No. 682,878. Patented Sept. 17, 1901.

W. G. MORRISON, Dec'd.

H. CLARK, Administrator.

DOUBLING FRAME.

(Application filed Apr. 3, 1897.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

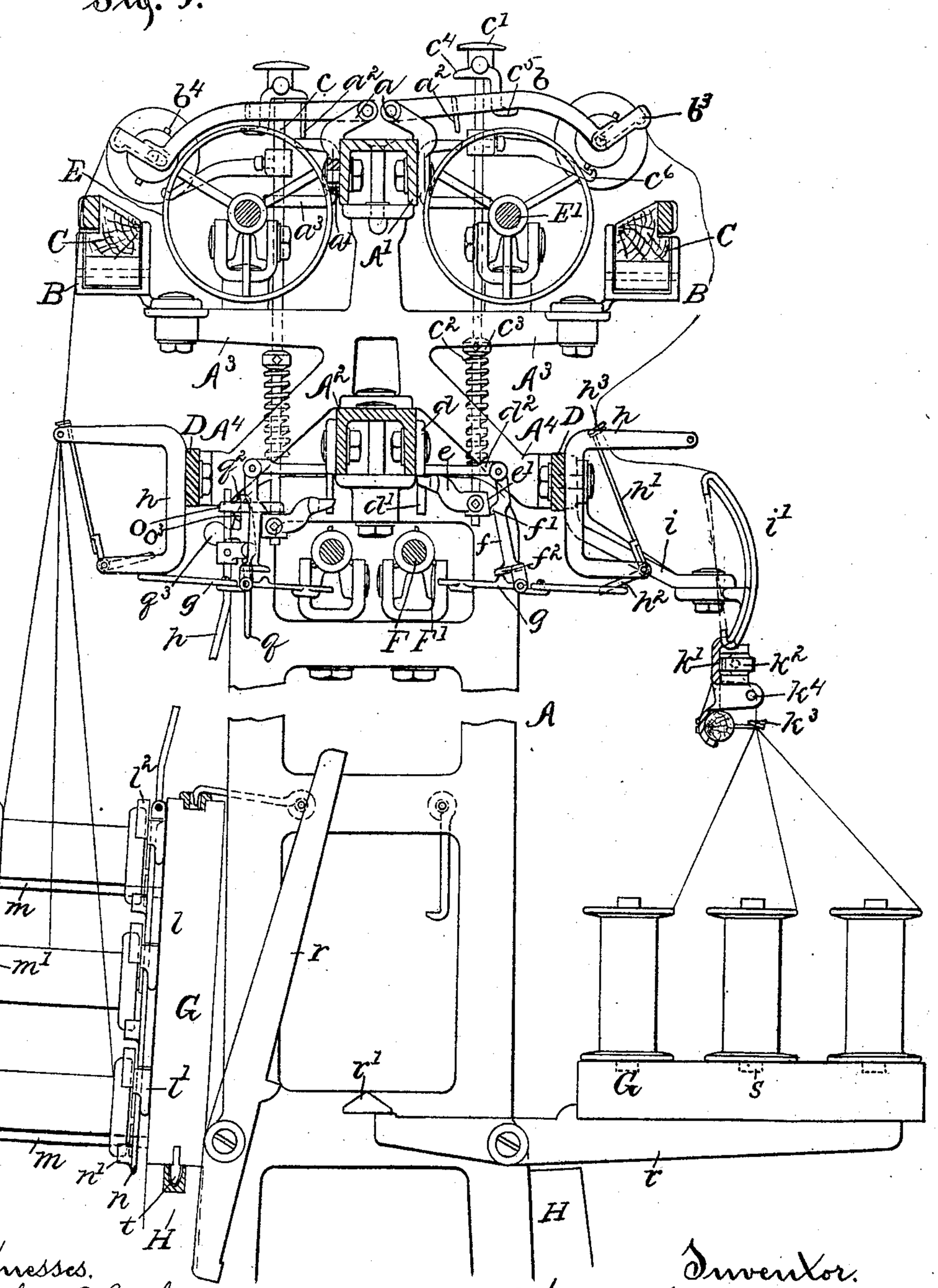

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Fig. 2.

