No. 609,300. Patented Aug. 16, 1898.

E. J. SATTERWHITE.

WINDING MACHINE.

(Application filed Sept. 10, 1897.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 1.

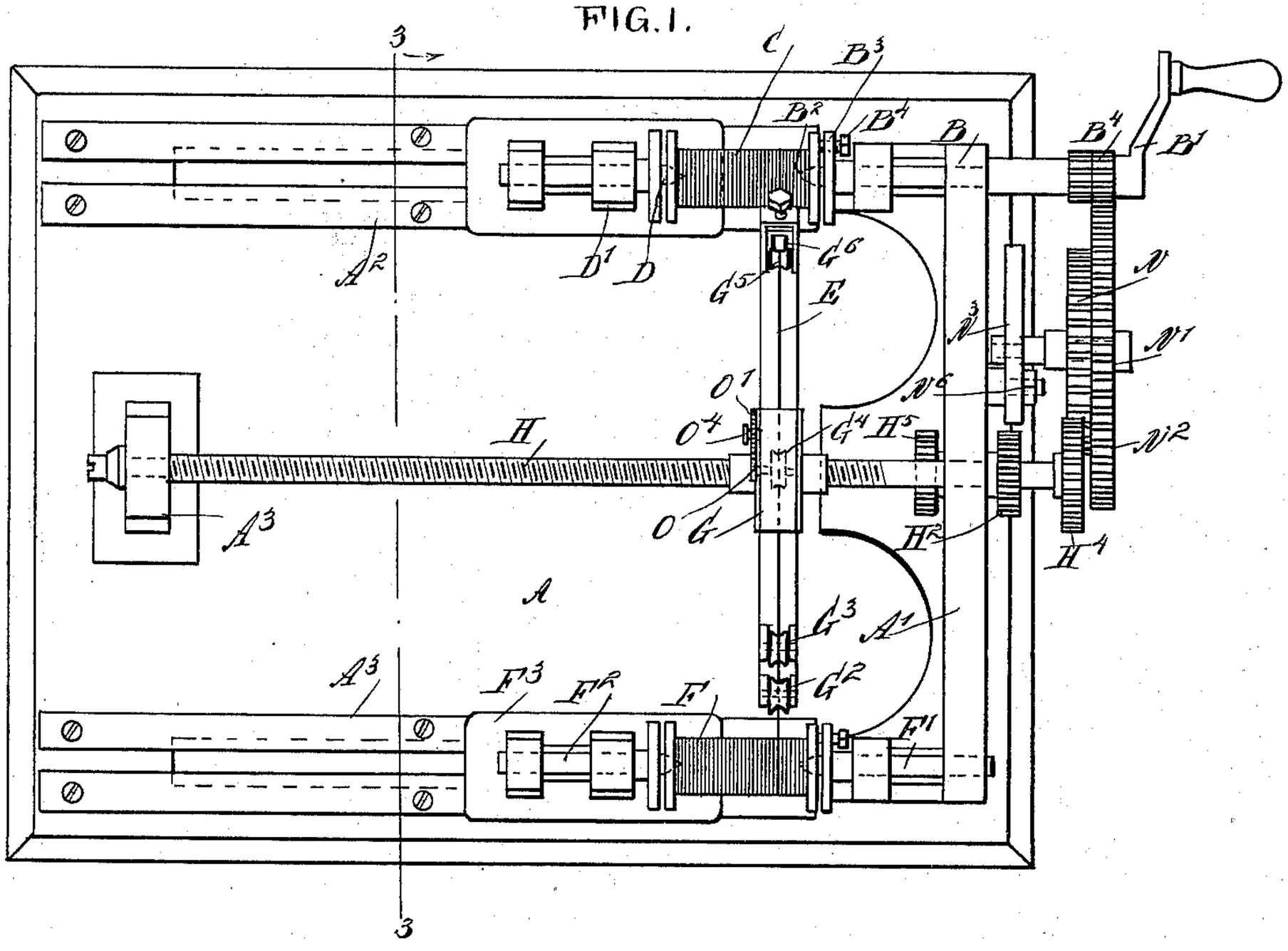

FIG. 2.

