Dec. 14, 1926.

1,610,882

C. D. REYNOLDS

AUTOMATIC REGISTER AND STOP DEVICE

Filed March 17, 1920 6 Sheets-Sheet 1

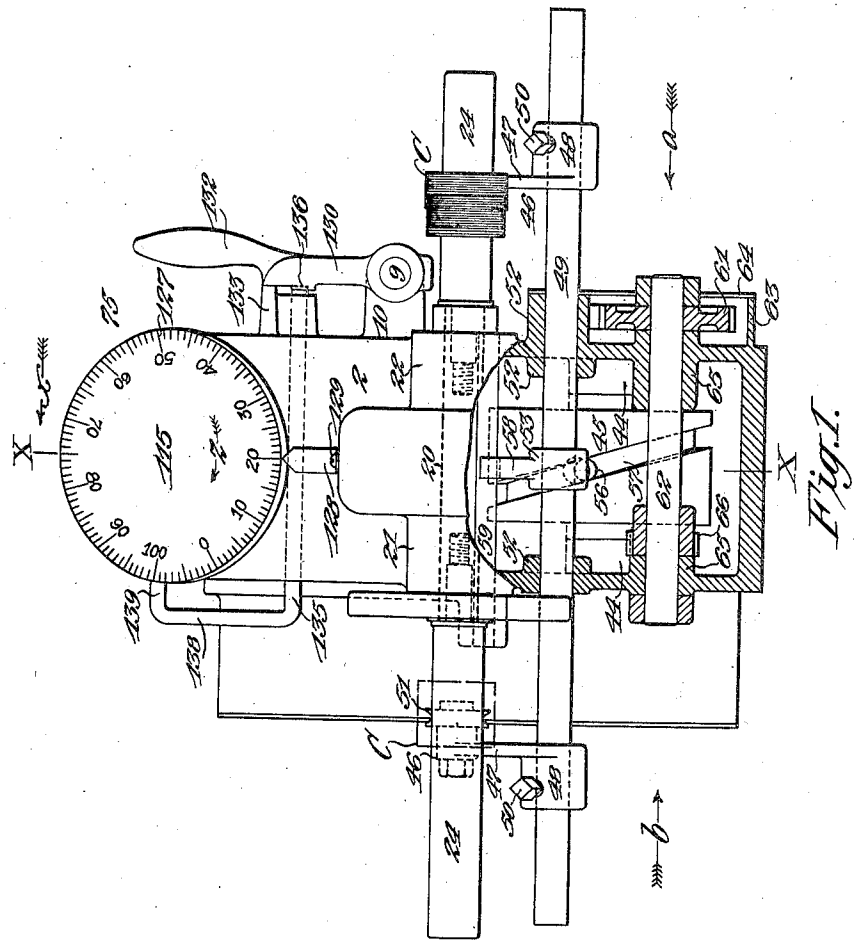


Fig. 1.

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AUTOMATIC REGISTER AND STOP DEVICE

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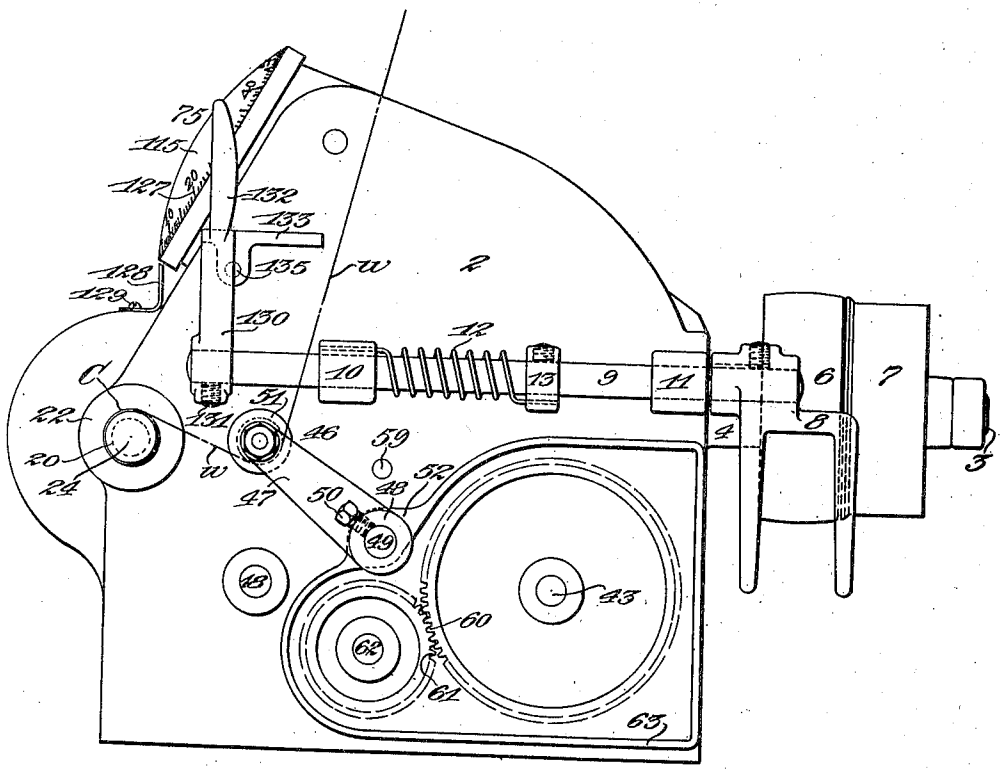


Fig. 2.

