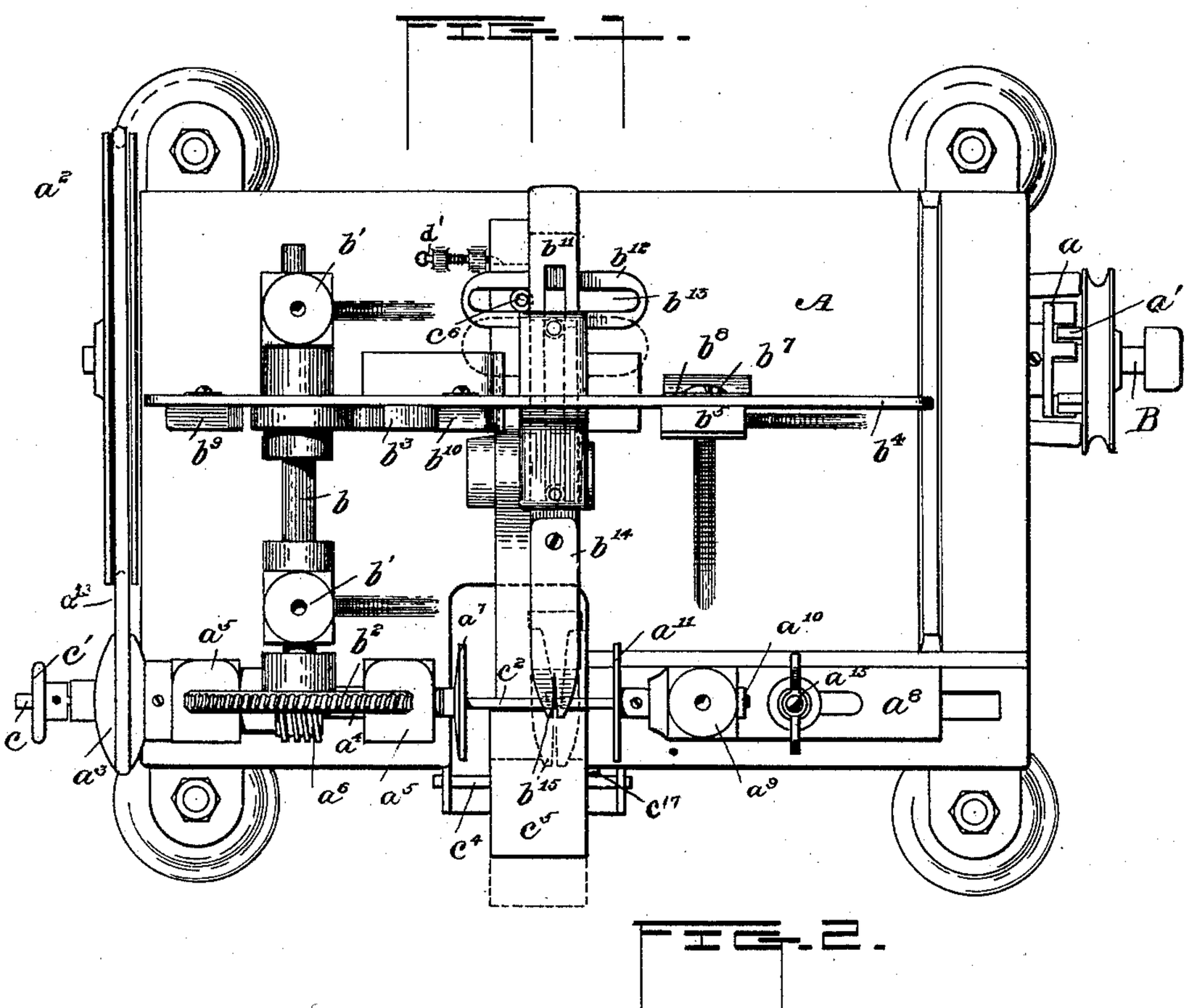
(No Model.) 3 Sheets—Sheet 1.

W. DUCHEMIN.

THREAD WINDING MACHINE.

No. 463,142. Patented Nov. 17, 1891.



