m' and the arm m^2 and carrying the bracket n, the driving-roller l and the rollers n' and n^2, mounted in the bracket n and in contact when running with the roller l, in combination with means, brought into operation when the parts are to be stopped, to raise the brackets m and n, bringing the brake-arm m' into contact with the peripheries of the rollers n' and n^2, and raising said rollers from contact with the roller l.

7. The roller l and means for driving the same, the flanged feed-rollers n' and n^2, adapted to be driven by the roller l, and supports for the feed-rollers n' and n^2, the parts being so arranged that the flange on the roller n' is out of alinement with the flange on the roller n^2.

8. The roller l and means for driving the same, the flanged feed-rollers n' and n^2, adapted to be driven by the roller l, and so mounted that the portions thereof about which the threads are to be wrapped overhang the roller l, the parts being so arranged that the flange

on the roller n' is out of alinement with the flange on the roller n^2.

9. A stop-motion mechanism having fallers for the threads, the feed-rollers n' and n^2 and means for driving the same, and the spindle b, in combination with the rod g, the doubling-guide u secured to the rod g and so located as to receive the threads that leave the fallers, assemble them and guide them to the feed-rollers, and means, brought into action by the operation of the stop-motion mechanism, to impart vertical motion to the rod g and thereby raise the feed-rollers and the doubling-guide u at the time of stopping the spindle, substantially as and for the purpose described.

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