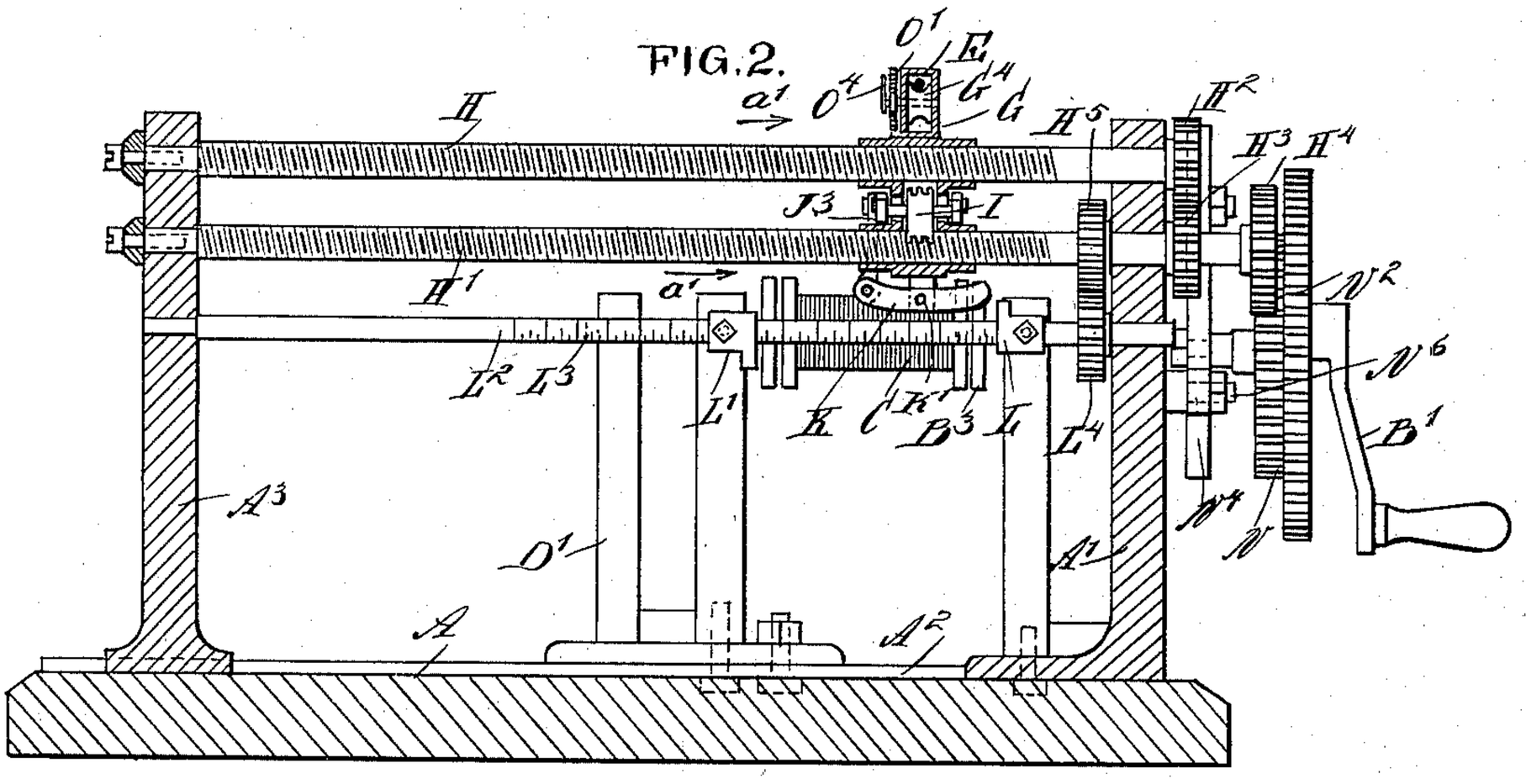

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FIG. 3.