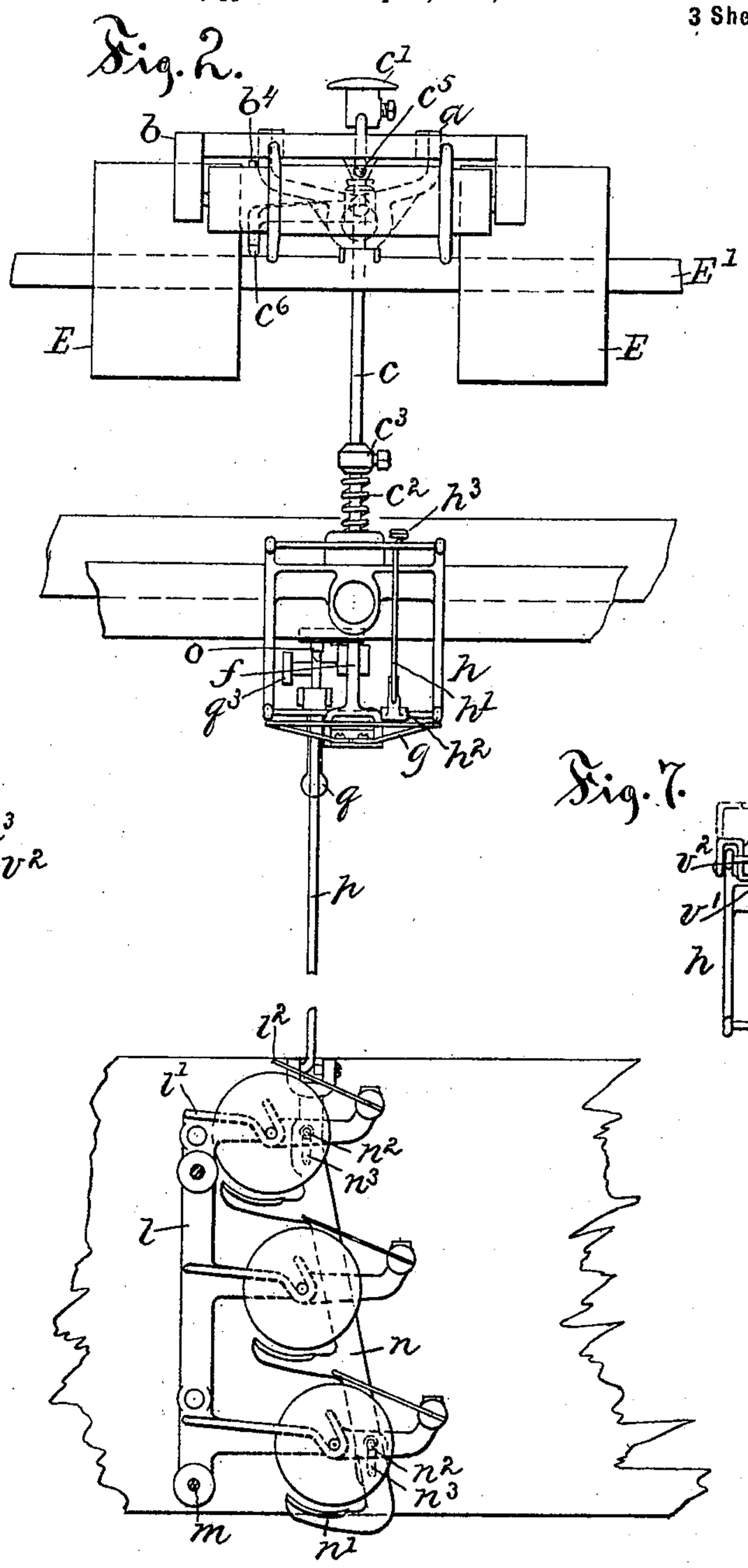

Fig. 6.

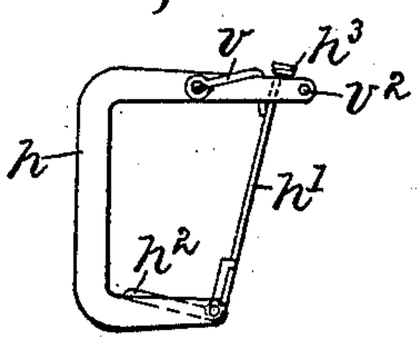

Fig. 7.

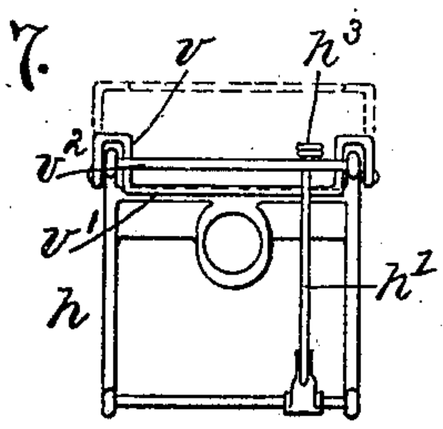

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Fig. 3.

