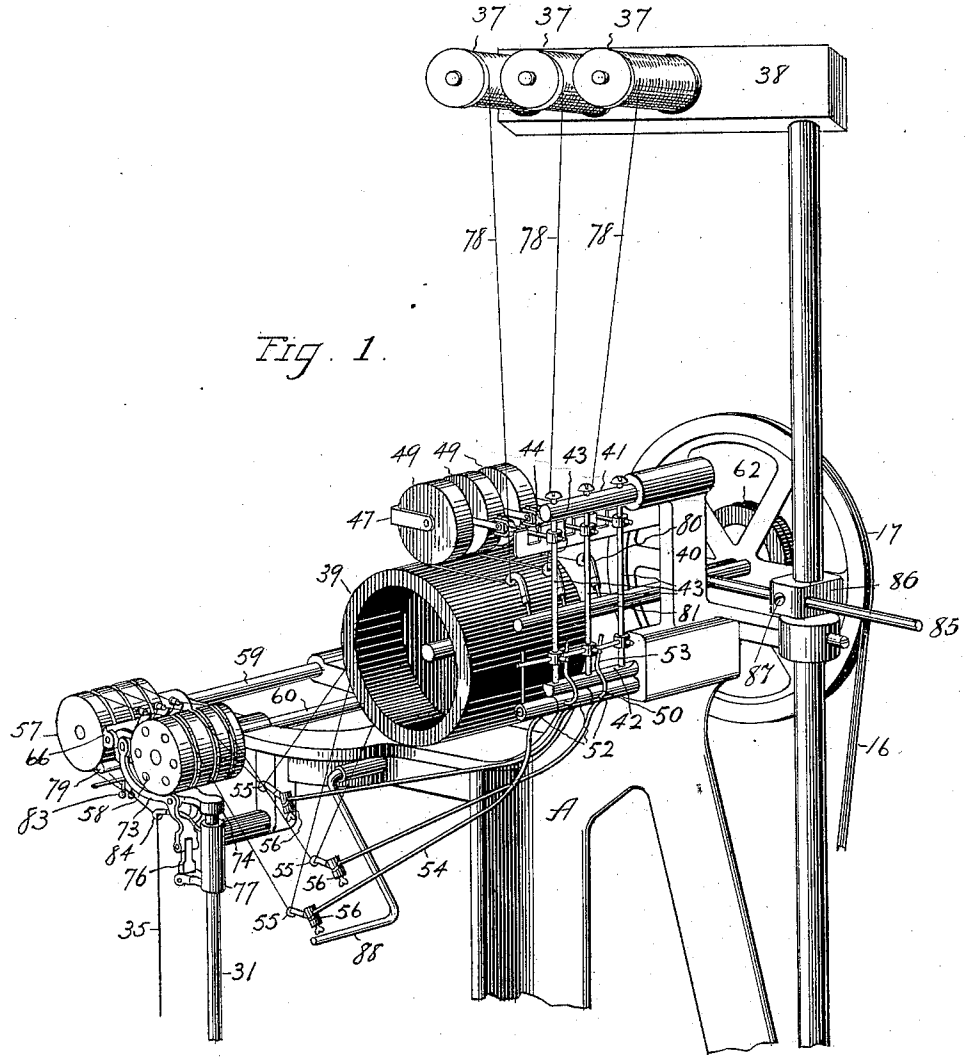
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J. A. KEYES.

MACHINE FOR DOUBLING SILK OR OTHER THREADS.

No. 600,726. Patented Mar. 15, 1898.

Fig. 1.



Witnesses
A. W. Stiefel
C. J. Legan

Inventor
James A. Keyes
By James Shepard.
Atty.