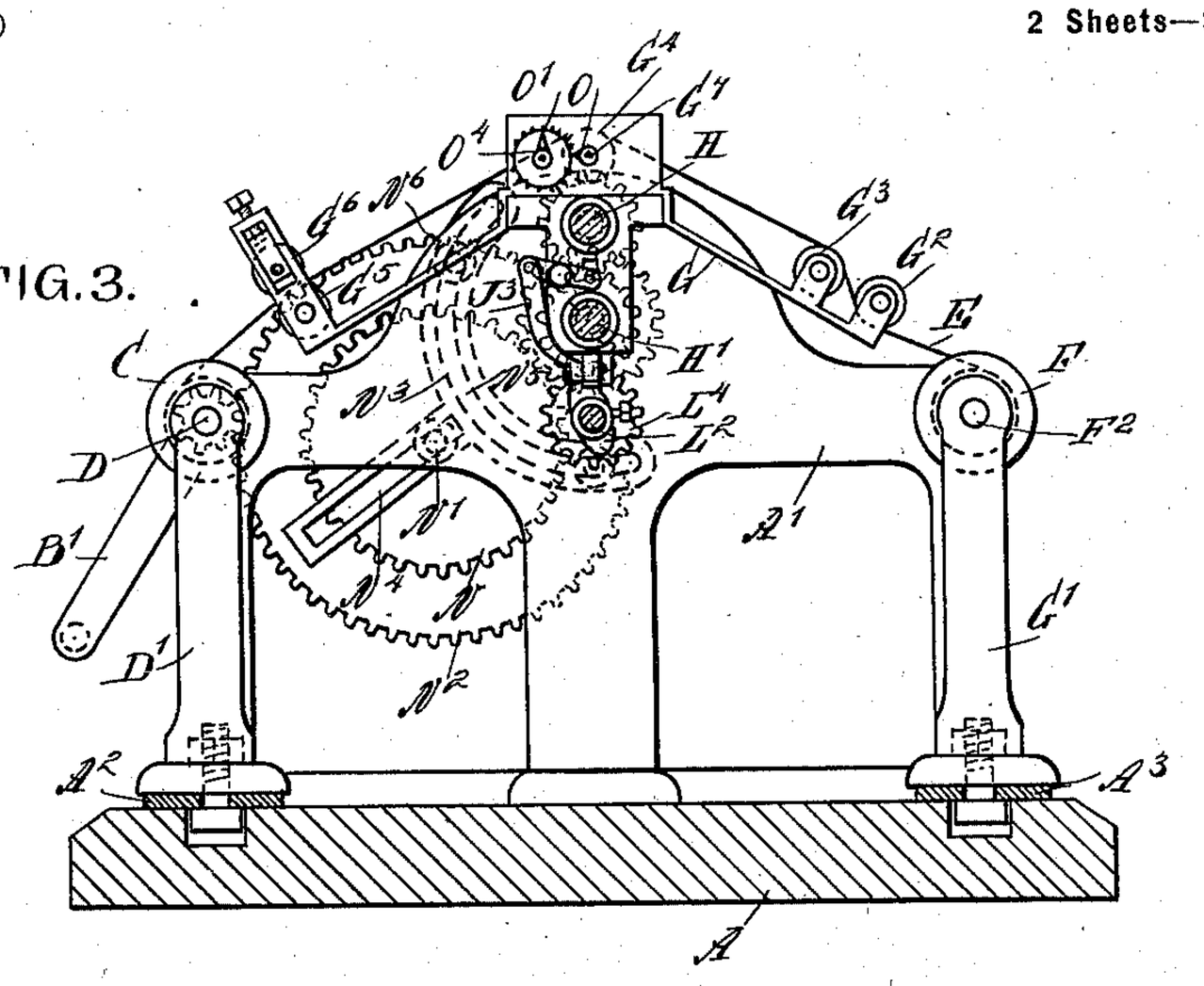


FIG. 4.