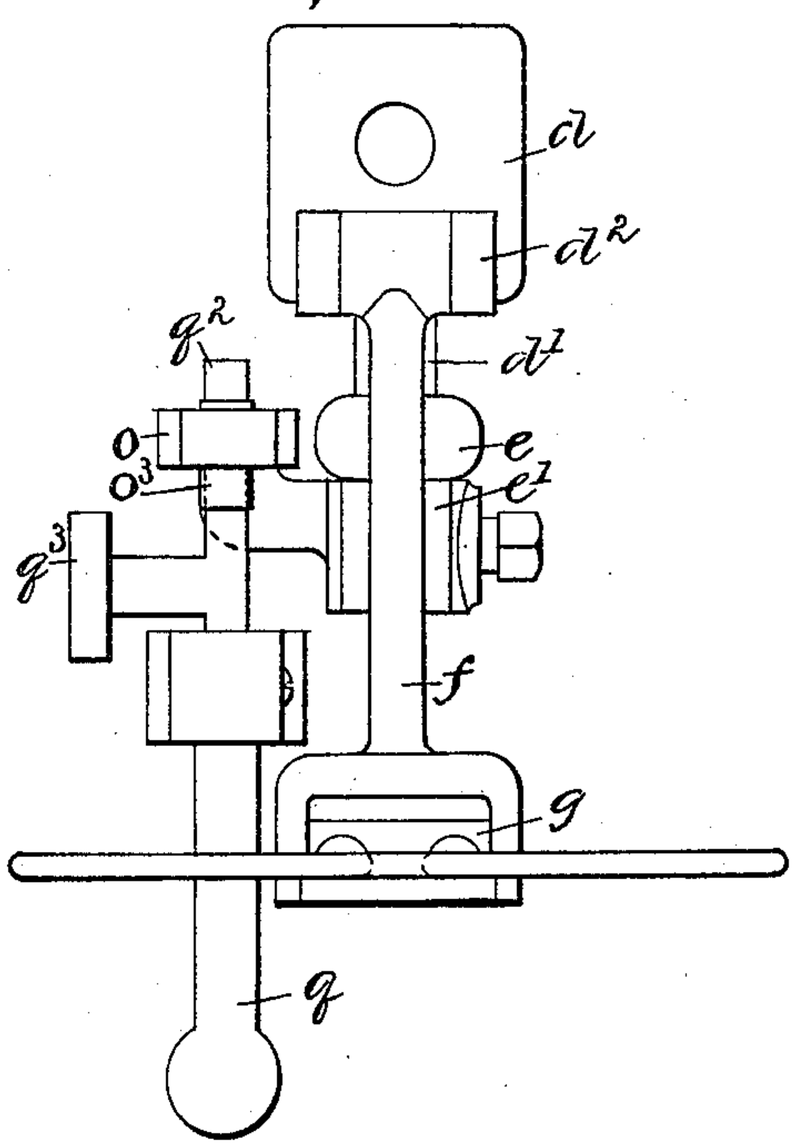


Fig. 4.

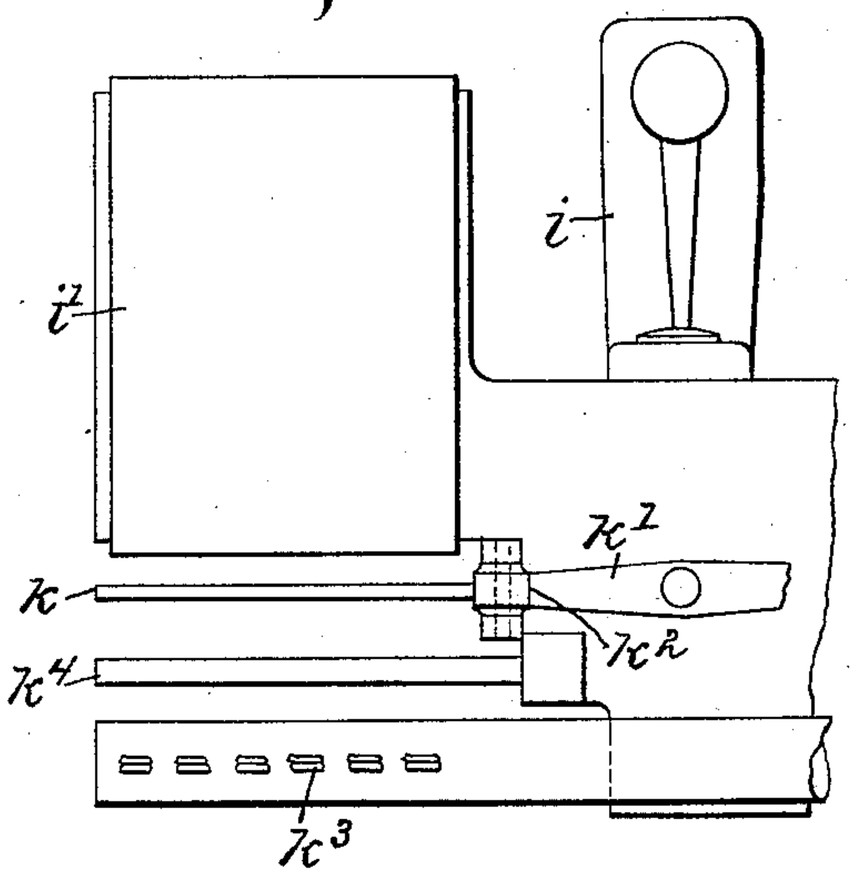


Fig. 8.