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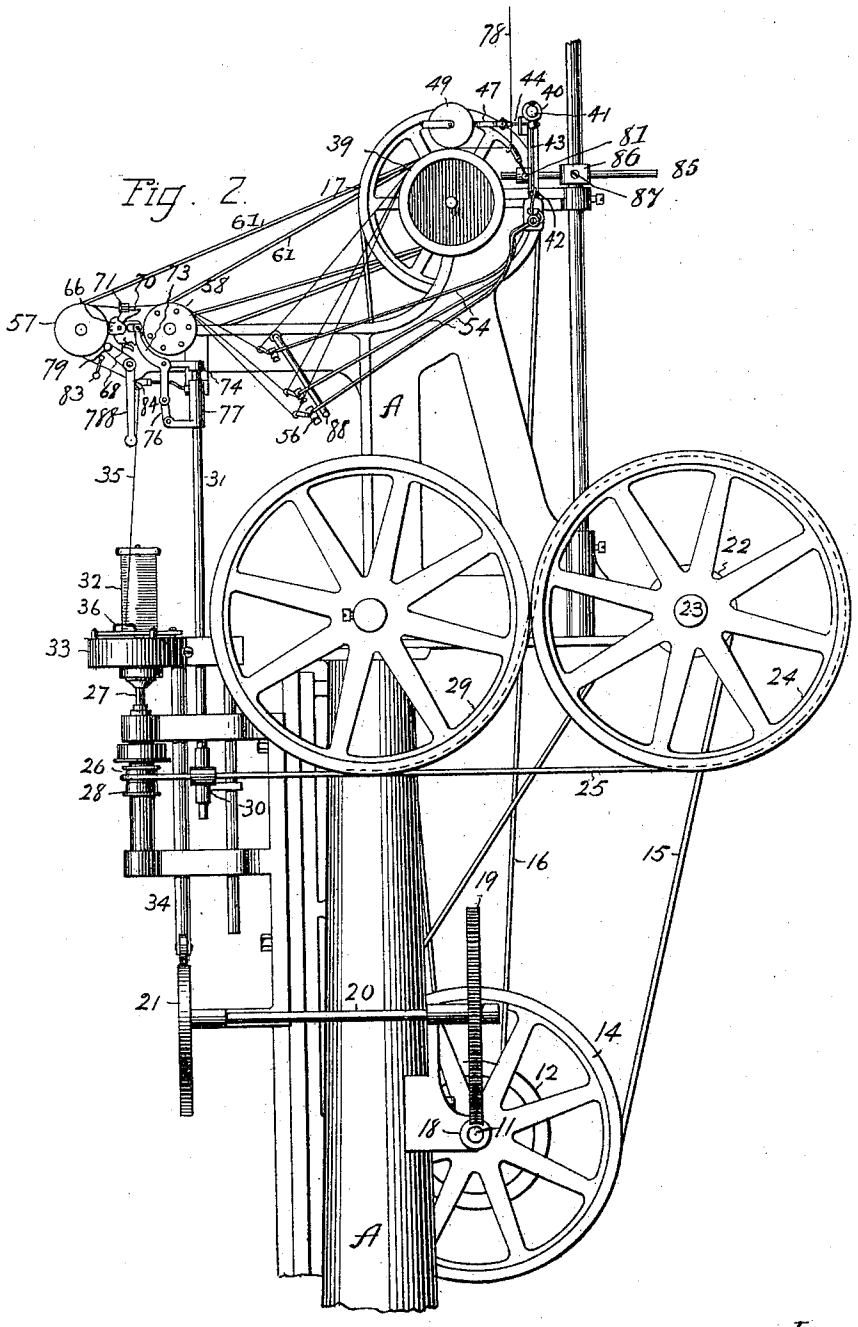
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Fig. 2.



Witnesses
A. W. Stiefel
P. J. Egan

Inventor
James A. Keyes.
By James Shepard.
Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

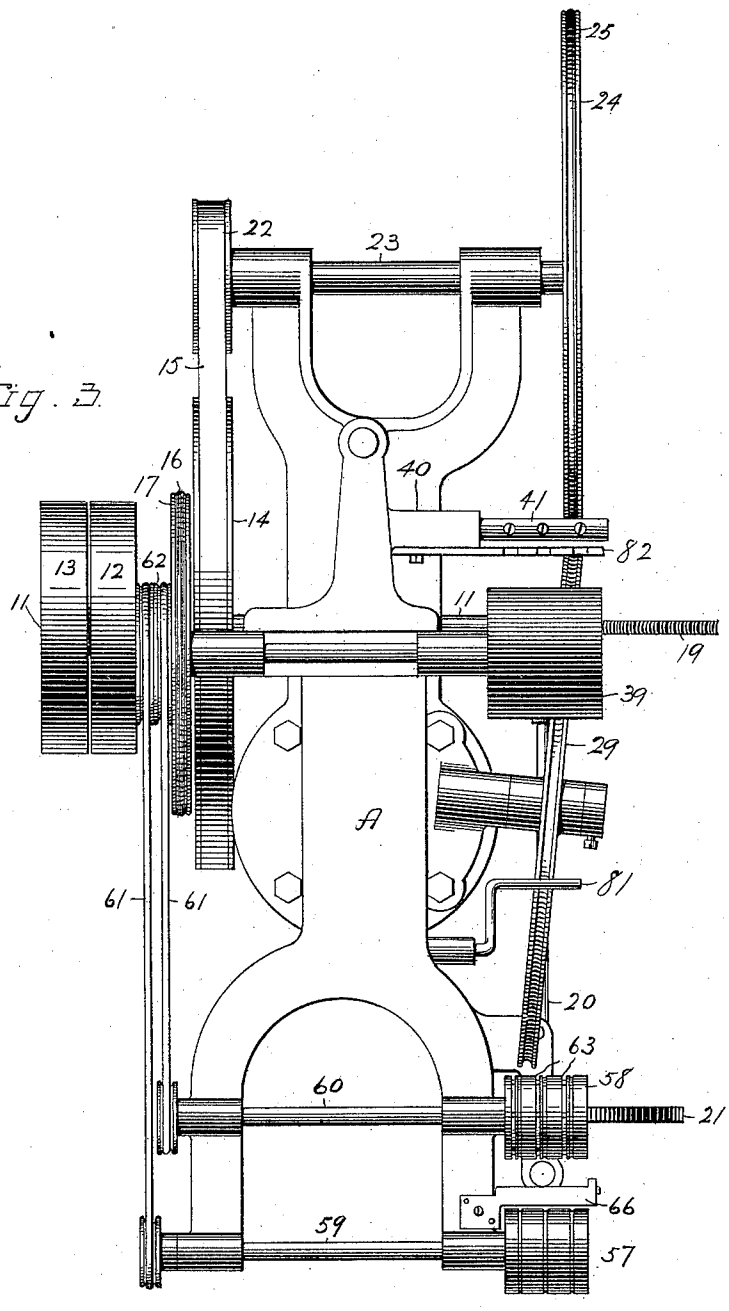
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Fig. 3.