Witnesses

T. A. Commerford

Arch. M. Catlin

Inventor

William Duchemin

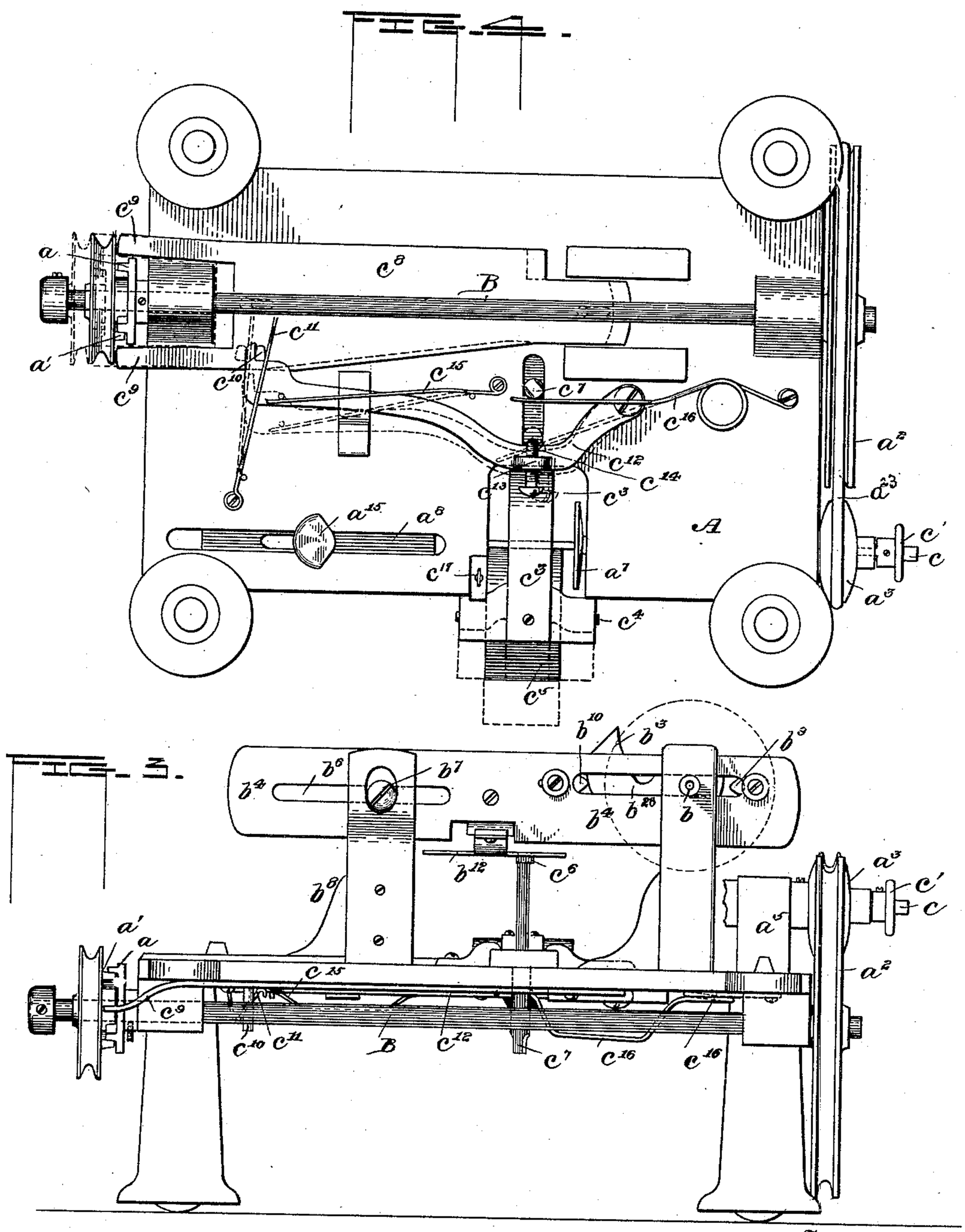
(No Model.)

3 Sheets—Sheet 2.

W. DUCHEMIN.

THREAD WINDING MACHINE.

No. 463,142. Patented Nov. 17, 1891.