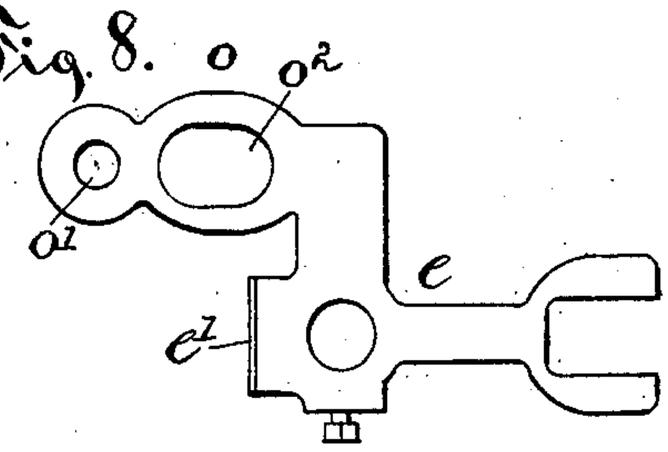
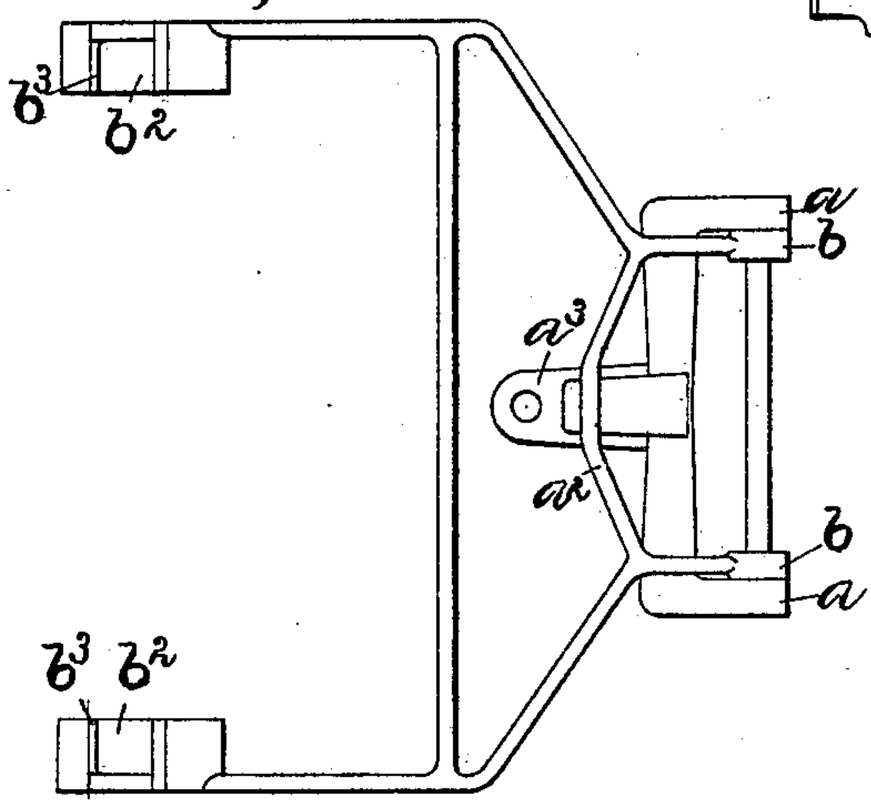


Fig. 5.



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UNITED STATES PATENT OFFICE.

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DOUBLING-FRAME.

SPECIFICATION forming part of Letters Patent No. 682,878, dated September 17, 1901.

Application filed April 3, 1897. Serial No. 630,523. (No model.)

To all whom it may concern:

Be it known that I, WALTER G. MORRISON, a citizen of the United States, and a resident of Willimantic, in the county of Windham and State of Connecticut, have invented certain new and useful Improvements in Doubling-Frames, of which the following is a full, clear, and exact description, whereby any one skilled in the art can make and use the same.

My invention relates to the class of machines used for doubling silk or like fiber; and the object of my invention is to increase, in a given size of machine, the amount of work that may be done within a given time by so constructing and arranging the mechanism that the machine may be run at a high rate of speed as compared with prior machines of this class.

Referring to the drawings, Figure 1 is a detail view, in vertical section, through the frame of a machine, showing on the right side of the figure my invention as used in doubling the threads from bobbins vertically arranged and with the parts in operation and on the left of the figure the invention as applied to the doubling of threads drawn from bobbins horizontally arranged, but with the parts out of an operative position. Fig. 2 is a view in front elevation of a portion of a machine, illustrating my invention, the bobbins being horizontally arranged. Fig. 3 is a front view of the trip-lever, finger-lever, and guide and yoke on enlarged scale. Fig. 4 is a detail front view of the tension device appurtenant to a single set of bobbins on enlarged scale. Fig. 5 is a detail plan view of the spreader and its support on enlarged scale. Fig. 6 is a detail side view illustrating mechanism for holding unused drop-wires in an upright position. Fig. 7 is a detail view in front elevation, showing the drop-wire holder in its lowermost position and in dotted outline in its raised position. Fig. 8 is a detail top view of the guide and brake-rod support.

In the accompanying drawings the letter A denotes the standards of the frame, one of which is located at each end and any suitable number at intervals along the length of the frame. Braces A' A^2 extend between the standards of the frame in line in the vertical center thereof, the brace A' being located near the top and the brace A^2 directly thereunder and at a point somewhat above the horizontal center of the standards. Brackets B are secured to guide-rail extensions A^3, projecting laterally from the standards, the brackets containing guideways for the guide-rail C. Drop-wire-frame extensions A^4 project downward and laterally from the standards underneath the guide-rail extensions and form supports for a rail D, to which drop-wire frames, to be hereinafter described, are attached. Spreader-supports are secured at suitable intervals along the side of the brace A' at just sufficient distance apart to avoid interference in their operation. Each spreader-support has arms *a*, to which spreader-arms *b* are pivoted. The spreader-support is adjustably secured to the brace by means of a bolt passing through a slot a' and bears a stop engaging with the cross-piece a^2, extending between the spreader-arms, to limit the downward movement of the spreader. A starting-rod support a^3 from the spreader-support has a hole therein, through which extends a starting-rod *c*. The spreader, including the spreader-arms and cross-pieces, extends forward from the pivot, the spreader-arms *b* branching outward, as shown. In the outer ends of the spreader-arms are formed bearing-slots b^2. The bottom walls of these bearing-slots are formed in a plane extending diagonally to a vertical line, so that the spindle of the bobbin is supported partially by the bottom wall of the slot and does not bear with its full weight upon the friction drive-wheel E, from which it receives its rotation. The object of thus constructing the slot, the bottom wall of which partially supports the weight of the bobbin, is to avoid breaking of the slender threads by the sudden starting of the bobbin in throwing the parts of the machine into operation. It has been found by experiment that when the whole weight of the spindle and bobbin bears upon the friction drive-wheel the threads are snapped off by the sudden starting of rotation of the bobbin in the operation of the machine. This same objection is found in machines known as "drum-spoolers" or "drum-dou-

