W. J. BARRETT.

WINDING MACHINE

APPLICATION FILED AUG. 17, 1910.

1,067,235.

Patented July 15, 1913.

5 SHEETS—SHEET 1.

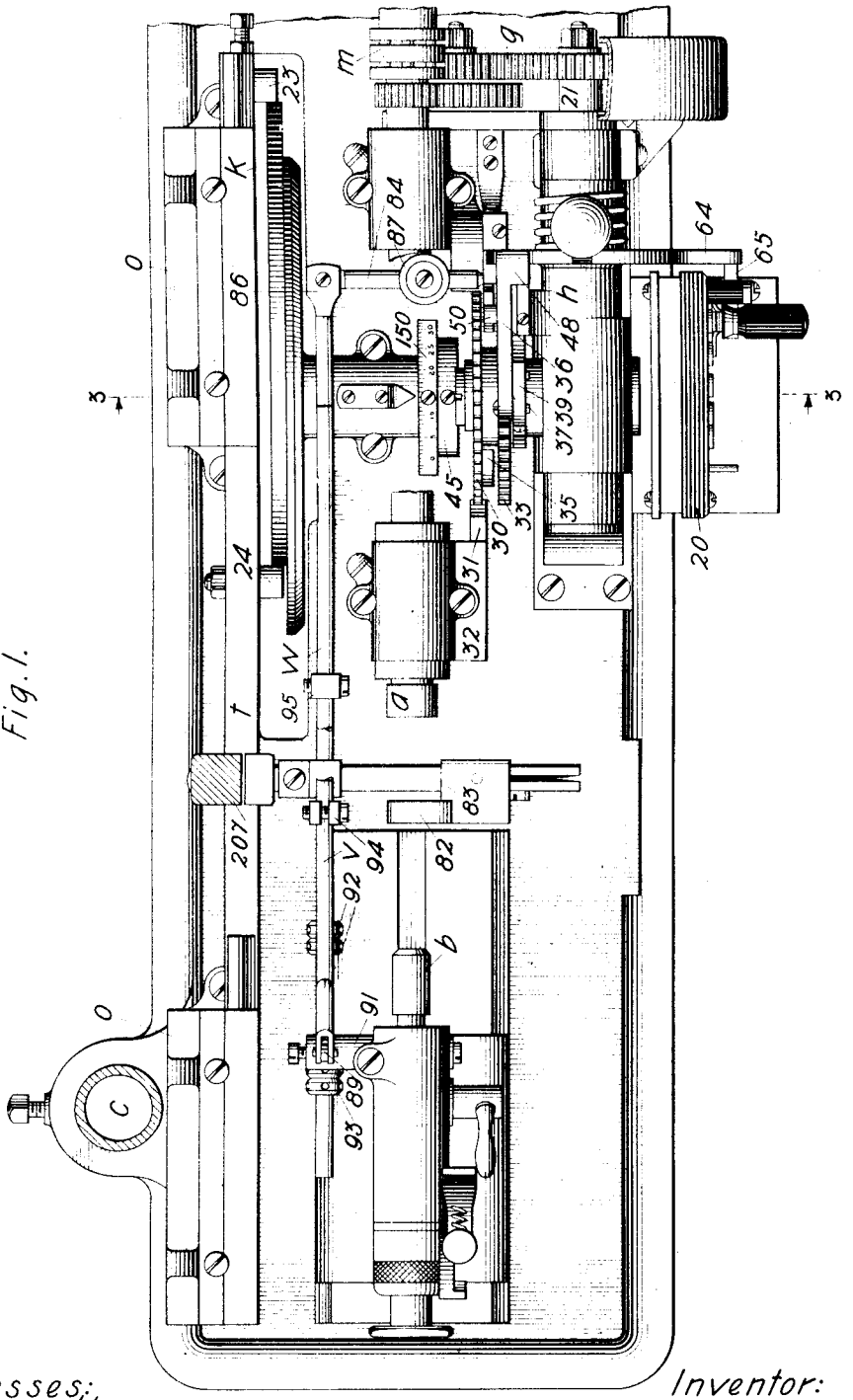



Fig. 1.