Witnesses
L. A. Commerford
Arch. M. Catlin

Inventor
William Duchemin

(No Model.) 3 Sheets—Sheet 3.

W. DUCHEMIN.

THREAD WINDING MACHINE.

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FIG. 5.

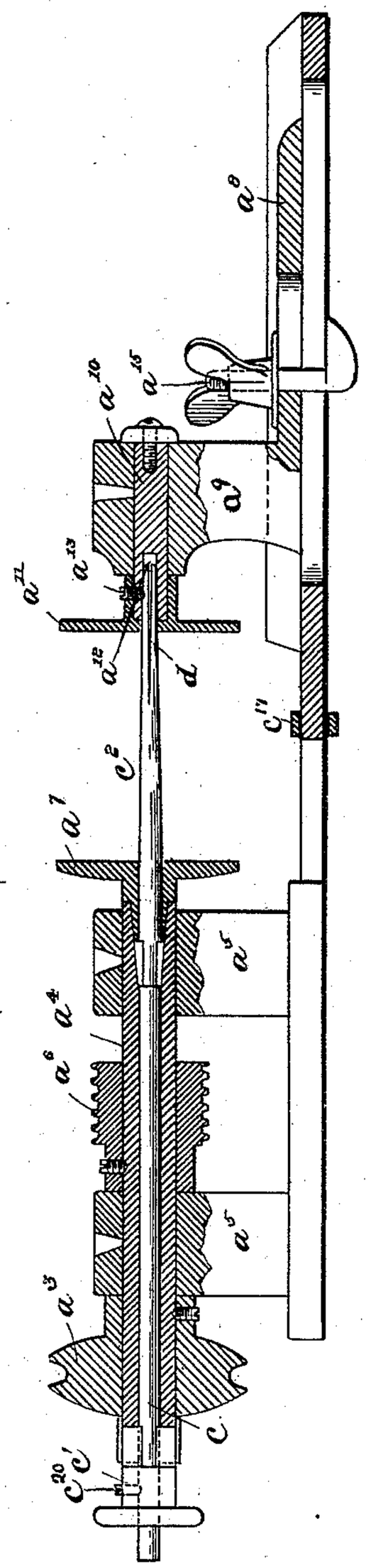


FIG. 6.

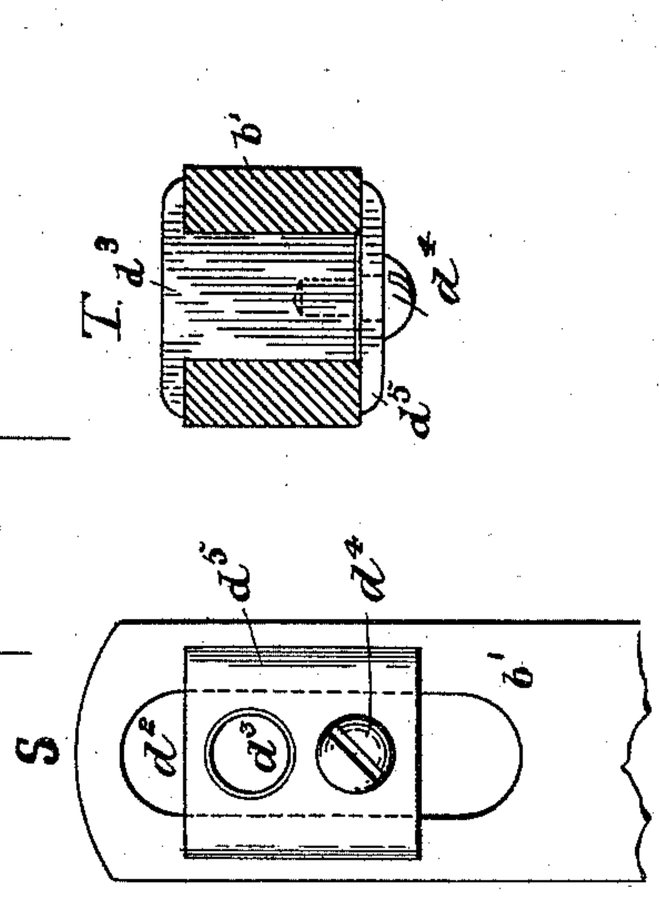


FIG. 7.