blers," in which that part of the bobbin upon which thread is being wound comes in contact with the drive-wheel or with an intermediate roller, which in turn comes in contact with the driving means as to its body part. This is a serious objection in machines of this class, as the rate at which they can be operated is limited, and the capacity of the machine is consequently limited. In such a machine it has been found that the snapping off the slender threads is almost sure to happen after a certain speed limit is reached. By my improvement the rate at which the machine can be run, and the consequent capacity of the machine, is materially increased and the above-enumerated faults present in prior machines reduced to a minimum. This has been accomplished by so arranging the spreader and the slots therein that the spreader serves merely to carry the bobbin into position where its spindle will come into contact with the periphery of the friction drive-wheel, and the slots are so arranged as to inclination that the bobbin is supported with just sufficient weight on the friction drive-wheel to enable it to gain and maintain its relative rate of speed of rotation with respect to said drive-wheel. The spreader is pressed down to a fixed stop, against which it is firmly held during the entire winding operation, so that any movement of the bobbin during the winding may not be in the least interfered with by any movement of the spreader. The upper wall of the slot prevents the bobbin from jumping, which would cause the threads to be snapped when it again came suddenly into contact with the friction drive-wheel, thus increasing the pressure on the drive-wheel and suddenly accelerating its movement. The slots are so arranged as to direction with reference to the rotative movement of the friction drive-wheel that the force exerted by said wheel is decreased the instant the bobbin begins to move away in its movement in the slot and is not increased, as would be the case should the bobbin in its initial movement under pressure of the drive-wheel move in an opposite direction from that of movement of the surface of the said drive-wheel or against the force exerted thereby. This construction insures the bearing of the bobbin upon the friction drive-wheel with a pressure depending upon and controlled by the relative speeds of rotation of said drive-wheel and bobbin—that is, as the spreader is moved downward the bobbin-spindle suddenly striking the rapidly-rotating drive-wheel begins to rotate at very slow speed, owing to the extremely light contact of the bobbin-spindle with the drive-wheel and the ability of the former to instantly relieve itself of that pressure. The bobbin, however, slowly increases its momentum until the speed to be imparted thereto is attained. Any unevenness that may occur in the contact-surfaces of the parts will cause in this starting movement the bobbin to move quickly away from the friction drive-wheel, so that its movement will not be suddenly accelerated by said unevenness to a degree to cause the threads to snap. No weight whatever of the spreader is borne by the bobbin, the latter being perfectly free and having practically unrestricted movement to accommodate itself to any of the varying conditions that may be imposed as the spindle comes in contact with the friction drive-wheel. The arrangement of the slot as described provides a wall that overlies the spindle and prevents the bobbin from bounding out of its bearing in its rotation at the high rate of speed at which it is run. The parts are so adjusted that the spindle of the bobbin shall not rest at the bottom of the slot.

A supporting-recess b^3 is located in the bottom wall of each of the bearing-slots near their upper ends for the purpose of supporting the bobbin in a position with the spindle out of contact with the friction drive-wheel in the operation of taking up the broken threads and preventing the stop-pins b^4 on the bobbin-spindle from encountering a positive stop, to be hereinafter described, as it is necessary that the bobbin be allowed permissive rotation as the thread is drawn off in the operation of taking up the threads. The friction drive-wheels E are supported on a shaft E′, mounted in bearings on the frame, and which extends lengthwise of the frame in position to allow the friction drive-wheels to make contact with the spindles of the bobbins when the latter are dropped in the swinging movement of the spreader. These friction drive-wheels are so located along the shaft that a single wheel makes contact with the ends of two bobbin-spindles, a single bobbin receiving its rotary movement from the operation of two friction drive-wheels.

The starting-rod is held in an upright position by the starting-rod support a^3, and to the upper end of this starting-rod is secured a starting-knob c'. This starting-knob is secured to the starting-rod as by means of a set-screw, and its upper end is properly formed to be grasped or pressed upon by the hand to force the rod downward against the tension of a spring c^2, borne on the rod, this spring pressing against a collar c^3, adjustably secured to the rod and a fixed part on the frame of the machine. A starting-lug c^4 on the starting-knob c' overlies the cross-bar a^2, extending between the spreader-arms. A lifting-lug c^5 as the starting-rod is forced upward encounters a cross-bar on and lifts the spreader to a distance sufficient to disengage the bobbin-spindle from the friction drive-wheel which rotates it. The lug c^4 as the starting-rod is pushed downward encounters the spreader and holds it during the entire winding operation firmly in position with the bobbin-spindle in contact with the friction drive-wheel, the spreader resting on its stop. Means for holding the starting-rod in its lowermost position will be hereinafter

described. A positive stop c^6 consists of an arm adjustably secured on the starting-rod and containing on its outer end a hook located in position to encounter the stop-pins b^4 on the bobbin-spindle when the starting-rod is in its upward position. The object of this stop is to cause the bobbin to immediately cease its rotation upon the breaking of a thread in order that the broken part shall not be wound upon the bobbin in the continued rotation due to the rapid rate at which the bobbin is driven.