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AUTOMATIC REGISTER AND STOP DEVICE

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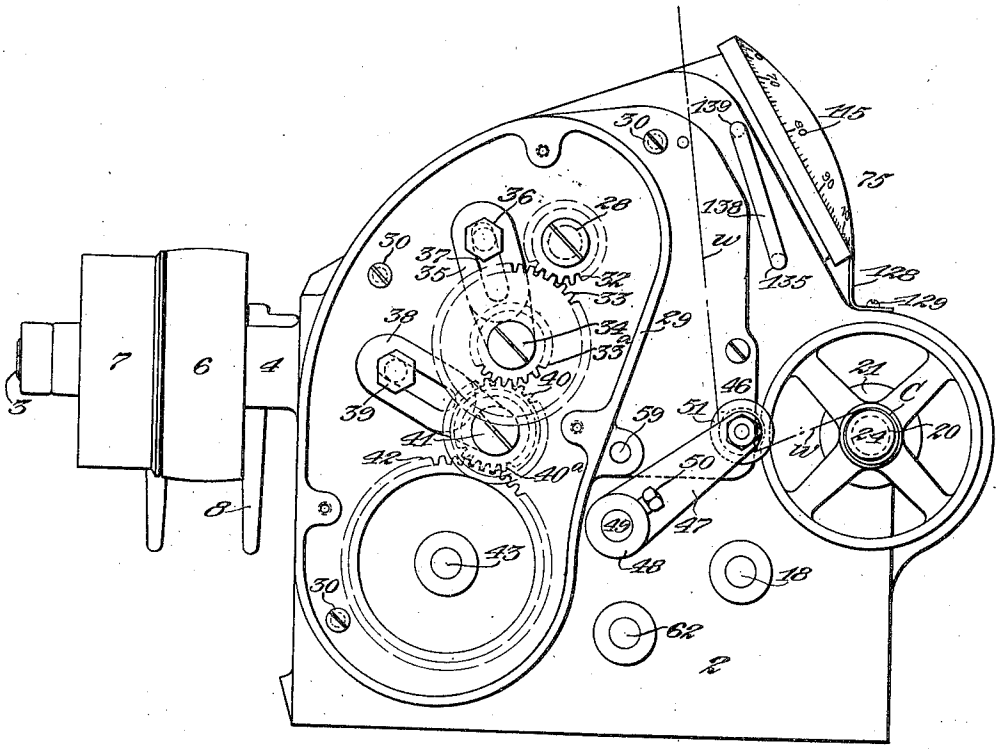


Fig. 3.

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AUTOMATIC REGISTER AND STOP DEVICE

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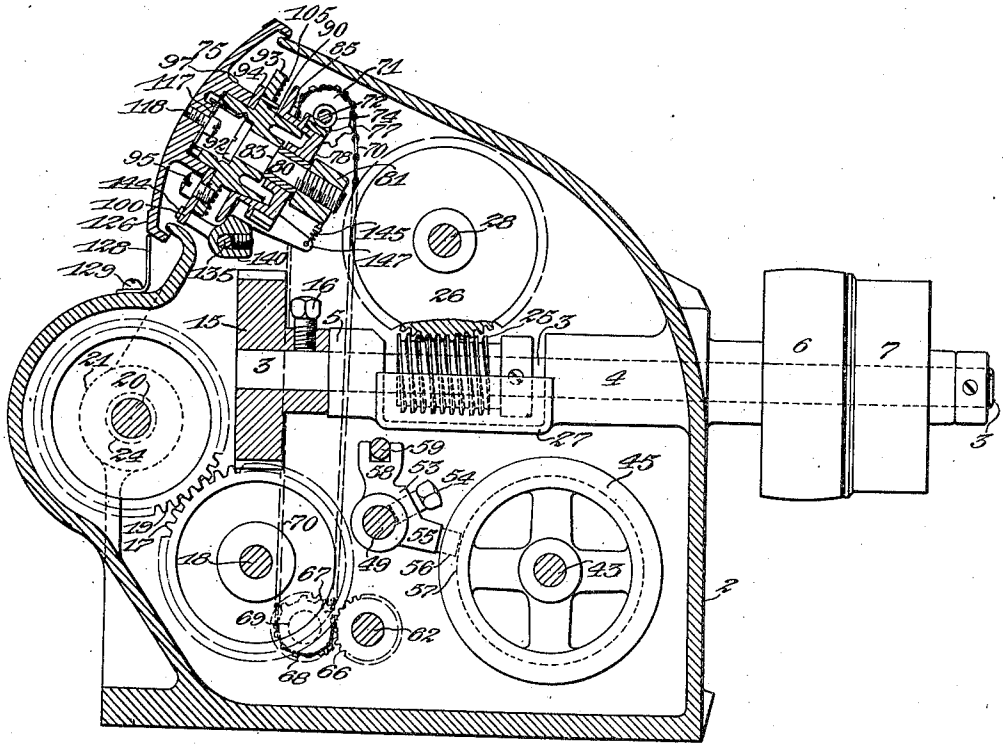


Fig. 4.

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AUTOMATIC REGISTER AND STOP DEVICE

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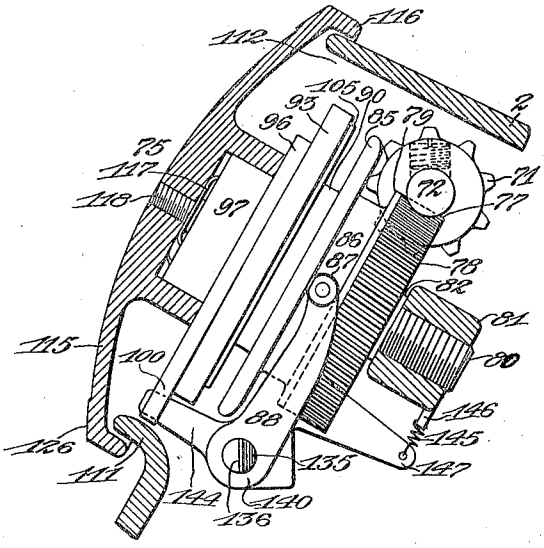


Fig. 5.