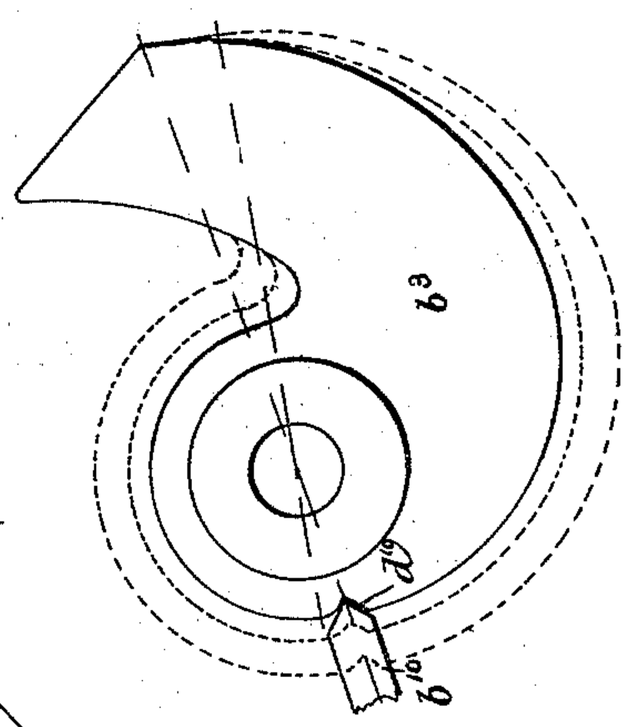
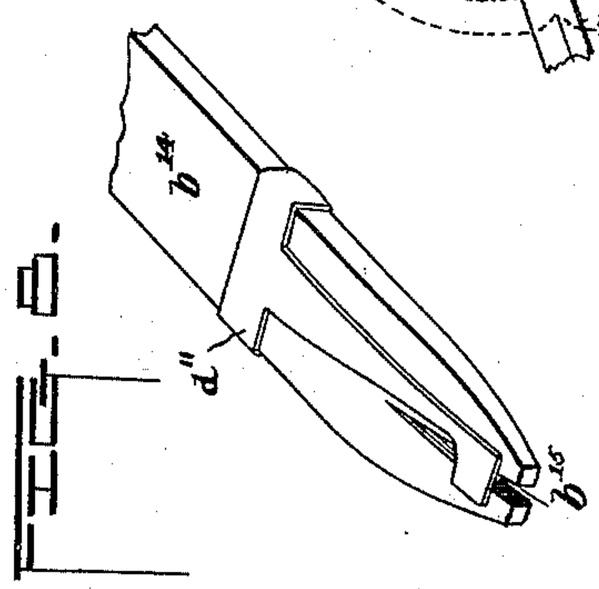


FIG. 8.



Witnesses
T. A. Connery, Jr.
Rich. M. Catlin

Inventor
William Duchemin

UNITED STATES PATENT OFFICE.

WILLIAM DUCHEMIN, OF NEWBURYPORT, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO HENRY W. BLAIR, OF MANCHESTER, NEW HAMPSHIRE.

THREAD-WINDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 463,142, dated November 17, 1891.

Application filed August 4, 1890. Serial No. 360,959. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM DUCHEMIN, a subject of the Queen of Great Britain, residing at Newburyport, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Thread-Winding Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to winding-machines to be used for winding cops that give out the thread from the center; and the objects of my invention are to produce a machine by which such cops of any desired dimensions can be produced and which will be automatically stopped when the cop is completed, and also in which the thread as it is wound into the cop will be given a rapid movement at the ends thereof, all as will hereinafter more fully appear. I attain these objects by the mechanical devices illustrated in the accompanying drawings, in which—

Figure 1 is a plan view; Fig. 2, a front elevation; Fig. 3, a rear elevation showing the arrangement of the thread-guide carriage; Fig. 4, a bottom view showing the arrangement of the automatic stopping mechanism, and Figs. 5, 6, 7, and 8 details.