A hanger d is secured to the brace A^2, a lug d' on the hanger engaging the forked end of a guide e, adjustably secured to the starting-lever at or near its lower end. The upper edge of the guide encounters a shoulder formed at the base of the lug d' as the starting-lever is moved upward and determines the extent of upward movement of the rod, and the arms of the fork lying on opposite sides of the lug form a guide to prevent rotation of the rod in its bearings. The starting-rod projects through a hole in the foot d^2 on the hanger that forms a bearing for the lower end of the starting-rod and also the spring c^2. The front end of the guide bears a cam-surface e', that in its upward movement acts on a catch f' on the pendant f, pivoted at its upper end to the foot d^2, and throws the lower end of the pendant outward. The cam-surface e' is so located with reference to the pendant f that when the latter hangs in its normal position the catch f' will engage the upper surface of the guide e when the starting-lever is pushed downward, thus holding the starting-lever in its normal lowermost position. A trip-lever g is pivoted to the pendant f near its center and so nearly balanced on its pivot as to be easily swung thereon. The rear end of the lever, however, is slightly heavier than the front end, so that the rear end normally hangs downward. A trip-shaft F is mounted in bearings on and extends lengthwise of the frame and bears trip-cams F', located adjacent to the inner end of each of the trip-levers. When the rear end of the trip-lever is swung upward into contact with the stop f^2 on the pendant, the cams F' strike against the end of the lever, forcing it forward, disengaging the catch f' from the starting-lever stop or guide and allowing the starting-rod c to be forced upward under the impulse of the spring c^2, thus carrying the spreader upward.

A drop-wire frame h is secured to the drop-wire-frame rail D, and in the lower part of the frame are pivoted drop-wires h', each wire having a foot h^2 of sufficient weight to throw the upper end of the drop-wire backward on the pivot when not engaged by a thread and of a length to encounter a cross-bar on the trip-lever g. A loop h^3 is formed in the upper end of the drop-wire, through which a thread from the supply-bobbin passes, the tension on the thread in the doubling operation being sufficient to hold the upper end of the drop-wire in a forward position. When for any reason a thread breaks, the pull on the drop-wire is released, and as it swings backward the foot h^2, coming in contact with the forward end of the trip-lever g, tilts it, throwing the rear end upward into the path of movement of the cams F'. This contact between the parts operates to stop the machine, as hereinbefore described.

A tension-support i is secured to the rail D, and on this support is secured a tension device i'. This tension device consists of a curved surface to which is secured a plush pad, the whole being located in such position with relation to a tension-arm that the thread is in contact with the curved surface to an extent to provide a proper tension for the thread. On the support for the pad is also pivoted a swinging tension-arm k, the threads from the supply-bobbins passing up through the eyes k^3 in front of the tension-rod k^4 and behind the tension-arm k and thence onto the pad. A spring k' is secured to the tension-support and with its end bearing with considerable face against flat surfaces k^2 on the tension-arm k. These surfaces are arranged, preferably, at right angles each to the other and in such position with regard to the arm that the pressure of the spring on said surfaces will hold the arm in an open or closed position.

The tension device above described is more especially applicable with the supply-bobbins arranged in an upright or vertical position, as shown on the right-hand side in the view in Fig. 1. With the supply-bobbins arranged in a horizontal position, as shown on the left-hand side of the machine in the view in Fig. 1, the bobbins are caused to revolve on a supporting-spindle, which provides sufficient tension for the thread; but in the breaking of the thread the bobbins continue to turn, owing to the high rate of speed at which the machine is run, and wind the thread up in a reverse direction on the bobbins. In order to prevent such winding, I have provided an automatic brake device constructed as follows: A bobbin-rail G is secured to the side parts of the frame, along which the bobbins are supported in series. A bobbin-frame l is secured to the rail G in any suitable manner and is provided with bobbin-supporting arms l', in which are located sockets for the reception of the inner ends of the spindles bearing the bobbins. These arms bear on their outer ends spring-stops l^2, secured to the arm and extending therefrom in a position to overlie the head of the bobbin. Rods m extend outward from the bobbin-frame and bear on their outer ends a support m' for the outer ends of the bobbins, recesses being located in this support with proper relation to the recesses for holding the opposite ends of the spindles to support the bobbins in a horizontal line. A brake-slide n is supported on the frame l in such manner as to have a vertical reciprocation thereon, brakes n' being located on this slide in position to underlie the head

of each of the bobbins. A pin n^2 projects from the frame l through a slot n^3 in the slide, this slot and pin determining the extent of reciprocation of the slide. As the slide is moved upward the brake n' comes in contact with the head of the bobbin, lifting the latter upward until it presses against the spring-stop l^2.