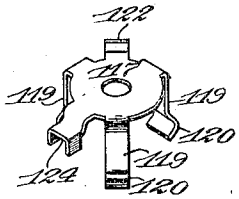


Fig. 7.

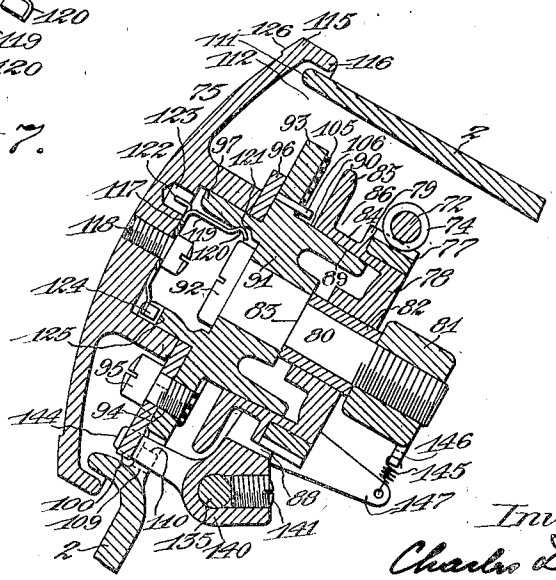


Fig. 6.

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AUTOMATIC REGISTER AND STOP DEVICE

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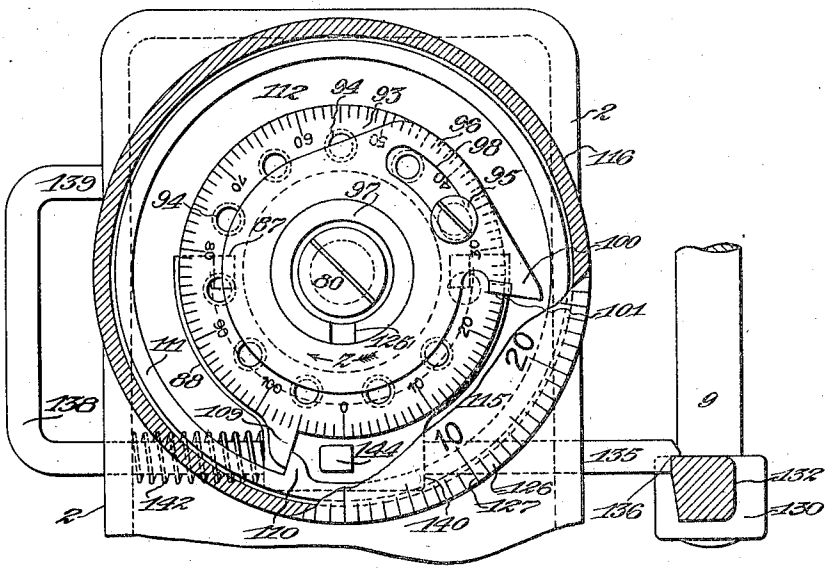


Fig. 8.

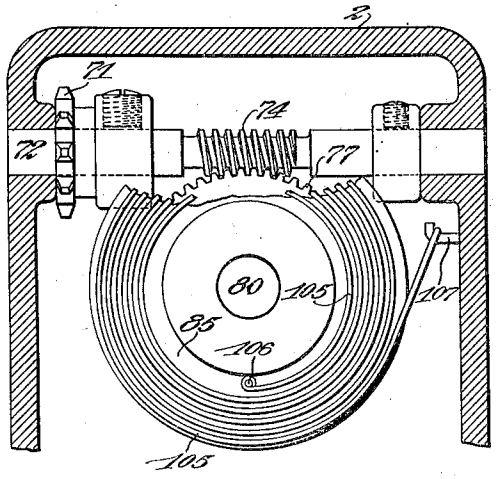


Fig. 9.

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Patented Dec. 14, 1926. 1,610,882

UNITED STATES PATENT OFFICE.

CHARLES D. REYNOLDS, OF CRANSTON, RHODE ISLAND, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE NEW ENGLAND TRUST COMPANY, TRUSTEE, A CORPORATION OF MASSACHUSETTS.

AUTOMATIC REGISTER AND STOP DEVICE.

Application filed March 17, 1920. Serial No. 366,687.

My invention relates to improvements in automatic registering and stopping mechanism for indicating the progress of operation of a machine and for arresting its action at a predetermined stage in the operation.

One object of the improvement is to provide a clock or indicator which may be set to cause the machine to perform a certain definite number of operations and to stop the machine automatically upon the completion of the work.

Another object of the improvement is to provide a device which is simple in construction, compact in size, and entirely automatic in its control of the operation of the machine to which it is applied.

Further objects of the improvement will appear from the following specification which comprises a detailed description of one embodiment of the invention as illustrated in the accompanying drawings, in which like reference characters designate like parts. In the drawings:

Fig. 1 is a front elevation of a winding machine showing my improved registering and stopping device applied to use thereon and illustrating a portion of the frame or casing of the machine as broken away to reveal the inner mechanism;

Fig. 2, an end elevation of the winding machine, looking in the direction indicated by the arrow *a*, Fig. 1;

Fig. 3, an opposite end view looking in the direction indicated by the arrow *b*, Fig. 1, both of these end views showing the covers removed from the gear-casings on the sides of the machine;

Fig. 4, a vertical, sectional view of the machine taken on the line X—X of Fig. 1, looking in the direction indicated by the arrow *x*;

Fig. 5, an enlarged, side view of the clock or registering and stop-control device of the machine;

Fig. 6, an enlarged, sectional view of the same taken in a vertical, axial plane;

Fig. 7, a detailed view of the spring-detent for the cap and dial of the registering device;

Fig. 8, an enlarged front view of the clock or registering device showing its outer dial broken away to illustrate the setting mechanism; and

Fig. 9, a detailed view of the driving- and resetting-mechanism of the clock.