Similar letters refer to similar parts throughout the several views.

A, Fig. 1, represents the frame of the machine, on the under surface of which, in suitable journal-boxes, is secured the driving-shaft B, which is furnished at the rear end with a clutch member a and clutch-pulley a', the said pulley being so adapted that at the desired time it can be clutched with or disengaged from said clutch member a. (See Fig. 4.) At the rear end of shaft B is a belt-pulley a^2, which, by means of a band a^3, drives the pulley on the hollow shaft a^4, which latter is fitted in suitable bearings in the upper end of the uprights a^5 and is fitted with a worm a^6, the position of which is between the uprights a^5. On its front end is a disk a^7, at the center of which is a conical boss, (shown in Fig. 5,) which fits closely into the bore of said shaft a^4 and has in its center a small hole for the reception of the winding-spindle. In front of the shaft a^4 is a rectangular tail-stock a^8, the perpendicular arm a^9 of which is of the same height as the uprights a^5. At its upper end it is fitted with a short shaft a^{10}, on the front end of which is secured, as by set-screw, (not shown,) a disk a^{11}, of the same size as the disk a^7, and within which is a similar central hole a^{12}, which extends inward about one-half the length of the shaft a^{10}. The horizontal part of the tail-stock is so fitted that it can be sent back and forth on bearings made for that purpose on the top of the rear end of the frame A. It is secured in any desired position by a set-bolt a^{15}.

At one end of the frame A, in such position that its axial line is in the same vertical plane as the longitudinal center of the worm a^6 and at right angles to shaft a^4, is the cam-shaft b. It is fitted in suitable bearings in the uprights b', and on its front end is secured a worm gear-wheel b^2, which works in and is actuated by the worm a^6. On its rear end is secured a crescent-shaped cam b^3 in such position that the rear surface thereof is as close as may be without touching the inner surface of the thread-guide carriage b^4. The line of action of this carriage b^4 is parallel with the shaft a^4, and the rear end is fitted to a flat bearing on the back surface of the upright b^5 (shown in Fig. 2) in such a manner that it can be moved back and forth. It has a central longitudinal slot b^6, through which is passed a headed shouldered bolt b^7, the stem of which plays in said slot b^6. The said bolt b^7 is secured in position in a vertical slot d^2 in the upright b^5 by means of a nut b^{36} on the opposite side thereof. This shouldered bolt b^7 is intended to keep the carriage b^4 in horizontal position, and the carriage is kept in position laterally by a spring-plate b^8, Fig. 3, which is secured to the foot of the upright b^5 in such manner that its free end bears against the back surface of said carriage b^4 and keeps it in position against the flat surface bearing on the upright b^5, and also furnishes the necessary tension for its steady working back and forth when impelled by the cam b^3. Said carriage is furnished at the front end also with a longitudinal central slot b^{28} of such size that it will pass over and work smoothly on the cam-shaft b, and is kept in lateral position by upright b' and cam b^3, and is provided on its front surface

with two stops b^9 b^{10}, the front stop b^9 being secured rigidly in position by means of two stopping-pins which pass through the stop b^9 and enter the surface of the carriage b^4, the rear stop b^{10} being adjustably secured by means of a longitudinal slot in the carriage b^4, which will permit of the stop b^{10} being moved (see Figs. 2 and 3) to adapt it to different-sized cams. These stops have wedge-shaped ends and are placed in such position on the carriage b^4 that a line drawn through the apices of the wedges would pass through the axis of the cam-shaft b on the front surface of the carriage b^4, and at right angles therewith is secured the thread-guide carrier b^{11} in such position that when the carriage b^4 is at the extreme limit of its forward reach the longitudinal center of said carrier b^{11} will be in perpendicular line with the front surface of the disk a^7. On the under surface of the carrier b^{11}, fitted in such a manner by means of a set-screw that passes through a longitudinal slot therein and threads into the carrier b^{11} that it can be moved back and forth, is plate b^{12}, which has on the rear end a T-shaped plate, in which is a slot b^{13}, that is at right angles with the thread-guide plate b^{12}. The thread-guide b^{14} is secured on the front end of the guide-plate, so that it can be adjusted to the right or left by a pivot-bolt that threads into the guide-plate b^{12}. At the extreme front end of said guide is a groove b^{15}, through which the thread is led to the winding-spindle c^2 and is held in position therein by the action of a spring-guard d^{11}, that is fitted on the end of the guard, and overlaps the groove shown in Fig. 8.