The brake-slide is caused to operate on the breaking of a thread by mechanism as follows: The guide e is provided with a brake-rod support o, having a guide-opening o', in which the end of the brake-rod p is loosely held, the lower end of the rod being secured to the brake-slide n. A finger-lever q is pivotally supported on the upper end of the brake-rod, the upper end of the lever bearing a hook q^2, projecting through a lever-opening o^2 in the brake-rod support o. A hook-stop o^3 consists of a projection extending downward from the under side of the brake-rod support in line with the wall of the opening o^2 and to an extent to continually lie in front of the hook q^2. A weight q^3 is borne on the finger-lever in proper position to cause the upper end of the lever to be swung normally forward. It will be seen from this construction that as a drop-wire is swung backward by the breaking of a thread and the starting-rod caused to move upward by the release of its trip the brake-rod is also carried upward, bringing the brake into action to stop the supply-bobbins from rotating, the hook q^2 being normally in engagement with the upper surface of the brake-rod support o. In taking up the threads before the starting-rod has been pushed downward to start the receiving-bobbin it is necessary that the brakes on the supply-bobbins shall be released in order to allow the threads to be drawn upward. This is accomplished by swinging the finger-lever backward until the hook q^2 disengages from the upper surface of the support o, the weight of the rod and brake-slide carrying it downward to a distance sufficient to release the brake, but to keep the hook in contact with the wall of the opening in the brake support or stop o^3. After the threads have been taken up and the starting-rod pushed downward the finger-lever is caused to project through the lever-opening o^2 and the hook to again engage the upper surface of the support.

In order to adapt the machine to the horizontal or vertical arrangement of the supply-bobbins, a swinging bobbin-rail support r is located at intervals along each side of the machine, and a stop r' is located on the frame of the machine to hold the support in a practically horizontal position. The bobbin-rail G is provided on one side with sockets s, in which the spindle of the bobbin is suported in a vertical position. When it is desired to support the bobbins horizontally, the rail-support r is swung upward to the position shown on the left of the frame of Fig. 1 of the drawings and the edge of the rail supported on a brace H, forming part of the machine. In this position the sockets s are located on the back side of the bobbin-rail and the frame l on the front side. Pins t project from the lower edge of the bobbin-rail into sockets in the brace H, and sockets on the upper edge of the rail are adapted to receive a swinging hook u, pivoted on the frame of the machine. This arrangement of the bobbin-rail enables the bobbins to be supported in a horizontal or vertical position simply by changing the position of the bobbin-rail from the horizontal to the vertical position, as shown on the right and left hand sides, respectively, of the frame in Fig. 1 of the drawings.

The description herein has been confined almost exclusively to the mechanism appurtenant to a single set of bobbins; but it is to be understood that the described mechanism may be duplicated to any desired extent along the frame of the machine, a complete set of devices usually being employed for a single set of bobbins; but in some instances the device operating in connection with two sets of bobbins, as in the case of the friction drive-wheel for rotating the receiving-bobbins, is employed. A horizontal or vertical arrangement of the supply-bobbins on a single frame has been shown, it being common in the use of the machine to so operate a single frame.

In Figs. 6 and 7 there is shown a device for holding the unused drop-wires in an upright position. This consists of a swinging frame having arms v, pivoted, preferably, to the outside of the drop-wire frame h at the upper end thereof. This frame has a cross-bar v' extending over the edge of the drop-wire frame and downward, as shown in Fig. 7, in position to lie back of the unused drop-wires and just in front of the drop-wires in use, the unused drop-wires being located between this portion v' and the rod v^2 on the drop-wire frame. The arms v are of sufficient length and pivoted at the proper point, so that as they are swung upward the upper ends of the drop-wires will swing underneath, as shown in dotted lines in Fig. 7 of the drawings.

I claim as my invention—

1. In combination with a friction drive-wheel and means for rotating it, a bobbin-spindle, a bobbin-supporting frame adapted to carry the spindle of the bobbin into contact with the friction drive-wheel and having journal-supports for the bobbin consisting of inclined slots arranged to permit unobstructed movement of the bobbin in the slots, means for moving said bobbin-supporting frame toward the friction drive-wheel, and means for supplying material to the bobbin.

2. In combination with a friction drive-wheel and means for rotating it, a bobbin-spindle, a bobbin-supporting frame arranged to carry the spindle of the bobbin into contact with the friction drive-wheel and having journal-supports for the bobbin consisting of inclined slots arranged to permit unobstructed movement of the bobbin therein, means for firmly holding the bobbin-supporting

frame during the winding operation, and means for supplying material to the bobbin.

3. In combination with a friction drive-wheel and means for operating it, a bobbin-spindle, a bobbin-supporting frame arranged to carry the spindle of the bobbin into contact with the friction drive-wheel and having journal-supports for the bobbin consisting of inclined slots arranged to permit unobstructed movement of the bobbin therein, a starting-rod arranged to hold the supporting-frame against a fixed stop during the winding operation and also to move it backward, the stop, means for moving the starting-rod, means for releasing the rod on the breaking of a thread being wound, and means for supplying thread to the bobbin.

4. In combination in a doubling-frame, a friction drive-wheel with means for rotating it, a frame adapted to support a bobbin, a bobbin mounted on the frame, projections carried by said bobbin, means for carrying the frame toward and away from the friction drive-wheel, a stop on said means adapted to engage said projections and means for supplying thread to the bobbin.