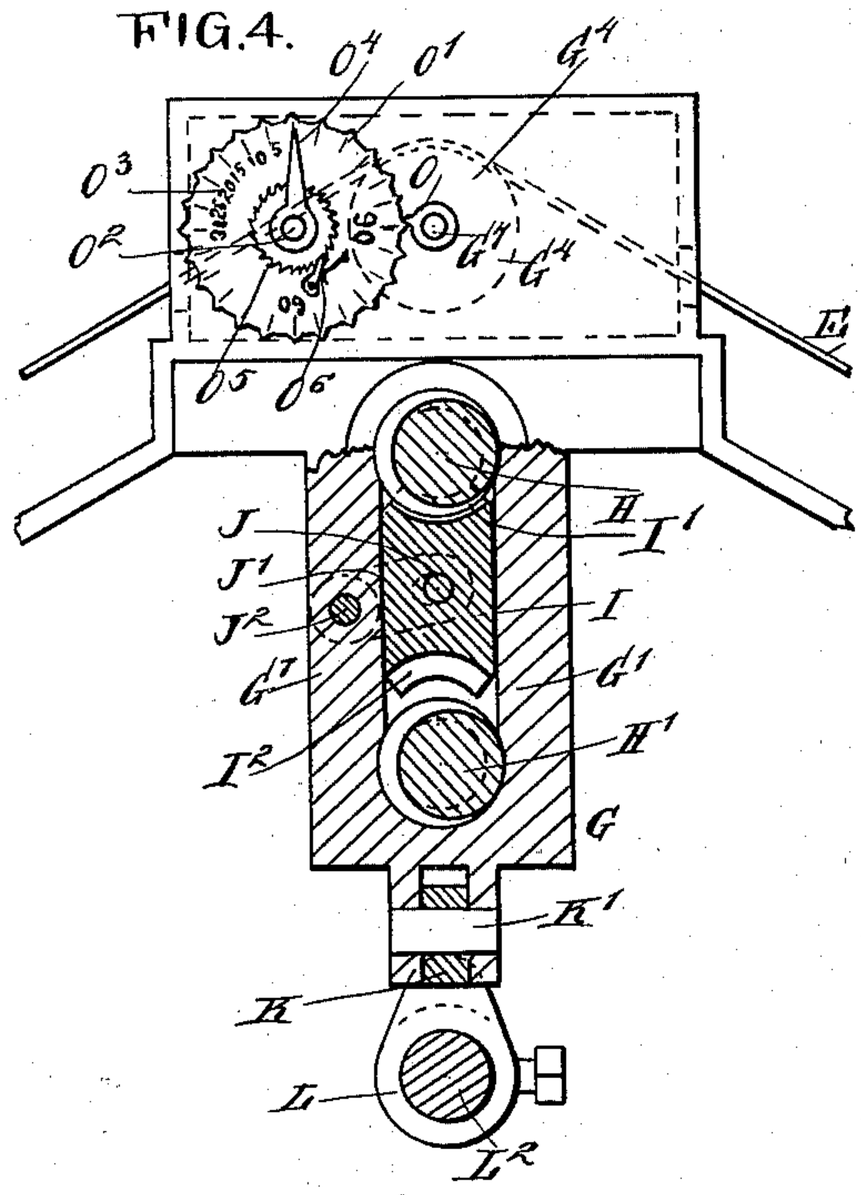
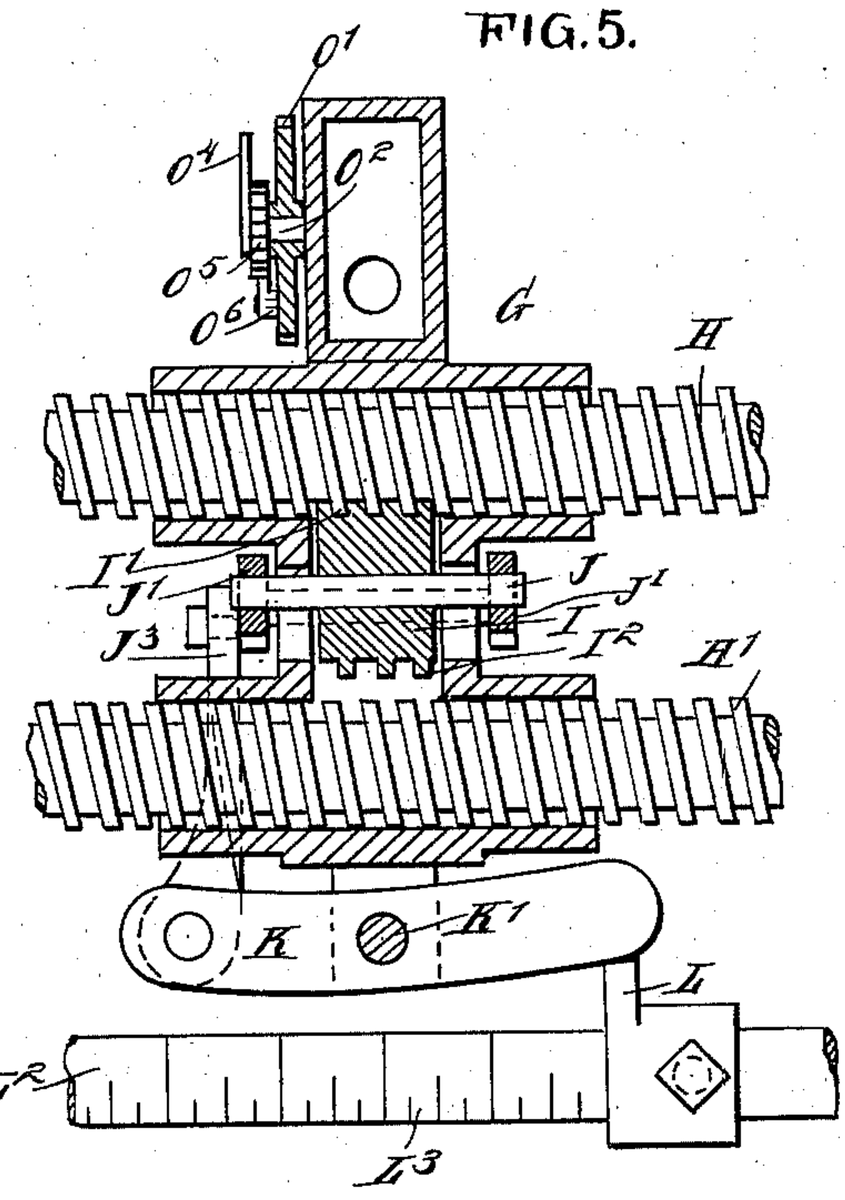