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5 SHEETS—SHEET 2.

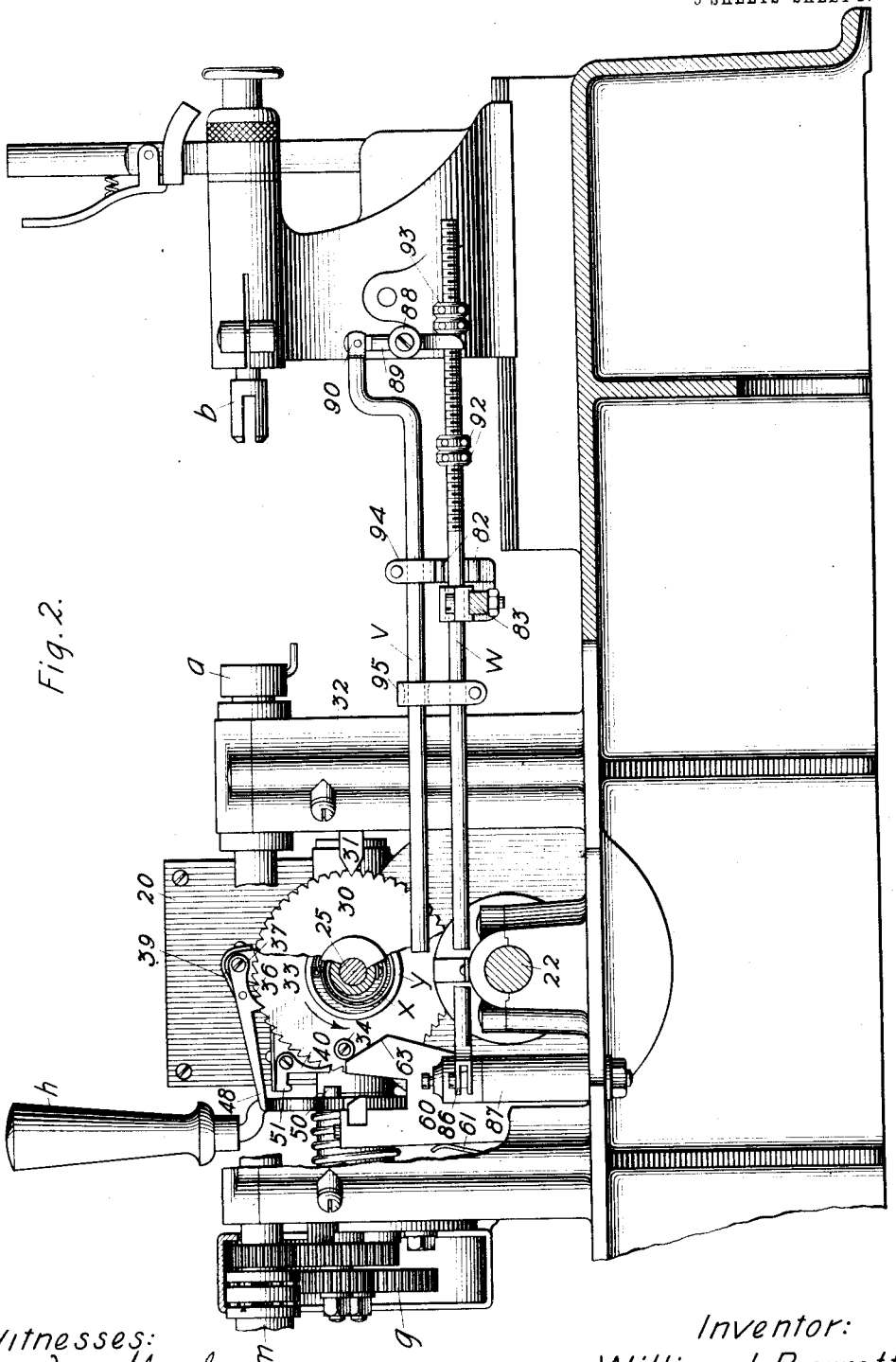



Fig. 2.