Witnesses
G. W. Stifel
P. J. Egan

Inventor
James A. Keyes
By James Shepard.
Atty.

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MACHINE FOR DOUBLING SILK OR OTHER THREADS.

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Fig 4.

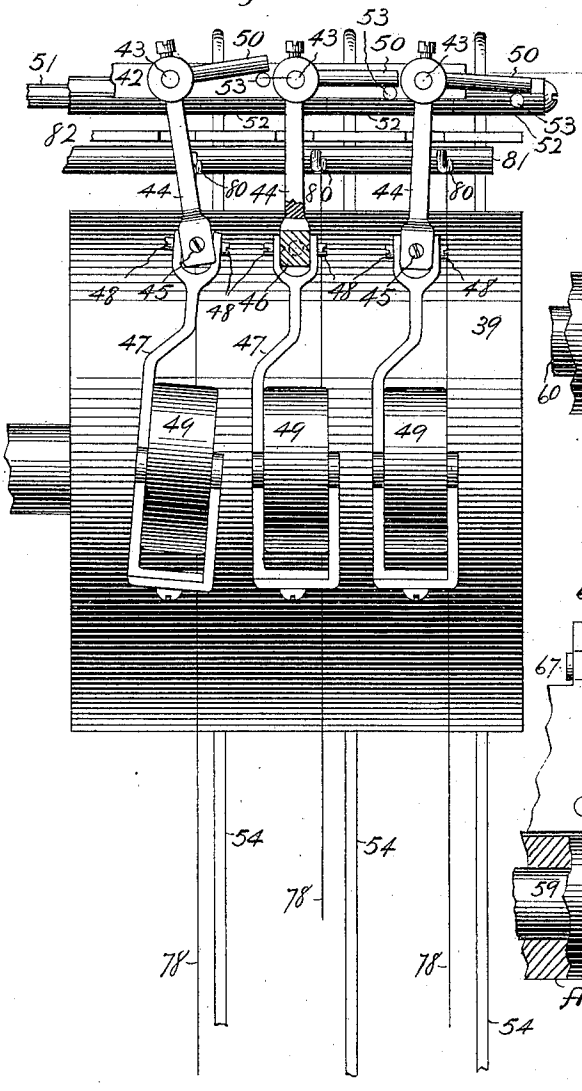


Fig 5.

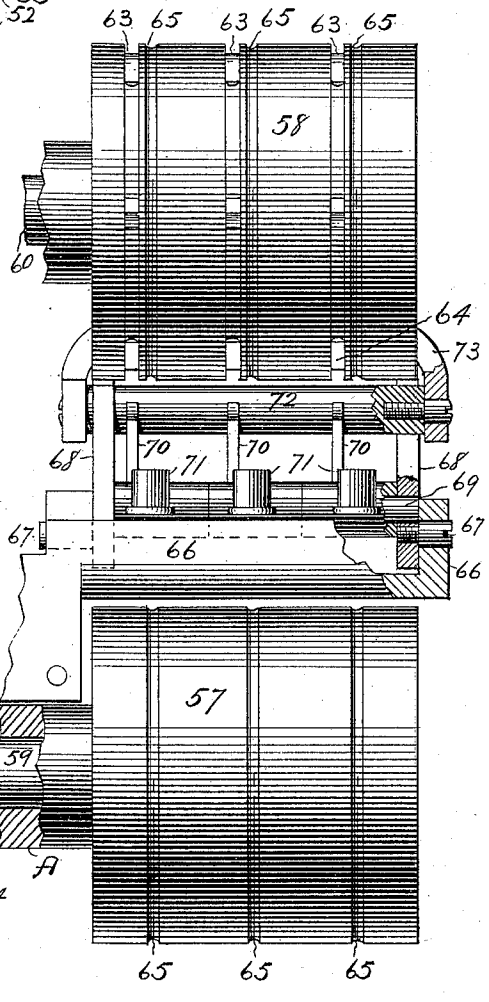
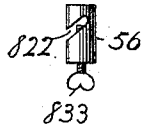