The mechanism just described is the device for leading the thread back and forth alternately during the process of winding.

I will now describe the manner and means in and by which the winding is done. The cop-winding spindle c^2, Fig. 5, tapers toward the point and is there furnished with a groove d, which is of similar depth on the opposite sides of said spindle, and its stock c fits the hollow shaft a^4 and has a clutch member c', which can be secured in any desired position thereon by means of a set-screw c^{20}. To place it in working condition, the spindle c^2 is passed through the disk a^7 and the thread is looped into the groove d at its point, and this point is passed into the hole a^{12} of the disk a^{11} and shaft a^{10}, where it is secured by the set-screw a^{13}. The projections of the clutch c' are then passed into the recesses in the end of the shaft a^4 and there secured, as explained.

On the upper surface of the frame A, directly under the thread-guide plate b^{12}, is a sliding carriage c^3, the front end of which terminates in two arms, between which is pivoted at c^4 the pressure-roller c^5 in such position that the axis of said roller is in the same horizontal plane and parallel with the axis of the shaft a^4. At the rear end of the carriage c^3 is a post c^6, the upper end of which is provided with a roller which passes into the slot b^{13} at the rear end of the thread-guide plate b^{12}, and on its bottom, about mid-length, is a downwardly-projecting stud c^7, which reaches through a slot in the frame A beyond the bottom. The function of this stud will now be explained. The shipping-bar c^8, Fig. 4, is secured to the under surface of the frame A by means of two shouldered screw-bolts, which pass through suitable slots in the bar c^8 and thread into the under surface of the frame A, as shown by dotted lines in Fig. 4, in such manner that it will slide back and forth parallel with the driving-shaft B. Its front end terminates in two arms c^9, which reach beyond the rear end of said frame and are of such size that the hub of the clutch-pulley a' can revolve between them. Near the front end it has a downwardly-projecting stud c^{10}. At the required time the shipping-bar is driven outward by the pressure of a spring c^{11} against the inner side of said stud c^{10}. On the front side of the shipping-bar c^8, secured to the frame A by a pivot, is a latch c^{12}, which is made in such form that when the clutches a and a' are closed the free or latching end of c^{12} will latch over the stud c^{10} of the bar c^8, and thus release the clutch-pulley a' from the outward pressure of the shipping-bar c^8, and when, by the action of the shipping-bar spring c^{11}, the clutch-pulley a' is driven clear of the clutch member a the end of the latch will rest against the front side of the stud c^{10}. Near the rear end of this latch c^{12}, in such position that it is in central line with the stud c^7 of the carriage c^3, is a downwardly-projecting plate c^{13}, into which is threaded a set-screw c^{14}, the point of which is adjacent to and in line with said stud c^7. The latch c^{12} is actuated by a spring c^{15}, which presses against a stud placed in its front end for that purpose, while the stud c^7 operates normally against the tension of a spring c^{16}, as shown in Fig. 4.

The entire combination operates as follows: The tail-stock a^8 is brought forward until its front surface presses against a stop c^{17} and is there secured by the bolt a^{15}. The spindle c^2 is then passed into and through the hollow shaft a^4 and the central hole of the disk a^7. The thread is looped over the point of the spindle in the groove d and the point of the spindle is passed into the central hole in the disk a^{11} where it is secured by the set-screw a^{13}. The clutch member c' is then brought forward and its projections sent into the recesses in the end of the shaft a^4, it then being secured on the spindle-stock c, as before described. The roller c^5, which has been kept at the required distance from the spindle c^2 by the stop d', is released by hand, whereupon by the pressure of the spring c^{16} on the stud c^7 of the roller-carriage c^3 (see Fig. 3) said roller is sent in against the spindle c^2, and the operator by pressing the clutch-pulley a' into the clutch member a of the driving-shaft B sets the winding mechanism in operation, and as the bulk of the thread increases on the spin-