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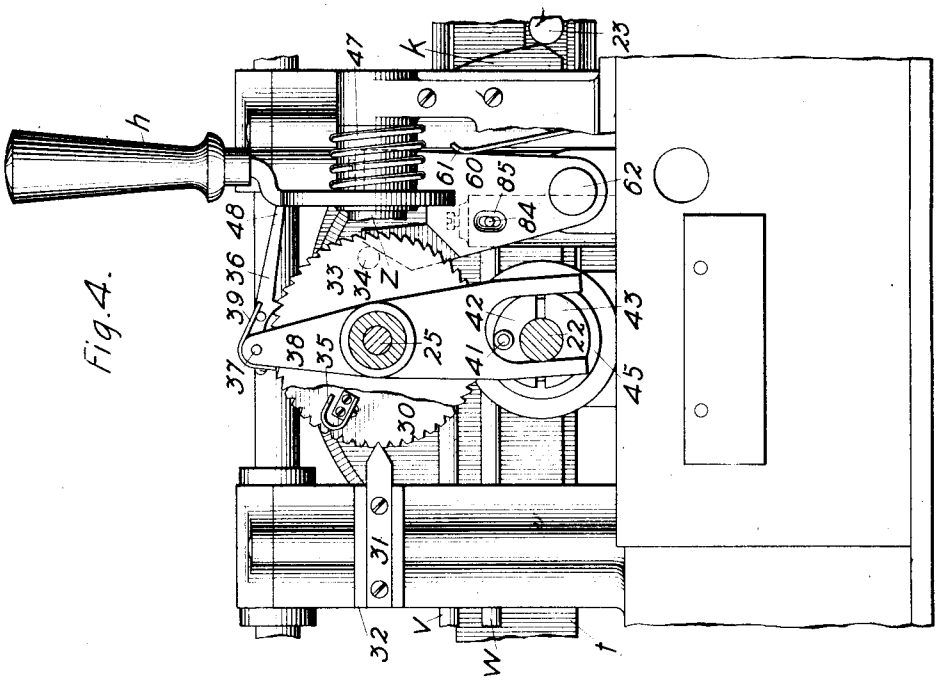



Fig. 4.