FIG. 5.



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UNITED STATES PATENT OFFICE.

EMMETT J. SATTERWHITE, OF FALLS CITY, NEBRASKA, ASSIGNOR OF TWO-THIRDS TO FRED E. FARINGTON, CHARLES W. FARINGTON, AND THEODORIC F. SULLIVAN, OF RICHARDSON COUNTY, NEBRASKA.

WINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 609,300, dated August 16, 1898.

Application filed September 10, 1897. Serial No. 651,237. (No model.)

To all whom it may concern:

Be it known that I, EMMETT J. SATTERWHITE, of Falls City, in the county of Richardson and State of Nebraska, have invented a new and Improved Winding-Machine, of which the following is a full, clear, and exact description.

My invention relates to machines for winding wire on a core for forming electromagnets; and its object is to provide a new and improved winding-machine arranged to accurately wind the desired amount of wire on a core of the desired length.

The invention consists of certain parts and details and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view of the improvement. Fig. 2 is a sectional side elevation of the same. Fig. 3 is a transverse section of the same on the line 3 3 of Fig. 1. Fig. 4 is an enlarged cross-section of the guide or carrier and adjacent parts, and Fig. 5 is a sectional side elevation of the same.

The improved winding-machine is mounted on a suitably-constructed frame having a base A and a standard A′, in which is journaled a spindle B, provided at one end with a crank-arm B′ or other means for turning the said spindle. The inner end of the spindle B is formed with a center B^2 for engaging a core or spool C, journaled at its other end in a center D, held in a standard D′, longitudinally adjustable in guideways A^2, secured to the top of the base A.

On the spindle B is formed or secured a flange B^3, adapted to be locked to the flange of the core C by a set-screw B^4 or other suitable means, (see Fig. 1,) so that when the spindle B is rotated a rotary motion will be given to the spool C for winding up the wire E, unwinding from a bobbin F, held on centers F′ and F^2, of which the former is mounted in the standards A′, and the other center F^2 is mounted in a standard F^3, held longitudinally adjustable in guideways A^3, attached to the base A opposite the guideways A^2.

The wire E, while passing from the bobbin F to the core C, is engaged by a guide or carrier G, mounted to travel forward and backward, so as to lay the wire in successive layers on the core C, according to the distance between the flanges of the said core. The guide or carrier G is mounted to travel longitudinally on screw-rods H and H′, located one above the other and journaled in suitable bearings in the standards A′ and in a standard A^3, attached to the base A.

Between the screw-rods H and H′ is arranged a double nut I, formed with threads I′ I^2, of which the upper thread I′ is adapted to engage the threads on the screw-rod H, and the lower thread I^2 is adapted to engage the threads on the screw-rod H′. The double nut I is fitted to slide up and down in suitable guideways G′, formed in the guide or carrier G, as is plainly shown in Figs. 4 and 5, and the said nut I is held on a pin J, extending through elongated slots in the guide G to connect at its outer ends with arms J′, secured to a shaft J^2, journaled in suitable bearings in the guide G.