dle c^2 the roller c^5 and its carrier c^3 are moved out proportionately until the stud c^7, by pressing against the adjustable screw c^{14}, forces the latch c^{12} off from the stud c^{10}, whereupon by the action of the spring c^{11} the shipping-bar is sent out and by its pressure against the clutch-pulley a' sends it clear of the clutch member a, which action stops the process of winding. When the winding has ceased, the roller c^5 is drawn back clear of the cop and so retained by the action of the stop d', which springs out in the path of the carriage for that purpose and so remains until it is drawn back. (See Fig. 1.) The set-screw a^{15} is then loosened, which releases the end of the winding-spindle from the disk a^{11} and shaft a^{10}. The tail-stock a^8 is drawn back and the case which fits over the cop and which has been previously prepared is placed firmly over the cop, the point of the spindle passing through the central hole in the disk thereof. The spindle c^2 is then drawn back enough to free it from contact with the cop and the cop is removed therefrom and the rear disk secured in the case, which action finishes the structure of the cop. When the cop is removed from the spindle, the thread which was looped over its end remains outside of the central vent of the perforated disk of the case in readiness to be drawn out when wanted.

The stop c^{17} is made in the form of a clamp, the arms of which pass over and embrace the front edge of the frame A, and is secured in any desired position thereon by means of a thumb-screw in the lower arm thereof. (Shown in Fig. 4.) It will be noted that when the machine is in operation the shaft a^{10} and disk a^{11} are revolved by the action of the winding-spindle c^2, the end of which is secured therein by the set-screw a^{13}, thus forming a revolving spool, which prevents damage to the end coils of the cop caused by chafing against a stationary disk.

By winding the cop in taper the case, which also is made tapering, can be placed over it without touching the surface-thread of the cop until it is in position thereon, thus leaving the coils intact, which cannot be effectively done when placing the cover on straight cylindrical cops. By moving the graduating-screw c^{14} inward the cop is made smaller, for the reason that the sooner the bar c^7 comes in contact with the point of said screw the sooner the shipper-bar will force the clutches apart and thus stop the winding. The pitch of the winding is changed by changing the worm-gear b^2, since the less the diameter of said worm-wheel the steeper the pitch of the winding will be. The length of the cop is changed by changing the pitch of the cam b^3—that is, if a cop of one and a half inches is required the periphery of the cam should be suitably curved in toward the center; but the length of the incline in all cases should be precisely the same, or one-half of the circumference of the circle, having the axis of the cam as its center and the distance from said axis to the most distant point of the cam as a radius.

The length of the cam must be constant and formed substantially in the manner shown in Fig. 7, for the reason that only the rear stop b^{10} may be changed in adapting the carriage b^4 to suit different cams, as the changes in the length of the reach of said carriage must occur at the end thereof that is adjacent to the tail-stock a^8, the position of which can be changed to suit the different lengths of the reach of said carriage, and also as the diameter of the cam and position of the forward stop b^9 are unchanged the thread-guide b^{11} is at all times brought to the same relative position with the disk a^7 that cannot be changed.

For winding heavy thread or light cord the spring c^{16} of the roll-carriage c^3 must be changed to give a suitable heavier pressure to insure the required solidity of winding, which in this kind of work depends more on the pressure of the roller c^5 on the surface of the thread while being wound than upon a tension on the thread during the process of winding.

It will be observed that in the event of lowering or raising the cam-shaft b for the purposes of changing the pitch of the winding, as before partially described, as the forward end of the thread-guide carriage b^4 has its working bearings on the said shaft b the forward end is therefore always kept in the proper position, and the only further change necessary is at the rear end thereof, which is adjusted by lowering or raising the screw-bolt b^7. The bearing-block d^3 of the shaft b is fitted in a slot d^2 in the upright b', so that it will move smoothly therein, and is provided with laterally-projecting flanges, which bear against the face-surface of the upright b', and is secured in position in the slot by the action of a set-screw d^4, (see Fig. 6,) which passes through a rectangular plate d^5 (that bears on the opposite surface of the upright) and threads into the block d^3. Thus by tightening the screw d^4 the block d^3 is clamped in position in slot d^2 by the joint action of the side flanges thereon and the rectangular plate d^5, as shown at S and F, Fig. 6. Machines, however, that are intended for one class of winding are made with the parts permanently placed in position and which are constructed and adapted to wind cops of thread to be used by and in sewing-machines. The cam b^3 is of such form that the carriage b^4 is sent back and forth at each revolution of the shaft b.