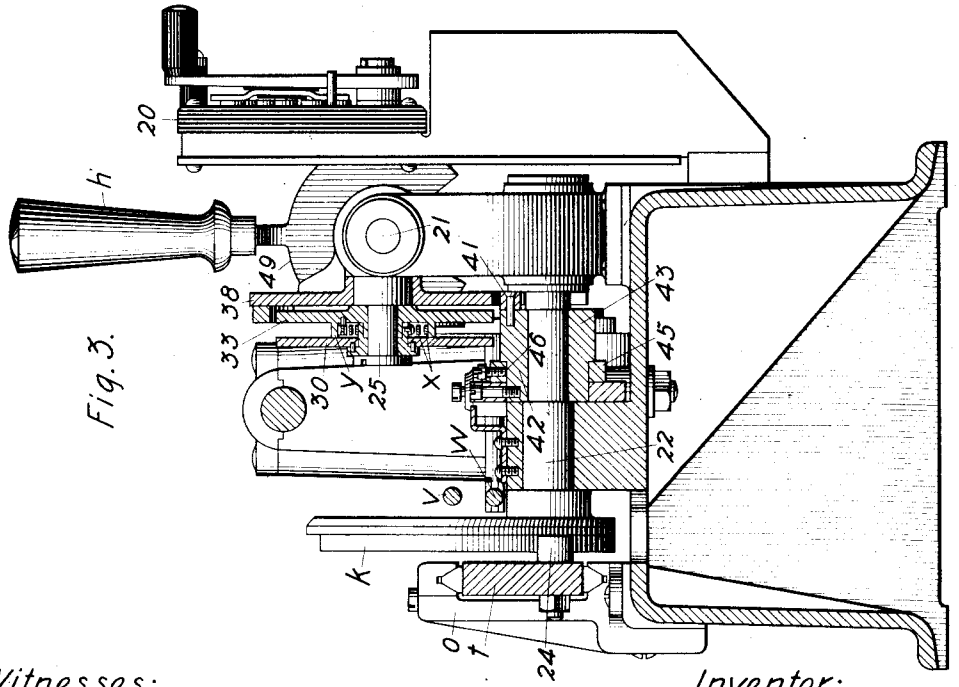



Fig. 3.

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5 SHEETS—SHEET 4.

Fig. 7.

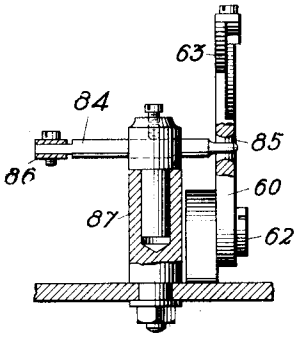



Fig. 6.

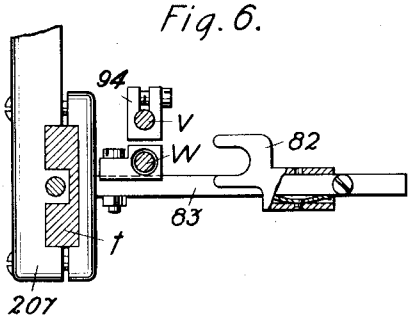
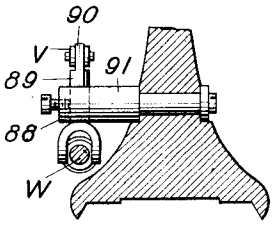



Fig. 5.




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WINDING MACHINE.