My improved clock or indicator and its automatic stop-controlling device is adapted for use on various types of machines and apparatus, but I have preferred to herein illustrate it as applied to a winding machine for winding electrical coils. In producing certain types of electrical coils in quantity it is required to wind the same with uniformity as regards the number of layers of wires or conductor in each coil. It is also desirable that the winding machine be stopped automatically when the coil has been completed with the predetermined number of layers so as not to waste time or material in winding on extra turns. For this purpose my improved device may be applied to the winding machine to render its operation practically automatic, the registering device being set for any desired number of traverses of the winding-guide, and the stop-device controlled thereby to arrest the operation of the machine after the given number of layers have been wound onto the coil. Moreover, my improved register and stop-device is so designed that it may be reset after the machine completes a cycle in its operation, to produce one or more coils of a given number of layers, whereby to cause it to repeat the same operation without further attention on the part of the operator.

Referring to the drawings, in the preferred embodiment of the invention as herein shown the operating mechanism of the machine is enclosed within a box-like frame or casing 2 which is provided with suitable bearings for the driving-elements. As shown in Fig. 4, the main drive-shaft 3 of the machine is journaled in a bearing 4 at the rear of the frame 2 and extends forwardly therefrom through a second bearing 5 projecting from the side wall of the frame. On the rearward end of the drive-shaft 3 is a driving-pulley 6 which may be connected by a belt (not herein shown) to any suitable source of power for driving the machine. At the side of the pulley 6 is a "loose" or idler pulley 7 onto which the driving-belt is shifted when the operation of the machine is to be arrested; it being understood that the pulley 6 is fast on the shaft 3 and the

pulley 7 free thereof in accordance with the well known arrangement. For shifting the driving-belt from the "tight" to the "loose" pulley, and vice versa, I employ the usual shipper-fork 8, see Fig. 2, which is mounted on the end of a rod 9 slidable in bearings 10 and 11 on the side of the frame 2. The shipper-rod 9 is adapted to be slid to the right, as viewed in Fig. 2, to shift the belt from the "tight" to the "loose" pulley, by means of a compression spring 12 surrounding the rod between the bearing 10 and a collar 13 fast thereon. The ends of the spring 12 are held in suitable holes in the bearing 10 and collar 13 so that the spring may be wound up or set with a torsion to adapt it to rock the rod in its bearings, the purpose of this arrangement being to hold the detent-means in locking engagement. The detent-means acts to hold the rod in its forward position, as illustrated in Fig. 2, to maintain the driving-belt on the "tight" pulley 6, the arrangement of this part of the mechanism being hereinafter described in detail in connection with the automatic stopping-mechanism of the machine.

Referring again to Fig. 4, the drive-shaft 3 carries a skew-gear 15 at its forward end which is secured fast thereon by means of a set-screw 16 in its hub. The gear 15 meshes with a skew-gear 17 on a cross-shaft 18 which is journaled in suitable bearings (not herein illustrated) on the sides of the frame 2. Meshing with the gear 17 is a similar gear 19 which is fast on a shaft 20 journaled in bearings 21 and 22 on the sides of the frame 2, see Fig. 1. At the opposite ends of the shaft 20 are enlarged spindles 24 having studs secured into the shaft. The spindles 24 project from the sides of the frame 2 to receive the spools, tubes or other cores on which the coils or packages are wound, thus serving as the wind-mandrels of the machine.

Secured fast on the drive-shaft 3 between its bearings 4 and 5, see Fig. 4, is a worm or screw 25 which meshes with a worm-wheel or gear 26 arranged thereabove. The worm 25 runs in a bath of oil contained in a reservoir 27 which extends therebelow between the bearings 4 and 5, being preferably constructed integral therewith. The worm-gear 26 is fast on a cross-shaft 28, journaled in bearings on the frame 2, and projecting at one end into a gear-casing 29 attached to the side of the frame by means of screws 30, as shown in Fig. 3. On this end of the shaft 28 is a pinion 32 which meshes with a "change" gear 33 journaled on a stud 34 at the end of an arm 35. The arm 35 is fastened to the side of the frame 2 by a bolt 36 extending through a slot 37 at its end to allow for adjustment of the arm when gears of different diameter are substituted for the gear 33. A similar slotted arm 38 is attached to the side of the frame 2 by a bolt 39 and carries a second change-gear 40 journaled on a stud 41 at its end. The gear 33 carries a companion gear 33^a fast therewith and meshing with the gear 40 on the stud 41; while the gear 40 carries a companion gear 40^a which meshes with a gear 42 fast on a cross-shaft 43 journaled in bearings 44, 44 on the frame 2, as illustrated in Fig. 1.

Referring to Figs. 1 and 4, the shaft 43 carries a helically-grooved cam 45 which serves as the reciprocating-means for the traverse-guides 46 which feed the wire *w* or other strand to the coils C being wound on the mandrels 24. As shown in Figs. 1, 2 and 3, the guides 46 consist of arms 47 formed with hubs 48 which are mounted on the ends of a reciprocating rod 49 and secured thereto by set-screws 50. At the ends of the arms 47 are grooved pulleys or guide-wheels 51 under which the wire *w* feeds to the coils C. The rod 49 slides in bearings 52 on the frame 2 from which its ends project at either side. Near the center of the rod 49 is a bifurcated member 53, see Fig. 4, secured thereon by a set-screw 54. One arm 55 of the member 53 projects toward the cam 45 and carries a stud or roll 56 engaging the helical groove 57 in the periphery of the cam. The other arm 58 of the member 53 is forked at its end to embrace the sides of a rod 59 extending between the sides of the frame 2 and serving as a track for the member as it slides back and forth to reciprocate the rod 49.