One of the arms J′ has an extension, as is plainly shown in Fig. 3, and this extension is pivotally connected by a link J^3 with one end of a lever K, fulcrumed at or near its middle, at K′, to the lower end of the guide G. The ends of this lever K are rounded off, as plainly shown in Figs. 2 and 5, and are adapted to be alternately engaged by stops L L′, secured by set-screws on a shaft L^2, mounted to turn in suitable bearings in the standards A′ and A^3. On the shaft L^2 is formed a graduation L^3 for setting the stops L L′, according to the distance between the flanges of the core C, on which the wire is to be wound in layers of a length corresponding to the distance between the said flanges.

Now when the several parts are in the position shown in Fig. 2 and the guide G is traveling in the direction of the arrow *a′*, this movement being caused by the nut I being in engagement with the lower screw-rod H′, then the forward end of the lever K will finally be engaged by the stop L, so that the lever receives a swinging motion and draws the link J^3 downward and causes a swinging

of the arms J′ to move the nut I out of engagement with the screw-rod H′ and into engagement with the screw-rod H. As the screw-rods H and H′ turn in opposite directions it is evident that the nut I is caused to travel in the reverse direction of the arrow a', and as the said nut is held in the guide G the latter will always move in the reverse direction of the arrow a'. When the guide G is moved to the left, the lever K finally moves into engagement with the stop L′, so that a swinging motion is again given to the said lever K, but in an opposite direction, so as to move the nut I out of engagement with the screw-rod H and again into engagement with the screw-rod H′. The nut I and guide G will now again travel in the direction of the arrow a', and the above-described operation relatively to the alternate travel forward and backward of the guide G is repeated.

The screw-rods H and H′ rotate in unison, and for this purpose I provide gear-wheels H^2 H^3, secured on the rods H and H′ and in mesh with each other. On the screw-rod H′ is also secured a gear-wheel H^4 in mesh with the gear-wheel N, secured on a stud N′ and rigidly connected with a larger gear-wheel N^2 in mesh with a pinion B^4, secured on the spindle B. Thus when the latter is rotated a rotary motion is given to the core C and at the same time to the gear-wheels N, N^2, and H^4 to rotate the screw-rod H′ and also to rotate the screw-rod H, but in an opposite direction, by the gear-wheels H^3 and H^2. The shaft L^2 is likewise simultaneously rotated with the screw-rods H and H′, and for this purpose the screw-rod H′ is provided with a gear-wheel H^5 in mesh with a gear-wheel L^4, secured on the said shaft L^2.

When winding wire of a different thickness, it is necessary that a different rate of speed shall be given to the guide G from that given to the core C, and for this purpose I make the connection between the pinion B^4 and the gear-wheel H^4 interchangeable by substituting different-sized gear-wheels for the gear-wheels N and N^2. In order to permit such a change, I make the stud N′ adjustable on a frame N^3, adjustably held on the standard A′. This frame N^3 is provided for this purpose with a slotted arm N^4, in which the stud N′ is adjustably secured, and with a slotted segment N^5, secured by bolts N^6 to the standard A′. By mounting different-sized gear-wheels N N^2 on the stud N′, I adjust the latter in the slotted arm N^4 and the said arm on bolts N^6 until the gear-wheels N N^2 connect the pinion B^4 and the gear-wheel H^4 with each other.

The guide G for carrying the wire A is provided on one side next to the bobbin F with friction-rollers G^2 G^3, under which and over which passes the wire from the said bobbin F to and over a pulley G^4, journaled in the top of the said guide G. The wire then passes laterally between the rollers G^5 and G^6, of which the former is journaled in fixed bearings in the guide G, and the other roller G^6 is journaled in adjustable bearings likewise held on the guide G, as is plainly indicated in Fig. 3. This adjustment is necessary for different-sized wires to be wound on the core C.

Now in order to indicate the length of the wire wound upon the bobbin F, I provide the guide G with a tally arranged as follows: On the shaft G^7 of the pulley G^4 is secured a tooth O in mesh with a gear-wheel O′, mounted to rotate loosely on a stud O^2, secured to the guide G. On the face of the gear-wheel O′ is formed a graduation O^3, indicating feet, yards, or like linear measurement, and on the said graduation indicates a fixed pointer O^4, secured on the stud O^2. A ratchet-wheel O^5 is attached to the stud O^2 and is engaged by a spring-pressed pawl O^6, fulcrumed on the gear-wheel O′, adapted to prevent the return movement of the indicating gear-wheel O′.