5. In combination in a doubling-frame, a friction drive-wheel with means for rotating it, a frame adapted to support a bobbin, the bobbin mounted on the frame, projections carried by a rotating part of the bobbin, a starting-rod for carrying the frame toward and away from the friction drive-wheel, a stop on the starting-rod adapted to engage said projections, and means for supplying thread to the bobbin.

6. In combination with a friction drive-wheel and means for rotating it, a bobbin-supporting frame arranged to carry a bobbin into position to be operated by said friction drive-wheel, and having journal-supports for the bobbin consisting of inclined slots permitting the bobbin to move along said slots in the direction of force applied by the contacting surface of the friction drive-wheel, and means for supplying thread to said bobbin.

7. In combination with a friction drive-wheel and means for rotating it, a bobbin-support having a reciprocating movement toward and away from the friction drive-wheel, a starting-rod adapted to engage the supporting-frame, means for forcing the starting-rod upward, a stop to limit the downward movement of the support, a lug on the rod arranged to hold the frame against the stop, and means for releasing the starting-rod on the breaking of a thread being wound.

8. In combination with a friction drive-wheel and means for rotating it, a bobbin-support having a reciprocating movement toward and away from the friction drive-wheel, a starting-rod adapted to engage the support in the upward movement of the rod, means for forcing the rod upward, a forked guide secured to the rod and arranged to engage a lug to prevent rotation of the rod and a shoulder to limit its upward movement, and means for releasing the rod on the breaking of a thread being wound.

9. In combination with a starting-rod, a bracket having a guide-lug projecting therefrom and forming a stop-shoulder, a guide secured to the starting-rod and in engagement with the lug, a projection from the bracket having an opening forming a bearing for the starting-rod, means for moving the rod to carry the guide into engagement with said stop-shoulder, a swinging latch pivoted to the outer end of the projection and arranged to engage the rod, and means for swinging the latch to permit the rod to operate.

10. In combination with a starting-rod having a reciprocating movement, means for holding the rod at one limit of its play, a bracket having a projection forming a bearing for the rod, a guide-lug extending from the bracket, a guide secured to the starting-rod and in engagement with the guide-lug and adapted to limit the upward movement of the starting-rod, a cam-surface formed on the guide, a latch pivoted to the projection from the bracket and arranged to engage the guide and adapted to contact with the cam whereby the latch is swung outward in the movement of the rod, and means for swinging the latch to disengage the rod.

11. In combination with a starting-rod having a reciprocating movement, means for holding the rod at one limit of its play, a bracket having a projection forming a bearing for the rod, a guide-lug extending from the bracket, a guide secured to the starting-rod and in engagement with the guide-lug and adapted to limit the upward movement of the starting-rod, a cam-surface formed on the guide, a latch pivoted to the projection from the bracket and arranged to engage the guide and adapted to contact with the cam whereby the latch is swung outward in the movement of the rod, a tilting lever pivoted on the latch, trip-cams adapted to engage the end of the lever, means for moving the trip-cams, and means for tilting the trip-lever into the path of movement of the cams whereby the latch is disengaged from the starting-rod.

12. In combination with a starting-rod, means for holding the starting-rod normally at one limit of its play, means for holding the starting-rod temporarily at the opposite limit of its play, a guide, a yoke borne on the guide and having a latch-opening therein, a brake-rod bearing a brake in operative relation to a supply-bobbin and extending loosely through the yoke, a finger-lever pivoted on the brake-rod and having a hook extending through the latch-opening in the yoke, and means for holding the lever normally against one wall of the latch-opening.

13. In combination with a starting-rod, means for holding the starting-rod normally at one limit of its play, means for holding the starting-rod temporarily at the opposite limit

of its play, means for disengaging the temporary holding device, a guide, a yoke borne on the guide and having a latch-opening therein, a lug on the yoke forming a continuation of the wall of the opening, a brake-rod bearing a brake in operative relation to a supply-bobbin and extending loosely through the yoke, a finger-lever pivoted on the brake-rod and having a hook extending through the latch-opening in the yoke, means for holding the lever normally against one wall of the latch-opening.

14. In combination with the frame of a winding-machine, a bobbin-rail, means for securing bobbins to the rail, a rest for the lower edge of the rail, a pin and engaging socket on the rail and support, and a swinging hook and engaging socket at the upper end of the rail.

15. In combination in a drop-wire frame, a swinging drop-wire holder consisting of arms pivoted to the frame and a cross-bar connecting the arms, said cross-bar being arranged to lie back of the drop-wire and when swung upward to allow the drop-wire to pass underneath.

16. In combination with a friction drive-wheel and means for rotating it, a bobbin-support having a reciprocating movement toward and from the friction drive-wheel, a starting-rod adapted to engage the support and arranged to have longitudinal movement independent of the support, means for forcing the starting-rod upward, a fixed stop to limit the downward movement of the support, a lug on the rod overlying the support, and means for releasing the rod on the breaking of a thread being wound.

17. In combination with a friction drive-wheel and means for rotating it, a bobbin-support having a reciprocating movement toward and from the drive-wheel and having slots for the reception of the spindle of a bobbin, said slots inclining upward and forward with respect to the direction of movement of the surface of the friction drive-wheel, and means for moving the bobbin-support away from the friction drive-wheel.

WALTER G. MORRISON.

Witnesses:
HUBER CLARK,
JOHN G. MITCHELL.