Referring to Fig. 2, the cam-shaft 43 projects through the right-hand side of the frame 2 and carries a spur-gear 60 which meshes with a gear 61 on the end of a cross-shaft 62. The gears 60 and 61 are enclosed within a casing 63 projecting from the side of the frame 2 and protected by a cover 64, see Fig. 1. The shaft 62, driven from the cam-shaft 43 through the gears 60, 61, is journaled in bearings 65 on the sides of the frame 2 and carries a pinion 66 within the frame. The pinion 66 meshes with an equal pinion 67, see Fig. 4, which is fast with a sprocket-wheel 68 journaled on a stud 69, the stud being screwed into the side of the frame 2, but not herein shown in detail. The sprocket 68 is connected by a chain 70 to a similar sprocket 71 fast on a spindle or shaft 72 which is journaled in suitable bearings at the top of the frame 2. The shaft 72 is formed with a screw 74, or it may carry a worm, which serves as the driving means for the clock or registering device set into the top of the frame 2 and indicated in general by the reference character 75.

The clock-mechanism is driven from the worm or screw 74 by means of a worm-gear 77, see Figs. 5, 6 and 9, which is formed integral with or constructed as a ring fitted to the periphery of a clutch-member 78 and

abutting a flange 79 formed thereon. Referring to Fig. 6, the clutch-member 78 is journaled on the reduced portion of a stud 80 which is screwed into an arm or cross-piece 81 extending between the sides of the frame 2. The hub of the clutch-member 78 is free to slide on a bushing 82 held on the stud 80 between its shoulder 83 and the arm 81. Overhanging the hub of the clutch-member 78 is an outer rim 84 formed with an extended peripheral flange 85 at its end which, with the opposite flange 79, forms an annular groove 86, see Fig. 5. The groove 86 is engaged by pins or rolls 87 at the end of a fork 88 straddling the sides of the clutch-member 78, the fork 88 being rockable, under the control of means to be later described, whereby to slide the clutch-member 78 longitudinally of its bearing. The interior of the rim 84 of the clutch-member 78 is formed with a tapered face adapted to frictionally engage the exteriorly tapered face 89 of a male clutch-member 90.

The male clutch-member 90 is formed with a hub 91 journaled on the enlarged portion of the stud 80 between its head 92 and the end of the bushing 82. At its outer end the male member 90 is provided with an annular flange 93 forming a dial marked on its outer face with graduations, see Fig. 8, numbered in units of ten from "0" to "100". Spaced equidistantly around the dial 93 are a series of holes 94 which are threaded to receive a locating-screw 95 for an adjustable stop-plate 96. The stop-plate 96 takes the form of a ring fitted to an overhanging annulus or hub 97 on the clutch-member 90 and adapted to abut the face of the dial-flange 93. In the stop-plate 96 is an arcuate slot 98 registering with the holes 94 in the dial 93 to adapt the screw 95 to be inserted therethrough to clamp the plate to the face of the dial. Projecting from the rim of the stop-plate 96 is a stop-finger 100 having a radially disposed edge 101 adapted to register with the graduations on the dial 93. The slot 98 in the plate 96 allows the finger 100 to be adjusted through a space of ten graduations on the dial 93 when the clamping-screw 95 is released; and for a greater range of adjustment the screw 95 is removed and placed in the different holes 94 of the dial in accordance with the setting required. The stop-finger 100 serves as the actuating-means for the stopping-mechanism of the machine which causes the arrest of its operation at a predetermined stage in the winding as regulated by the setting of the clock; the arrangement of this part of the apparatus being more fully described hereinafter.

On the back of the dial-flange 93 is a spiral spring 105, see Figs. 6 and 9, similar to the main-spring of a watch. One end of the spring 105 is anchored to a pin 106 driven into the flange 93 and its opposite end is secured to a hook 107 projecting from the side of the frame 2. The spring 105 is wound up by the turning movement of the clutch-member 90 when the latter is rotated from the worm-driven clutch-member 78, so that when the clutch-members are disengaged the spring will return the dial-carrying member 90 to initial position. Referring to Fig. 8, the dial 93 is formed with a stop-lug 109 projecting from its periphery and adapted to strike against a fixed abutment 110. The abutment 110 is formed on the rim 111 of an opening 112 in the frame 2 in which the clock 75 sets, and serves to limit the turning movement of the dial 93 under the impulse of its resetting spring 105.

Referring to Fig. 6, the annulus 97 of the clutch-member 90 extends outwardly beyond the stop-plate 96 to adapt it to receive the hub of a circular cap 115. This latter element is formed with a convexly crowned top bordered by an annular rim 116 which overhangs the circular flange 111 on the opening in the frame or casing 2, see also Fig. 8, thus adapting the cap to serve as a cover to protect the clock-mechanism contained within the frame. The cap 115 is held on the annulus 97 of the clutch-member 90 by releasable means so that it may be conveniently removed to allow setting of the stop-mechanism of the clock. For this purpose a spring detent-member or clip 117 of spider-like form is fastened to the center of the cap by means of a screw 118. As illustrated in Fig. 7, the clip 117 is formed with legs 119 adapted to enter the annulus 97 and provided with hooks 120 at their ends for engaging an annular groove 121 on its interior. When the hub of the cap 115 is slipped on over the annulus 97 the hooks 120 at the ends of the legs 119 snap into the groove 121 to hold the cap in place; and when it is required to remove the cap the hooks may be sprung out of the groove under a forcible pull outwardly on the cap. The clip 117 is held rotatively with the cap 115 by means of a finger 122 engaging a pocket 123 in the cap; while a second detent or finger 124 on the clip is adapted to enter a pocket 125 in the rim of the annulus 97 to lock the cap rotatively with the clutch-member 90. On the outer face of the cap 115 is a raised dial-rim 126 marked with graduations 127 which are adapted to register with a fixed index-pointer 128, see Fig. 1, secured to the frame or casing 2 by means of a screw 129. The graduations on the dial-rim 126 correspond with those on the inner dial 93 when the cap 115 is secured in place on the clutch-member 90, so that as the outer dial cooperates with the index 128 it serves as a means for indicating the progress of operation of the machine.