Now on every revolution of the pulley G^4, which is caused by the traveling wire E, the gear-wheel O′ is moved the distance between two teeth, so that the pointer O^4 indicates the length of the wire that passed over the pulley G^4 during one revolution, the amount being read on the graduation.

Now it will be seen that by the arrangement described the wire E is wound on the core C from the bobbin F and is properly placed in position on the core by the traveling guide G, which moves forward or backward whenever a layer is completed, and at the same time the amount of wire placed on the core is indicated by the pointer O^4 on the graduation O^3, so that the machine can be readily stopped when the desired amount of wire has been placed on said core. The core is then detached from the centers B^2 and D, and a new empty core is put in position thereon, after which the wire is again fed upon this core in the manner above described.

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

1. A winding-machine provided with a traveling carrier, a double nut held on the said carrier, two revoluble screw-rods adapted to be alternately engaged by the said double nut, to move the carrier forward and backward, a lever operatively connected with said double nut and arranged to swing about an axis extending transversely of the screw-rods, and stops adapted to engage said lever and to move it alternately in opposite directions, substantially as shown and described.

2. A winding-machine provided with a traveling carrier, a double nut held on the said carrier, two revoluble screw-rods adapted to be alternately engaged by the said double nut, to move the carrier forward and backward, and a shifting device for the said nut, and comprising arms carrying the nut and fulcrumed on the carrier, a lever connected with the said arm and fulcrumed on the carrier, and stops adapted to alternately engage the said lever, to impart a swinging motion

thereto, for shifting the nut, substantially as shown and described.

3. A winding-machine provided with a traveling carrier, a double nut held on the said carrier, two revoluble screw-rods adapted to be alternately engaged by the said double nut, to move the carrier forward and backward, a shifting device for the said nut, and comprising arms carrying the nut and fulcrumed on the carrier, stops adapted to alternately engage the said lever, to impart a swinging motion thereto, for shifting the nut, and a graduated bar on which the stops are adjustable, to set the stops according to the length of the spool to be wound, substantially as shown and described.

4. A winding-machine provided with screw-rods, mounted to turn in opposite directions, a carrier fitted to slide, a double nut held to slide in the said carrier, and adapted to alternately engage the said screw-rods, a lever fulcrumed at its middle on the said carrier and connected with the nut, to shift the same from one screw-rod to the other, and adjustable stops for engaging the ends of the said lever and rocking the same, substantially as shown and described.

5. A winding-machine provided with screw-rods, mounted to turn in opposite directions, a carrier fitted to slide, a double nut held to slide in the said carrier, and adapted to alternately engage the said screw-rods, a lever fulcrumed at its middle on the said carrier and connected with the nut, to shift the same from one screw-rod to the other, and adjustable stops for engaging the ends of the said lever and rocking the same, the said stops being mounted on a shaft rotating in unison with the said screw-rods, substantially as shown and described.

6. A winding-machine provided with screw-rods, mounted to turn in opposite directions, a carrier fitted to slide, a double nut held to slide in the said carrier, and adapted to alternately engage the said screw-rods, a lever fulcrumed at its middle on the said carrier and connected with the nut, to shift the same from one screw-rod to the other, adjustable stops for engaging the ends of the said lever and rocking the same, and means, substantially as described, for rotating the said screw-rods in unison, as set forth.

7. A winding-machine, provided with a spindle for rotating the core on which the material is to be wound, a guide for delivering the wire to said core, the said guide being mounted to travel forward and backward, revoluble screw-rods rotating in unison, intermediate interchangeable gear mechanism for rotating the said screw-rods from the said spindle, and a nut adapted to be moved alternately in engagement with the said screw-rods, to move the carrier alternately forward and backward, substantially as shown and described.

8. A winding-machine, comprising a reciprocating carrier, a shifting mechanism located upon the carrier to change the direction of its travel, and rotary stops each located at one end of the path of the carriage and adapted to engage and operate said shifting mechanism.

EMMETT J. SATTERWHITE.

Witnesses:
F. E. FARINGTON,
L. E. BOYLE.