Fig. 6.



Witnesses
A. W. Stiper
P. J. Egan

Inventor
James A. Keyes.
By James Shepard
Atty.

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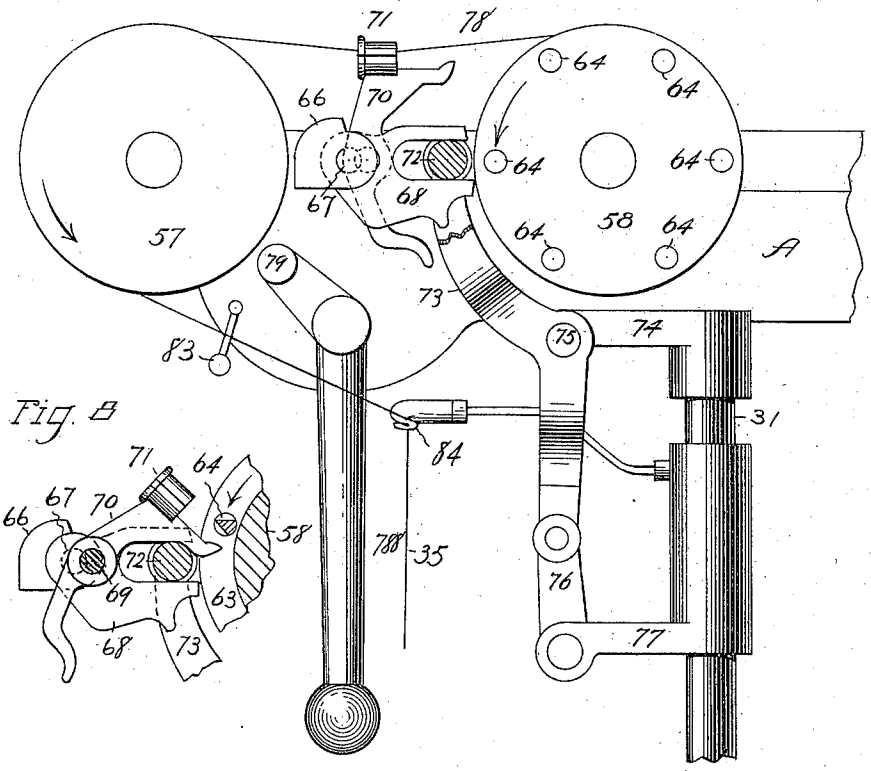


Fig. 7.

Fig. 8

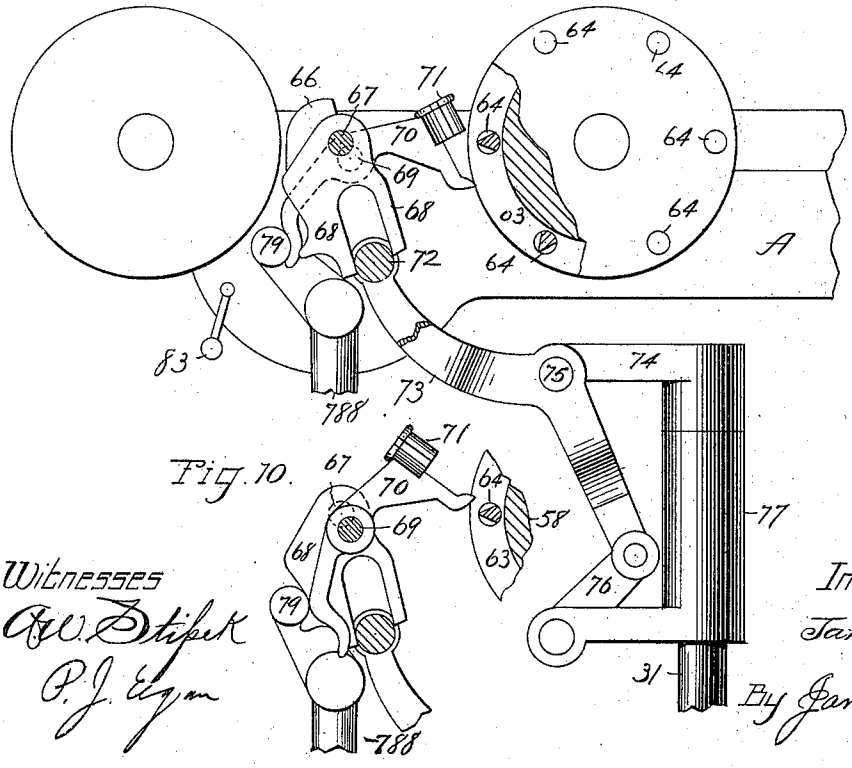


Fig. 9

Fig. 10.