The clock 75 cooperates with the stopping

mechanism of the machine through an arrangement of detent-means as next described. Referring to Figs. 1 and 2, the belt-shipper rod 9 carries an arm 130 secured to its outer end by a set-screw 131. The upper end of the arm 130 is formed with a handle 132 whereby it may serve as a starting-lever for the manual operation of the belt-shipper 8 in starting the machine. Projecting from the side of the frame 2 is a ledge or track 133 along which the side of the arm 130 rides during its sliding movement with the shipper-rod 9, the arm 130 being forced against its track 133 by the torsion of the spring 12 which is held at its ends for this purpose in the manner as previously explained. Referring now to Figs. 1 and 8, the detent-means for the shipper-rod 9 comprises a cross-rod 135 slidable through bearings in the sides of the frame 2 and provided with a notch or shoulder 136 at its right-hand end adapted to engage the edge of the arm or starting-lever 130. The opposite end of the rod 135 is bent around in a U-shaped handle 138 having an upper leg 139 adapted to strike against the side of the frame 2 to limit the sliding movement of the rod to the right, as viewed in Fig. 8. The detent-rod 135 carries the clutch-fork 88, which operates the clutch-member 78 as previously described, the fork being formed with a hub 140 encircling the rod and secured thereon by a set-screw 141, see Fig. 6. Coiled around the rod 135 between the hub 140 of the fork 88 and the side of the frame 2 is a compression-spring 142 which tends to urge the rod to the right until its leg 139 strikes against the frame as shown in Fig. 8. It is to be noted that the detent end of the rod 135 is beveled off on one side to adapt the edge of the starting-lever 130 to ride across it and seat itself in the notch 136, the torsion of the spring 12 on the rod 9 being weaker than the tension of the spring 142 so that the lever 130 is allowed to rock or yield for this purpose instead of causing the rod 135 to slide back. Projecting forwardly from the hub 140 of the clutch-fork 88 is a lug or abutment 144 with which the finger 100 on the stop-plate 96 is adapted to engage to slide the detent-rod 135 to the left to release the stopping-lever 130. The purpose of the handle 138 at the end of the rod 135 is to provide for rocking the clutch-fork 88 to slide the clutch-member 78 rearwardly to release it from the clutch-member 90, whereby to allow the turning of the latter under the action of its spring 105. Normally the clutch-member 78 is held in engagement with the driven clutch-member 90 by the pressure of the fork 88 against its flange 85. As shown in Fig. 6 the fork 88 is operated under the pressure of a spring 145 anchored at one end to a lug 146 on the cross-arm 81, with its other end secured to the end of an arm 147 projecting from the side of the hub 140 of the fork.

Having now described the construction and arrangement of the mechanism of my improved registering and stopping device, its method of operation in connection with the machine to which it is applied will next be explained: The clock or registering-device 75 is connected to be operated from the machine which it controls, and the gearing for its drive may be of any suitable ratio in accordance with the character of the operations to be registered. When employed on a winding machine, as herein illustrated, the clock is adapted to register the number of traverses of the winding-guides 46 to indicate the number of layers wound onto the coil. For this purpose the drive for the registering-mechanism is geared to turn the dial one notch or graduation for each half rotation of the traverse-cam 45. One half a turn of the cam 45 effects a complete traverse of the guides in one direction and the next half turn carries them back in the opposite direction to the starting point. In setting the machine to wind a coil of any predetermined number of layers, therefore, say twenty-five, the stop-plate 96 is adjusted around the inner dial 93 until its stop-finger 100 registers with the graduation "25" on the dial as shown in Fig. 8. This adjustment or setting of the stop-plate 96 is made by removing the locating-screw 95 and turning the plate on its supporting annulus 97, after which the screw 95 is inserted through the slot 98 and screwed into its appropriate hole 94 to clamp the plate in position on the dial. Assuming, now, that the dial is set with its zero mark registering with the index pointer 128, as shown in Fig. 8, the machine is ready for operation and may be started by drawing the handle 132 forward. This forward movement of the starting-handle 132 slides the rod 9 to the left, as viewed in Fig. 2, to cause the belt-shipper 8 to shift the driving-belt from the "loose" pulley 7 onto the "tight" pulley 6 whereby to start the rotation of the drive-shaft 3. As the arm 130 is drawn forward by its handle 132 it will ride across the beveled end of the detent-rod 135 and come into engagement with the notch 136 as shown in Fig. 8. As before explained, the spring 12 on the rod 9 allows the arm 130 to rock to adapt it to ride out across the end of the detent-rod; but after the edge of the arm passes the shoulder 136 on the rod the torsion of the spring 12 serves to maintain it locked in engagement therewith.

Referring to Figs. 2 and 3, the wire w or other strand to be wound is led from its source of supply, usually arranged above, down around the guide-wheels 51 and thence to the winding mandrels 24. In the type

of winder herein illustrated two traverse guides 46 are shown as arranged on opposide sides of the machine, but if desired the capacity of the winder may be increased by multiplying the number of guides at either side, the mandrels 24 and traverse-rod 49 being extended for this purpose. The ends of the wire strands *w* are fastened to the mandrels 24 and as the latter are rotated during the operation of the machine the wire will be traversed back and forth thereon to wind the coils C, indicated at the left of Fig. 1 by dash lines and at the right by full lines.