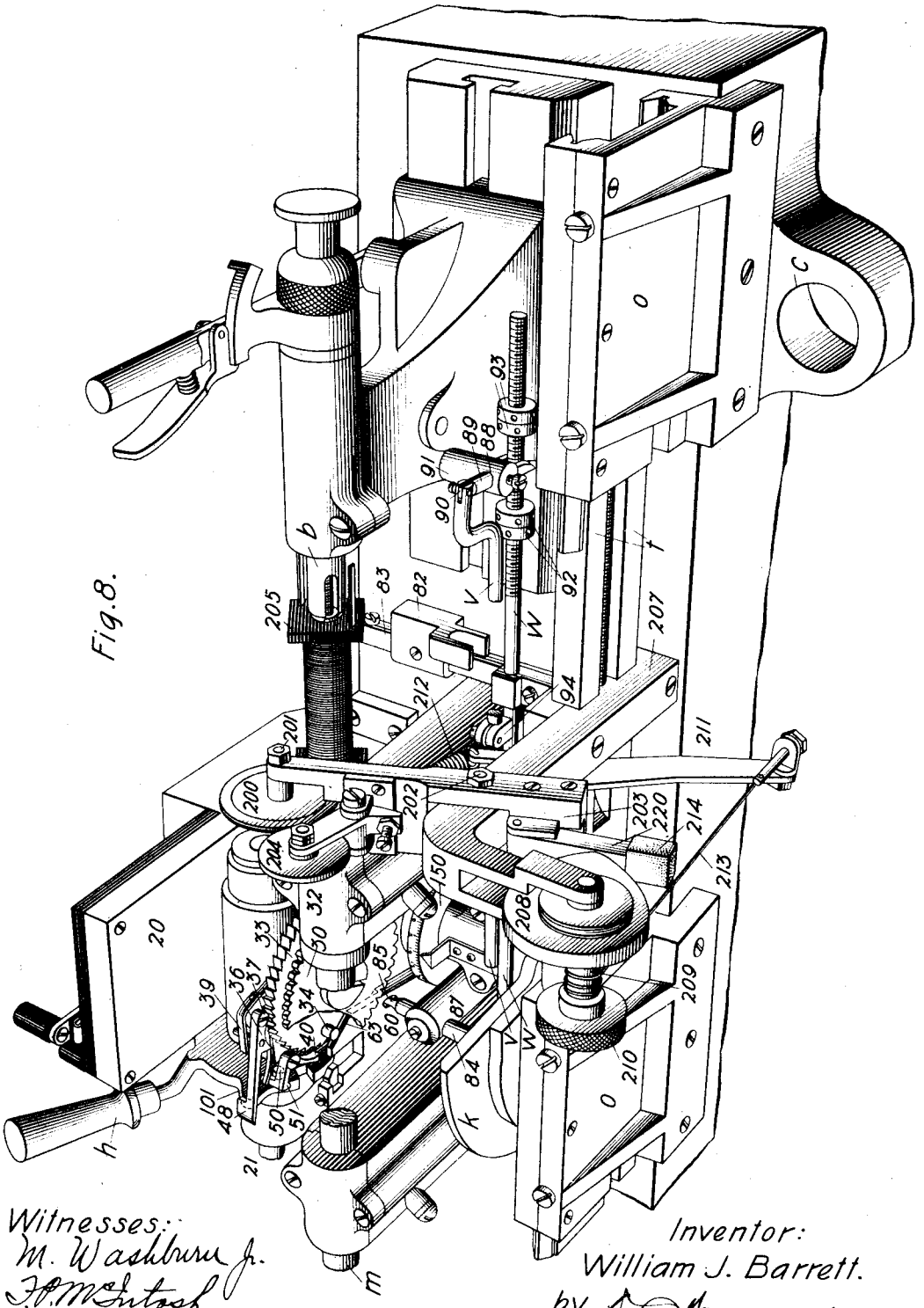
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**1,067,235.**

**Patented July 15, 1913.**

5 SHEETS—SHEET 5.

Fig. 8.




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# UNITED STATES PATENT OFFICE.

WILLIAM J. BARRETT, OF BROOKLYN, NEW YORK, ASSIGNOR TO WESTERN ELECTRIC COMPANY, OF NEW YORK, N. Y., A CORPORATION OF ILLINOIS.

## WINDING-MACHINE.

1,067,235. Specification of Letters Patent. Patented July 15, 1913.

Application filed August 17, 1910. Serial No. 577,638.

*To all whom it may concern:*

Be it known that I, WILLIAM J. BARRETT, citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Improvment in Winding-Machines, of which the following is a full, clear, concise, and exact description.

This invention relates to automatic winding machines, such as are run by power and arrange insulated wire in helical coils on bobbins, automatically stopping when a predetermined number of turns have been wound.

The object of this invention is to provide for stopping the winding when any number of turns have been wound and then if the electrical resistance is not at a fixed point (owing to variation in the wire), automatically winding the required additional number of turns, stopping automatically: and further, to provide automatic means whereby the start to wind is at the end of a bobbin instead of at an intermediate point where the stop may have been made to secure the required number of turns and amount of resistance, and combining with this means a hand operated device to throw the last named means in and out of operation, as with a single simple movement.

The accompanying drawings illustrate the invention.

Figure 1 is a top plan view with part of the main shaft broken away; Fig. 2 is a rear elevation partly in section showing the means whereby the start is automatically made at one end or the other of the bobbin; Fig. 3 is a broken section showing the cam for reciprocating the wire guide, and the means for determining the number of layers wound; Fig. 4 shows the connection between the cam and the gradually advancing tripping device; Figs. 5, 6 and 7 are sectional views of details of construction, and Fig. 8 is a perspective view clearly illustrating the relation of the parts in operation.