Witnesses
A. W. Stiefel
P. J. Egan

Inventor
James A. Keyes
By James Shepard
Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JAMES A. KEYES, OF NEW YORK, N. Y., ASSIGNOR TO N. S. PERKINS, OF NEW LONDON, CONNECTICUT.

MACHINE FOR DOUBLING SILK OR OTHER THREADS.

SPECIFICATION forming part of Letters Patent No. 600,726, dated March 15, 1898.

Application filed April 1, 1897. Serial No. 630,270. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. KEYES, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Machines for Doubling Silk or other Threads, of which the following is a specification.

My invention relates to improvements in machines for doubling silk or other threads; and the main object of my improvement is efficiency in operation, particularly with reference to being able to run the machine at a high speed and with reference to the uniformity in the tension of the different strands united.

In the accompanying drawings, Figure 1 is a perspective view of that portion of the machine which delivers the threads to the twisting or winding device. Fig. 2 is a side elevation, on a smaller scale, of the principal parts of the complete machine. Fig. 3 is a plan view of the frame of the machine and the principal driving parts, several of the smaller parts being omitted, the scale being the same as in Fig. 1. Fig. 4 is an enlarged plan view of the feeding-cylinder and its appurtenances, some of the parts being shown in horizontal section. Fig. 5 is a plan view of the delivering-rolls and adjacent parts, some of which are shown in horizontal section. Fig. 6 is a detached side elevation of one of the tension-weights. Fig. 7 is a side elevation, partly in section, of the delivering-rolls and connected parts on a smaller scale than Fig. 6. Fig. 8 is a sectional side elevation of parts thereof, showing one position of the trip-fingers. Fig. 9 is a side elevation corresponding to Fig. 7, but with the parts in a different position and differently sectioned; and Fig. 10 is a corresponding view of some of said parts in a still different position.

Where the parts are on a smaller scale and crowded, I have sometimes omitted some of the reference-numerals as to parts which are clearly shown and designated by proper numerals in other figures.

A designates the frame of the machine, having mounted upon its lower part a shaft 11, which carries the driving-pulley 12 and loose pulley 13, together with the pulley 14 for the belt 15, and another pulley (concealed from view in the drawings) for carrying the belt 16, which runs to the driving-pulley 17 at the upper part of the machine. The said shaft 11 also carries a worm 18 for driving the worm-wheel 19 on the shaft 20, which carries the cam 21. A belt runs from the pulley 14 to the pulley 22 on the counter-shaft 23, which shaft carries at its other end a pulley 24, around which is a belt 25, leading to the small pulley 26, for driving the winding and twisting spindle 27, a loose pulley 28 being on this winding and twisting spindle immediately below the fast pulley 26. The belt 25 is guided in its course by means of the idler 29 and extends through the shipper 30 on the shipper-shaft 31. Surrounding the receiving-bobbin 32 at the upper end of the twisting or winding spindle is a sliding frame 33, to which is attached a rod 34, that rests upon the cam-wheel 21, whereby the frame 33 is made to rise and fall and deliver the united strands of thread 35 from the flier 36 to the bobbin 32, all substantially as in ordinary twisting-machines. The twisting mechanism of itself is not of my invention, and I may substitute therefor any ordinary winding or winding and twisting mechanism.

My invention relates to the devices which deliver the united thread to the receiving-bobbin 32. I have shown my improvement as arranged for uniting three threads or strands into one. These three threads or strands 78 are taken from the respective bobbins 37, Fig. 1, which bobbins may be supported either horizontally or otherwise on any convenient support, as 38, to separately deliver their threads to the feeding-cylinder 39. This feeding-cylinder is driven by means of the belt 16 on the pulley 17, and it consists of a plain cylindrical roll. It is driven at a speed slightly in excess of that at which the thread will be wound upon the bobbin 32. Back of this feeding-cylinder is a bracket or stationary frame 40, bearing two horizontal arms 41 and 42, and between these arms are arranged as many shafts or vertical rods 43 as there are threads to be united. The upper arm 41 is omitted from Fig. 4 in order to better show the rods 43, which rods are delicately pivoted, so as to turn easily under the influence of