Referring to Fig. 4, the winding mandrels 24 are rotated from the cross-shaft 20 driven from the main drive-shaft 3 through the gears 15, 17 and 19 as before explained. The worm 25 on the drive-shaft 3 drives the gear 26 to rotate the shaft 28, and the latter is connected through the train of gears 32, 33, 33ª, 40, 40ª and 42 to the shaft 43. The shaft 43 carries the cam 45 which is thus driven at a greatly reduced speed to reciprocate the traverse-rod 49 by means of the member 53 connecting it therewith. The guides 46 carried by the rod 49 are thus traversed opposite the winding-mandrels 24 at a relatively slow rate and the wire is fed onto the coils C by the guide-wheels 51 to deposit the turns in successive layers, a layer being completed after each traverse of the guides 46 in either direction.

As the machine functions in this manner the clock or registering-device 75 is driven continuously through its connection therewith comprising the gear 60 on the cam-shaft 43 driving the gear 61 on shaft 62, see Fig. 2, and the pinion 66 on shaft 62, see Fig. 4, driving gear 67 and sprocket 68 connected by chain 70 to sprocket 71. The sprocket 71 drives the worm 74 to rotate the clutch-member 78 at a greatly reduced speed, the ratio between the cam-shaft 43 and the worm-gear 77 being proportioned to turn the dial 93 one space for each half turn of the cam as above explained.

The clutch-member 78 is held in driving engagement with its cooperating clutch-member 90 by the pressure of the fork 88 on its flange 85, see Fig. 5, under the action of the spring 145. The member 90 is thus driven by and with the member 78 to rotate the inner dial 93, the outer, indicating dial 126 being also turned therewith through its connection with the annulus 97 of the member 90. The dials 93 and 126 rotate in a clockwise direction, as indicated by the arrow *z*, Fig. 8, and the graduations 127 on the outer dial 126 are thus carried past the index-pointer 128 to indicate the progress of the work being done on the machine, that is, in the present case, the number of layers wound onto the coils. As the machine continues to operate in this manner the turning of the inner clock-dial 93 causes the stop-finger 100 to be carried around toward the abutment 144 on the clutch-fork 88 and to eventually come into engagement therewith. It will be noted by reference to Fig. 8 that the edge of the abutment 144 with which the stop-finger 100 engages is disposed slightly to the right of the vertical center of the dial 93. This provides that the finger 100 will strike against the abutment 144 before the dial reaches its starting point so that as the finger continues its rotation it will act on the abutment to slide the fork 88 and the rod 135 on which the latter is mounted to the left. That is to say, the finger 100 begins to act on the detent-rod 135 just before the clock dial reaches the point at which the machine is to be stopped, and finally as the finger comes into register with the index-pointer 128 the rod 135 will have been slid to the left a sufficient extent to release its notch 136 from the arm 130 of the starting-lever 132. Immediately the arm 130 is released from the detent-rod 135 the spring 12 on the rod 9 will act to slide the latter to the right, as viewed in Fig. 2, and the belt-shipper 8 will thus be caused to shift the driving belt onto the loose pulley 7 to arrest the operation of the machine. The machine is thus stopped automatically upon the completion of the coils with a given number of layers as determined by the setting of the stop-finger 100 on the dial 93.

After the completed coils have been removed from the winding-mandrels and the wire-strands connected to wind a new set of coils the operation of the machine is started again in the manner as next explained: The operator first grasps the detent-rod handle 138, see Figs. 1 and 8, and rocks it rearwardly to cause the clutch-fork 88 to slide the clutch-member 78 back from the member 90. As the driven clutch-member 90 is thus released from its driving-member 78 the spring 105 on the back of the flange 93 will cause it to be rotated in the direction opposite to that indicated by the arrow *z*, Fig. 8, to carry the stop-lug 109 back against the abutment 110 on the frame 2. The member 90 is thus returned to first position with the zero mark on both dials registering with the index-pointer 128. As the member 90 is turned back under the action of its resetting spring 105 the stop-finger 100 is carried away from the abutment 144, allowing the detent-rod 135 to slide to the right, under the action of its spring 142, to bring its end into position to be engaged once more with the arm 130 of the starting-lever 132. After the clock mechanism has been reset in this manner the machine may be started again by simply drawing the starting-handle 132 forward to engage its arm 130 with the end of the detent-rod 135 as before explained. It will thus be seen that the registering and

stopping device may be very easily reset after each successive operation of the machine, so that the functioning of the machine is automatically regulated to provide for uniformity of the work produced thereby. My improved device therefore provides for automatic control of the machine to which it is applied, so that very little attention is required on the part of the operator, and hence one operator can tend more machines and the rate of production is thereby greatly increased. It is further pointed out that the improved arrangement shown provides that the winding machine cannot be operated continuously, after stopping has been effected by the action of the registering device, until the clock or indicator has been set back to first position. If it is required to wind a few turns on the winding-mandrel or on the completed coil this may be accomplished by drawing the starting-lever forward and holding it with the hand. When, however, it is desired to start the winding of a new coil or coils, the detent-rod handle 138 must first be rocked to remove the clutch-member 90 from its driving-member 78. As the clutch is released the spring 105 causes it to be rotated to return the member 90 to first position with the zero mark on both dials registering with the index-pointer 128. This latter action carries the stop-finger 100 away from the abutment 144 to allow the detent-rod 135 to slide to the right, under the action of its spring 142, to bring its end into position to engage with the arm 130 of the starting-lever 132. Stated briefly, the detent-rod 135 cannot perform its function of maintaining the machine operative until the clock or counter is set back to zero position to begin the recording of the operations of the machine. It will thus be seen that the machine cannot be made to operate continuously without the clock registering the progress of its operation, or as in the present case, the number of layers wound into the coil. This provision is made to insure that the operator shall not leave the machine operating without making the proper count of layers; the important object being to prevent wasting wire by winding the coils without registering the number of layers deposited thereon. My improved device also provides for a more positive and accurate control of the machine than where the human element is depended upon to regulate its operation, and hence its product will be more uniform, and wastage of material wil be saved by preventing overrunning of the machine.