The bobbin or core to be wound with wire is placed between the driven head block *a* and the tail block *b* both located on a suitable bed plate, and said core or bobbin is clutched in any suitable manner. Wire is supplied from an overhead reel supported on a rod (not shown) located in socket *e*. The head *a* is driven by an electric motor connected on shaft *m*, which motor is controlled by a starting switch and resistance 20 in manner well known. Shaft *m* is connected to shaft 21 by gearing *g*, and shaft 21 is connected by worm gear (not shown) to transverse shaft 22 on which is fixed cam *k*. Cam *k* engages rollers 23 and 24 on a reciprocating carriage *o* supporting the wire guide 200, which guides the wire so that it lies closely in successive helical turns, in layers, on the bobbin 205. The cam *k* reverses the movement of this guide at each end of its trip from one side to the other; cam *k* turns continuously in one direction and, as shown in Fig. 1, has carried the guide to its extreme right-hand limit.

A tension device, like that shown and described in United States Letters Patent No. 890,244, dated June 9, 1908, issued upon the application of F. H. Loveridge, is employed; and a device to compensate for the increasing diameter of the bobbin to be wound is employed which differs in some respects from that shown in said Loveridge patent. After leaving said tension device the wire passes to the wire guide 200, a companion roller 204 prevents displacement of the wire from the grooved periphery of the guide 200; the guide 200 is rotatably supported at 201, on a lever 203 pivoted at 202, on a standard 207. The upper end of standard 207, is bifurcated and carries a cam wheel 208, on a short shaft 209, in bearings in the standard 207, so that the shaft is free to rotate; on the end of shaft 209 is a disk with a milled periphery 210 for hand manipulation. An arm 211 is pivoted on standard 207 and its free outer end is forced downward by a spring 212. A cord 213 has one end fast on the end of lever 211; it is turned around shaft 209 and its opposite end is fast to said shaft; the arrangement being such that shaft 209 and cam 208 have a tendency to rotate toward the rear side of the machine, but this tendency to rotate is held in check by a brake 214 engaging the periphery of the cam

wheel. The brake is carried on an arm 220, fixed to arm 203. As the diameter of the bobbin 205 increases due to added layers of wire, the guide 200 is raised and withdraws the pressure of the brake 214 on the periphery of cam 208, allowing said cam to rotate or escape gradually, at each added layer of wire, and this maintains a uniform pressure of the wire guide 200 on the surface of the bobbin 205.

To determine the number of layers to be wound before the desired automatic stop occurs, there is a disk 30 loose on shaft or bearing 25; the periphery of disk 30 is toothed and it is held by a stop 31 adjustably fixed on standard 32; disk 30 carries a resilient stop 35 and disk 30 is graduated and can be rotated and set to indicate the required number of to and fro excursions of the wire guide as will be now described. On shaft 25 ratchet wheel 33 is free to rotate; wheel 33 carries a roller stop 34; a spiral spring $x$ connects wheel 33 to shaft 25; the spring $x$ (Fig. 2) is in a box $y$ and returns wheel 33 to its starting position when it is released, after being stepped ahead to the tripping point. When wheel 33 is at its starting point the roller 34 on its surface engages spring stop 35 on the surface of disk 30. The ratchet wheel 33 is advanced step by step by a pawl 36 pivoted at 37 on the oscillating lever 38; a spring 39 holds pawl 36 in engagement with wheel 33, while a holding pawl 40, retains wheel 33 during the time pawl 36 is on its return movement.