The cops may be made more or less tapering by changing the taper of the spindle; but care must be taken to have the periphery of the roller correspond therewith, and the thread, which is herein represented as given out at the small end of the cop, can be made to discharge at the opposite end thereof, as preferably will be done in winding cops of coarse thread and of fine cord.

The working surface of the cam b^3 is so

graduated that the thread is wound more open at the change from right to left of the winding of each layer, and thus prevents said thread from piling during the process of winding, which is done as follows: At the commencement of the working plane of the cam b^3 is a shoulder d^{10}, having a sharper pitch than the working plane of the cam b^3, which impels the carriage at a swifter rate. At the finish of the layer leading to the left the shoulder d^{10} assumes the position shown at d^{10}, Fig. 7, and at the finish of the layer leading to the right the shoulder d^{10} will be in the same relative position to the stop b^9, and so on. Thus at the commencement of each layer by the action of the shoulder d^{10} the thread-guide carriage is brought forward swifter than at any other time, so causing more open winding at the points named. The working faces of the points of the stops b^9 b^{10} should be of the same plane as the working surface of the shoulder d^{10}.

The thread-plate b^{11} is so adapted that the outer end of the groove in the guide b^{11} is in perpendicular line with the front surface of the winding-spindle. As the thread accumulates on said spindle and the roller c^5 is pushed out thereby, the thread-guide, by the action of the roller-carriage stud c^6 in the slot of the T-shaped plate is also correspondingly moved, and in this manner the thread is always fed perpendicularly with the surface of the cop from the commencement to the finish of the winding. The advantage gained by this mode of feeding the thread to be wound is that the thread drops directly between the peripheries of the cop and roller and is thus held in the position in which it is fed by the guide, which prevents its overlapping while being wound.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a cop-winding machine, the combination of a driving-pulley, a spindle and thread-guide driven therefrom, a sliding presser-roller carriage, a spring-actuated shipper-bar provided with a catch, and a latch pivoted to the frame of the machine and engaging said catch, said latch being in the line of movement of the roller-carriage to be thereby disengaged from the said catch when the cop is completed to stop the machine, substantially as described.

2. In a cop-winding machine, the combination of a clutch and a driving-pulley, a spindle and thread-guide driven therefrom, a sliding carriage provided with a stud and a presser-roller, a spring-actuated shipper-bar provided with a catch, and a latch pivoted to the machine-frame and engaging said catch and carrying an adjustable post or screw in the path of travel of said stud, whereby when the cop is completed the spring-actuated shipper is released to move the clutch and stop the machine, substantially as described.

3. In a cop-winding machine, the combination of a spindle, mechanism for revolving it, a carriage having a thread-guide and provided with stops, and a revolving cam adapted to bear alternately against the stops to draw the carriage back and forth, said cam being provided with a shoulder in its periphery to rapidly change the travel of the carriage at the end of its stroke, substantially as described and set forth.

4. In a cop-winding machine, the combination of a spindle, mechanism for revolving it, a carriage having a thread-guide and provided with stops, and a revolving cam adapted to bear alternately against the stops to draw the carriage back and forth, said cam being provided with a shoulder in its periphery, the shoulder having an inclined face similar to the working faces of the stops, substantially as described and set forth.

5. In a cop-winding machine, a carriage provided with a thread-guide, a vertically-adjustable cam-shaft, a cam on the shaft working between the stops on the carriage, and means for vertically adjusting the opposite end of the carriage, substantially as set forth and described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM DUCHEMIN.

Witnesses:

LENDELL A. CONNER, Jr.,

ARCH. M. CATLIN.