My improved device is herein shown and described in connection with a winding machine as one example of the use to which it may be applied. It will be obvious, however, that the improved apparatus is adapted for various other types of machines and therefore the invention is not limited in this respect as regards the mechanism with which it is combined. It is also obvious that various modifications may be made in the structure and arrangement of the parts of the device without departing from the spirit or scope of the invention; therefore, without limiting myself to the exact embodiment herein presented, what I claim for my invention is:

1. In a winding machine, the combination with the winding-mechanism, of driving-means for operating the winding-mechanism, detent-means for normally maintaining said driving-means operative, registering-means adapted to be driven from the winding-mechanism, a stop-member adapted to be set at different points on the registering-means, means actuated from said stop-member to release the detent-means to render the driving-means inoperative after a predetermined extent of movement of the registering-means, and means operative from said detent-means to reset the registering-means to first position.

2. In a winding machine, the combination with the winding-mechanism, of driving-means for operating the winding-mechanism, detent-means for normally maintaining said driving-means operative, registering-means adapted to be driven from the winding-mechanism, a stop-member carried by the registering-means, means actuated from said stop-member to release the detent-means to render the driving-means inoperative, means for resetting the registering-mechanism to first position, and means actuated by the manual operation of the detent-means to energize the means for resetting the registering-means.

3. In a winding machine, the combination with the winding-mechanism, of driving-means for operating the winding-mechanism, detent-means for maintaining the driving-means operative, registering-means for indicating the progress of the winding operation, a clutch-member driven from the winding-mechanism, a second clutch-member adapted to be driven from the first member, means for maintaining said members in driving engagement, means connecting the second member to drive the registering-means, a stop-member adjustable to different positions on the registering-means, means adapted to be engaged by the stop-member to release the detent-means to render the driving-means inoperative, means operated by the manual adjustment of the detent-means to release the two clutch-members from driving engagement, and means to return the registering-means to first position upon the release of the clutch-members.

4. In a winding machine, the combination with the winding-mechanism, of driving-means for operating the winding-mecha-

nism, manually-adjustable detent-means for maintaining the driving-means operative, a rotatable clutch-member driven from the winding-mechanism, a second clutch-member adapted to be driven from the first member, an indicating dial on the second clutch-member, a stop-member adjustable on said dial, means adapted to be engaged by the stop-member to release the detent-means to arrest the operation of the driving-means, means operated from the manual adjustment of the detent-means to release the clutch-members from driving-engagement, and automatically operated means for returning the indicating dial to first position upon the release of the clutch-members.

5. In a winding machine, the combination with the winding-mechanism, of driving-means for operating the winding-mechanism, manually adjustable detent-means for maintaining said driving-means normally operative, an indicating dial, a clutch-device for rotating said dial, means connecting the clutch-device to be driven from the winding-mechanism, a stop-member adjustable to different positions on the dial, means adapted to be engaged by the stop-member to release the detent-means to render the driving-means inoperative, means actuated by the manual movement of the detent-means to operate the clutch-device whereby to release the indicating dial, and means for automatically returning the dial to first position after its release by the clutch device.

6. In a winding machine, the combination with the winding-mechanism, of driving-means for operating the winding-mechanism, manually adjustable detent-means for normally maintaining the driving-means operative, an indicating dial, means driven from the winding-mechanism to rotate the dial, a stop-member rotatable with the dial, means adapted to be engaged by said stop-member to release the detent-means to render the driving-means inoperative, means actuated by the manual adjustment of the detent-means to disconnect the dial from its driving-means, and means for automatically returning the dial to first position upon its release from its driving-means.

7. In a register and stop device, the combination of registering-means, a stop-member adjustable on the registering-means, a casing enclosing the registering-means, and a cap-like dial mounted on the registering-means and adapted to be removed to allow adjustment of the stop-member, said dial also serving as a cover for the casing of the registering-means.

8. In a register and stop device, the combination of registering-means, a stop-member operated from the registering-means, means to set the stop-member in relation to the registering-means, a casing enclosing the registering-means, and a cap-like dial connected to be rotated with the registering-means and removable therefrom to allow setting of the stop-member, said dial also serving as a cover for the casing of the registering-means.

9. In a register and stop-device, the combination with the stopping-mechanism of a machine, of a rockable and slidable detent-member for withholding said stopping-mechanism from action, a rotatable stop-member adapted to slide the detent-member to release the stopping mechanism, a clutch-device for driving the stop-member from the machine, manually operable means for rocking the detent-member, means actuated by the rocking movement of the detent-member to operate the clutch-device to release the stop-member, and means for returning the stop-member to first position after its release from the clutch-device.

10. In a register and stop-device, the combination with the stopping-mechanism of a machine, of a rockable and shiftable detent-member for maintaining the stopping-mechanism inactive, a rotatable stop-member for shifting the detent-member to release the stopping-mechanism, a clutch for connecting the stop-member with the driving-mechanism of the machine, a handle for rocking on the detent-member, and means controlled by the rocking movement of the detent-member to operate the clutch to release the stop-member to allow its return to first position.

11. In a register and stop-device, the combination with the stopping-mechanism of a machine, of a rockable and slidable detent-rod for withholding the stopping-mechanism from action, a rotatable clutch-member driven from the machine, a second clutch-member driven thereby, a stop-member adjustably mounted on the first clutch-member, means adapted to be engaged by the stop-member to slide the detent-rod to release the stopping-mechanism, a fork carried by the detent-rod and adapted to be rocked therefrom to release the clutch-members, and a spring for returning the stop-member to first position upon the release of the clutch.

In testimony whereof I affix my signature.

CHARLES D. REYNOLDS.