The oscillating lever 38 is journaled on the short shaft 25, and its lower end is bifurcated. There is a roller 41 on a two-part disk 42, 43, on shaft 22 held in fixed but adjustable position by a ring or collar 45 and a set screw 46; the roller 41 is between the bifurcations of lever 38 and as shaft 22 rotates, roller 41 engages first one leg of lever 38 and then the other, this advances and withdraws pawl 36 which thus advances ratchet wheel 33, one tooth for each rotation of shaft 22, or each complete rotation of cam $k$, or each complete excursion of the wire guide; so that two layers are wound for the advance of each tooth or space on the periphery of wheel 33. The starting lever is shown at $h$, pivoted on shaft $z$ and in Fig. 8 is shown retracted by spring 47. When moved forward, or to the left Fig. 3, or away from the operator, a projection 101 on lever $h$ passes out from under projection 48 on pawl 36 and a stop 50 on lever $h$ passes from under projection 51 on pawl 40, so that said pawls drop into engagement with wheel 33; when retracted, or moved to the right Fig. 3, lever $h$ raises pawls 36 and 40; so that in its forward position starting lever $h$ releases pawls 36 and 40 and they engage wheel 33, and in its retracted position said lever lifts said pawls out of engagement with wheel 33, and spring $x$ returns said wheel to its initial or starting position.

The starting lever $h$ is held in its forward or running position by lever or plate 60 (Fig. 4) pivoted at 62 and pressed forward by spring 61. Starting lever $h$ has a curved contact edge 49, Fig. 3, which is notched or slotted, as shown in Figs. 2 and 8, and plate or lever 60 has a projecting hardened steel contact-tooth, beveled on its free or contact edge, adjustably secured by a screw. This tooth rides on the curved periphery of lever plate $h$ and enters the notch in lever plate $h$ as said lever is moved forward to start the machine into operation. An inclined edge 63, (Fig. 2), of lever 60, takes a position in the path of roller 34 on ratchet wheel 33; this roller presses lever 60 to the left (Fig. 2) and releases starting lever $h$ which in turn lifts pawls 36 and 40 as described so that wheel 33 returns to its starting point, with stop 34 engaging stop 35. A projection 64 on starting lever $h$ strikes motor-switch holding-catch 65 (Fig. 1) opens the circuit and the machine stops.

The machinery so far described provides for setting the stop mechanism to automatically trip at the end of any number of complete layers, and at an intermediate point in a layer; this is done by setting the disk 30 to automatically stop at the end of a layer and the roller 41 to produce such stop at an intermediate point in a layer. This invention provides an improved means for setting the stop mechanism at an intermediate point in any layer by changing the position of the roller 41 after loosening the screw 46 (Fig. 3) on the ring 45 which clamps the two half disks 42 and 43; a graduated scale 150 being used to determine the position of the parts 42 and 43. This novel invention further provides means to automatically start the winding operation every time at the initial end of the bobbin, or at either end, as may be determined upon without regard to where it may have been stopped intermediately; and to do this without manipulating the driving apparatus or the adjusting devices held by set screws as described; and it is combined with a simple device by which said means for automatically stopping at an end may be thrown in and out of operation by a single movement.

As before stated lever 60 is pivoted at 62, it catches and holds the starting lever $h$ in its forward or running position; lever 60 is tripped when roller 34, on wheel 33, strikes incline 63. Means are provided to trip lever 60 by the movement of the reciprocating two-part carriage $o$, $o$, which carries the rail $t$ and on which is located carrier or standard 207 supporting an arm 83 extending for-