the threads. Upon each of said rods is fixed a lever or arm 44, the front end of which is forked and provided with set-screws 45, which are pointed on their ends and enter sockets within the pivotal blocks 46 within the forked end of said arms. A pulley-frame 47 with like forked ends and set-screws 48, which screws also enter said pivotal blocks, is connected thereby to said arms. Said frames have mounted in them the pulleys 49, which rest upon the summit of the feeding-cylinder. They are formed of metal or are otherwise weighted to act as a feeding device in connection with the feeding-cylinder 39. The forked ends of the arms and pulley-frames, together with the blocks and set-screws, form a delicate double joint which is practically universal, whereby the pulleys and frames may move up and down on a horizontal axis or may swing laterally on a vertical axis. In addition to the arms 44 each of the rods 43 is provided with a lever-arm 50. (See Fig. 4.) Upon the bracket 40 is a suitable shaft 51, upon which is mounted three rocking sleeves 52, each of which sleeves bears an upwardly-projecting arm 53 for engagement with the lever-arms 50 of the vertical rods 43 and also with the forwardly-extending levers 54, whose ends terminate in suitable thread-guides 55. These levers are provided with attachable and detachable weights 56. A notched bracket-plate 82 is arranged on the frame of the machine in connection with the swinging arms 44 to limit the extent of the swinging movement. In front of the feeding device I arrange the delivery-rollers 57 and tripping and supporting rollers 58, the same being arranged upon suitable shafts 59 and 60 and driven by belts 61, leading from their respective pulleys to driving-pulleys 62 by the side of the pulley 17 on the shaft of the feeding-cylinder. The supporting-roller 58 is also a trip-roller and is provided with grooves 63, having set within them cross pins or trips 64. Said supporting and tripping roller is also provided with thread-grooves 65, which correspond with like thread-grooves 65 in the delivery-roller.

Between the supporting and trip roller 58 and the delivery-roller 57 is a bracket 66, secured in any proper manner to a part of the frame and having pivotally connected to it, by means of the screw 67, a pair of forked arms 68. These forked arms carry a shaft or rod 69, whose center is eccentric to that of the screw 67, upon which the forked arms can swing. Upon this shaft 69 I pivot three tripping-fingers 70, the upper ends of said fingers being provided with suitable thread-guides 71. These fingers 70 are arranged in alinement with the grooves 63 in the supporting and tripping roller 58, as best shown in Fig. 5. The outer ends of the forked arms 68 embrace a roller 72, which is pivoted between the arms of the bifurcated lever 73, which lever, by its middle portion, is pivoted to a bracket 74 on the upper end of the shipper-shaft 31, as at 75, while the lower end of said lever is pivoted to a link 76, which link is in turn pivoted to the bracket-arm 77, through which the shipper-shaft 31 is guided in its vertical movements. Fig. 7 shows this lever in its normal position, with the threads 78 in working order, holding the fingers 70 in position, while the link 76 and connecting-arm of the lever 73 are thrown a little forward of their longitudinal alinement, so as to hold the parts in the position shown.

The threads 78 after leaving the feeding-cylinder 39 pass through the eyes 55 of the weighted levers 54, then over the roller 58, through the guides 71 of the fingers 70, over the delivery-roller 57, to the guide-fingers 83, and after passing said fingers are twisted into the united thread 35, which, passing through the eye 84, goes through the flier 36 to the receiving-bobbin 32. In Fig. 7 I have shown the roller 72 partly in section and represented one of the arms of the bifurcated lever 73 as broken off in order to more clearly show the relation of the forked arm 68 to said roller. In case any one of the threads passing through the guides 71 should break, the fingers 70 will fall forward by gravity, so as to rest upon the upper side of the roller 72, as shown in Fig. 8. In this figure I have sectioned the supporting and trip roller 58 and also the shaft or rod 69, upon which the fingers are mounted in order to better show their relations. When the finger drops down and rests upon the roller 72, as shown in said Fig. 8, the first trip-pin, moving in the direction indicated by the dart in said figure, will engage the end of said finger and force it downwardly, thereby pressing downwardly the roller 72, and force the outer end of the bifurcated lever 73 downwardly and forwardly, thereby throwing the upper end of the link 76 back of the vertical plane of the pivot 75, and permit the parts to fall by gravity to the position shown in Fig. 9. After a finger has turned on its axis 69 to the position shown in Fig. 8 the parts connected with the forked arm 68 then swing downwardly on the axis 67, and for that reason I have shown said axis 67 in section in Fig. 9. It will be seen that as the lever 73 moves from the position shown in Fig. 7 to that shown in Fig. 9 the bracket-arm 74 will fall, and thereby drop the shipper-shaft 31 downwardly, so as to carry the belt 25 from the fast pulley 26 to the loose pulley 28, (see Fig. 2,) and thereby stop the revolution of the twisting or winding spindle. Upon the frame of the machine is a lever 788, provided with a horizontal arm 9. In order to restore the parts to their normal position, this lever is operated to force the horizontal arm 79 against the lower end of the fingers 70, the first operation of which is to swing the fingers on their axis 69 until their points are elevated high enough to clear the stop-pin 64, as shown in Fig. 10. In this position it will be noticed that the axis 69 is below the axis 67 instead of in front thereof,