ward, and upon which there is a slide 82 (Fig. 6). There is a fixed post 87 (Figs. 1 and 7) supporting pivoted lever 84; one end of lever 84 enters a perforation 85 in lever 60 (Fig. 4). A horizontally disposed rod *w* (Fig. 1) is pivoted to lever 84 at 86; there is a parallel rod *v* jointed at 90 to a short section 89 (Fig. 2) pivotally supported at 88 in a post 91 (Fig. 1) supported upon the tail block. The lower terminal of section 89 is bifurcated and straddles the screw threaded end of rod *w;* on the screw threaded end of rod *w* are limiting nuts 92 and 93 and there is a check nut for each. The rods *v* and *w* are mutually supported by a stop 95, fixed on rod *w* through which there is a perforation in which rod *v* passes; there is a stop 94 fast on rod *v*. By pushing slide 82 up so that it is in position to engage nut 92 when carriage *o* is moving toward the tail block *b*, rod *w* is moved and through link 84 it moves lever 60. This automatically stops the machine at the limit of the winding operation. By placing slide 82 on the tail block side of stop 94 its upper edge strikes stop 94 on rod *v* and moves rod *v* to the right and rod *w* to the left or toward the block *b*, and lever 60 is tripped as before, but in this case it is tripped when the wire guide is at the opposite end of the bobbin or the opposite end of its movement. Slide 82 is now withdrawn. By changing the position of stop nut 92 or the position of stop 94, the winding may be automatically stopped at either end of the bobbin by advancing slide 82 and the automatic device described is quickly thrown in and out by a single movement of the slide 82 which is located at the front center of the machine and is easily and quickly moved.

In operation a blank spool is inserted between the holding devices *a* and *b*, starting lever *h* is moved forward, and the machine starts. The resistance of the wire is such that it is necessary to stop the winding operation when twenty and one-half layers of helical convolutions have been wound on the spool. This has been provided for by loosening screw 46, Fig. 3, and moving the two-part disk 42, 43, with the contact roller 41 to the predetermined point on the scale 150 so that staring lever *h* will be tripped at that point. When the machine is thus automatically stopped the wound spool is withdrawn. It is necessary to begin the winding for the next spool at one end to have the winding terminate at the half layer, the same as in the case of the spool first wound. We must therefore start at the end. The winding guide is automatically moved to this initial point each and every time by moving up the slide 82 by hand when the first spool is removed and a second spool inserted, then throwing lever *h* forward this starts the machine and it is automatically stopped at the initial end of the blank spool, the end of the wire is then brought into engagement with the blank spool, the machine is started again and again automatically stopped at a half way point when twenty and one-half layers are wound.

This improved device provides a manually operated means for quickly throwing into action an automatic device for completing the excursion of the wire guide over the fractional part of a layer and automatically stopping the wire guide at the same initial point, so that the winding may always start at the same terminal point.

What I claim is:

1. In an automatic winding machine, the combination of a wire guide, means for automatically moving said guide back and forth, means to automatically stop the movement of said guide at an intermediate point in any layer, means adapted to automatically return said guide to its initial starting point at the end of a layer of wire and stop it, and a manually operated device adapted to quickly throw the last named means in and out of action.

2. In an automatic winding machine of the character described, the combination with a traveling wire guide of means for starting the winding; means to automatically stop the winding at an intermediate point in any layer; means to thereafter return the wire guide automatically to the initial starting point and to stop the operation; and a device to quickly throw the last named means into and out of action consisting of a rod adapted to reciprocate to trip the starting device, a slide moving with the wire guide, and a manually operated connecting device for uniting said slide and rod.

3. In an automatic winding machine of the character described, the combination with a traveling wire guide of means for starting the winding; means to stop the winding at an intermediate point in any layer; means to return the wire guide to the initial starting point and automatically stop it; a device to quickly throw said means into and out of action comprising two oppositely moving rods adapted to reciprocate to trip said starting means, adjustable contacts thereon, a device traveling to and fro with the winding guide, and means for manually throwing said device into the line of movement of said contacts.

4. In an automatic winding machine, a traveling wire guide, means for starting the winding, and means for stopping the movement at the end of any layer, in combination with means for stopping the movement at an intermediate point in any layer, comprising a pivoted lever, a two-part disk on

a cam shaft, a roller contact on one part of said disk in position to engage said lever, a mechanical connection between said lever and said starting means, and a clamp for holding the two-part disk in any radial position.

In witness whereof, I hereunto subscribe my name this 15th day of Aug. A. D., 1910.

WILLIAM J. BARRETT.

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