and consequently as the fingers swing upon this axis their ends will not come in contact with the stop-pins 64 in their upward movement. After the fingers have thus been moved so as to be sure to clear the stop-pins 64 the horizontal arm 79 of the lever acts upon the forked arms 68 to turn them on the axis 67 and to carry said arms and fingers back to their normal position. By this construction I am able to use the said lever to move the parts from the position shown in Fig. 9 to that shown in Figs. 7 and 8. The broken threads being mended and properly placed in the thread-guide 71 the machine will be again in running order, as shown in Fig. 7.

I have thus described my tripping arrangement as having conjoint operation with the mechanism by which the threads are supplied thereto or taken therefrom; but I may substitute other thread-supplying mechanism for that herein described.

I will now describe more particularly the mechanism for delivering the threads to the winding or twisting device. The threads 78, extending downwardly from the bobbins 37, pass through suitable thread-guides 80, which guides are arranged on a suitable bracket 81. This bracket may be provided with any suitable provision for adjusting it from front to rear and laterally—as, for example, the rearwardly-extended arm 85, Fig. 1, of the bracket 81 passes through a socket-piece 86, having a set-screw 87 for securing said arm therein, whereby on loosening said set-screw the entire bracket may be moved from front to rear to adjust it, and then the set-screw can be tightened to hold the bracket in place. The bracket 81, in which the thread-guides are directly mounted, is jointed by a similar socket and set-screw (hidden from view in Fig. 1) for adjusting in like manner the bracket 81 on the bracket-arm 85 from side to side relatively to the rollers 49. The thread-guides 80 may be so set relatively to the centers of the rods 43 and roller 49 as to be a little to one side of the middle of said roller when the arm 44 and pulley-frame 47 are in a line which extends squarely across the feeding-cylinder 39, whereby the pull of the thread will have a tendency to throw the rollers 49 to one side and run off from the thread 78. The middle arm in Fig. 4 represents the parts in this position. The weight 56 upon the levers 54 will have a tendency to hold the arms 53 of the rocking sleeves 52 in contact with the lever-arms 50 on the rods 43. The wheels or rollers 49 are so heavy that when they are riding on one of the threads they press the thread firmly on the feeding-cylinder and act in connection therewith as a feed to pull the threads from the bobbins 37. As before stated, the speed of the cylinder is such that when the feeding-cylinder and wheels 49 act together to draw the thread from the bobbins they deliver the thread faster than the receiving-bobbin 32 will take it up. It necessarily follows that the thread between the feeding-cylinder 39 and the supporting-cylinder 58 will become slack. The weighted levers 54 immediately descend and take up all the slack in the thread as fast as it is paid out and thereby constantly exert on the thread a uniform tension equal to the force of the weighted levers on the thread. As these levers descend the arms 51 on the rocking sleeves come forward and thereby permit the arm 44 to swing to the left, as viewed in Fig. 4, whereby the wheel or pulley 49 runs off from the thread, as shown in the right-hand pulley in Fig. 4. As soon as the wheel or pulley 49 thus runs off the thread the feed is immediately stopped, so that the twisting or receiving bobbin 32 begins to take up the slack between the feeding-cylinder and the supporting-roll and thereby lifts the lever 54. When said levers are lifted, the arms 53 are forced backwardly against the arm 50, so as to swing the arm 44, carrying the pulley 49, to the right and draw said pulley upon the thread again, as shown in the left-hand one of the rollers 49 in Fig. 4. I have represented this roller in the position that it first has after being thus drawn upon the thread; but inasmuch as the arm 44 will now be held nearly in this position by the weighted lever the pulley-frame and pulley will swing a little to the right and ride over the thread to bring it nearer the middle of said pulley than the position shown. When thus upon the thread again, it feeds faster than the receiving-bobbin can take it up, and the lever is again depressed to take up the slack, and so on repeatedly, the feed automatically stopping and starting itself as occasion requires, while the threads between the delivery-cylinder and the receiving-bobbin are all of them kept under a uniform tension by the weighted levers. The operation of the machine is so delicate that the threads between the supporting-roller and the feeding-cylinder are never brought to a straight line, but always show an angle of depression, while at the same time the amount of slack will never be so great as to cause the levers to descend far enough to come in contact with their stop 88. This stop is merely for the purpose of preventing the arms from swinging down too far whenever a thread may break or when the machine is stopped. In Fig. 6 I have shown a detached view of one of the weights, which for convenience of applying to the levers is slotted, as at 822, and provided with a set-screw 833, extending into said slot, by means of which the weight may be attachably and detachably fastened to the levers. It is evident that the weight may be adjusted to different positions on the levers, or a lighter or heavier weight may be applied, as desired.

By my improvement the tension of the different threads being united is very uniform and is always equal to the weight upon the slack portion of the threads, and the machine runs so smoothly and easily that it may be run at a high speed.

By feeding from the bobbins faster than the receiving-bobbin can take up the threads may be wound upon the receiving-bobbin under a less tension than is required to pull the threads from the delivery-bobbins, and this is one feature which enables the machine to be run rapidly.

I do not wish to limit myself to the details of construction, but may make such changes and substitutions as fairly fall within the spirit and scope of my invention.

I claim as my invention—

1. The combination of a shipper with the lever 73 and link 76 all pivotally connected, the forked arms 68 engaging the upper member of said lever and pivoted to a suitable bracket, the trip-fingers having thread-guides and pivotally mounted on said forked arms, and the trip-roller 58, having trips 64, for engaging said fingers and operating the shipper through said lever 73 substantially as described.

2. The combination of a shipper with the lever 73 and link 76 pivotally connected therewith, the forked arms 68 engaging the upper member of said lever and pivoted to a suitable bracket, the trip-fingers having thread-guides mounted thereon, said fingers being pivoted on said forked arms eccentrically to the axis of said arms, and the trip-roller 58 having trips 64 for engaging said fingers, whereby the trip-fingers may be turned into a position that will clear the trips 64 preparatory to returning the parts to their normal position substantially as described.

3. The combination of the shipper-tripping lever 73, with the forked arms 68 engaging the upper part of said lever and pivoted on a fixed part of the machine, the shaft or axis 69 secured to said arms 68 eccentrically to the pivots for said arms, the trip-fingers mounted on said axis 69 and having thread-guides, a forward pointed end and downward extension below said axis, the trip-roller, bearing trips 64 adapted to engage the pointed end of said fingers when they are thrown forwardly, and a returning-lever having an arm 79 adapted to first engage the downward extension of the said fingers to move them on their axis and then to move the parts to their normal position by simultaneously acting on the said fingers and the forked arms substantially as described.

4. The combination of mechanism for driving a receiving-bobbin with an automatic stop-and-start feed for each thread, acting normally to pull the thread from the delivery-bobbin faster than said receiving-bobbin can take it up, and a gravity device for each thread operated by means of the slack portion thereof to stop and start the feed for each separate thread independently, substantially as described.

5. The combination of a thread-supporting roller, a feeding-cylinder, separate pulleys or rollers 49 for each thread to act as a feed in connection with said cylinder, means for mounting said rollers 49 to swing laterally on said feeding-cylinder, the weighted levers 54 having thread-guides 55 for engaging the threads at a point between said supporting-roller and feeding-cylinder, and mechanism connecting said levers 54 and rollers 49, whereby lifting said levers 54 will move the rollers over the threads on the feeding-cylinder and start the feed substantially as described.

6. In a doubling-machine, the combination of the feeding-cylinder 39 with a plurality of independent pulleys or rollers acting in connection with said cylinder as a feed, the frames in which said pulleys or rollers are mounted, the swinging arms 44 on shafts or rods 43, said arms and pulley-frames being pivotally connected, a lever-arm 50 on each of said shafts or rods, and weighted levers 54 carrying thread-guides and also carrying arms 53 for acting in connection with the lever-arms 50 to move the pulleys or rollers 49 laterally on the feeding-cylinder when the said levers 54 are being raised as described.

7. The combination of the feeding-cylinder, a plurality of pulleys or rollers 49 acting in connection with said cylinder as a feed, the rock shafts or rods 43 by which the frames carrying said rollers are pivoted to swing the said rollers 49 laterally, the thread-guides 80, each set to one side of the said rock shafts or rods 43, whereby the said pulleys have a constant tendency to run off the threads and stop the feed, and means operated by taking up the slack in the thread to move the said rock-shafts and thereby carry said pulleys 49 onto the thread after the said pulley has run off and stopped the feed, substantially as described.

JAMES A. KEYES.

Witnesses:
WILLIAM N. BREMER,
WILLIAM EIFLER.