No. 835,202.

PATENTED NOV. 6, 1906.

A. D. SCOTT.

WINDING MACHINE.

APPLICATION FILED APR. 6, 1904.

4 SHEETS—SHEET 1.

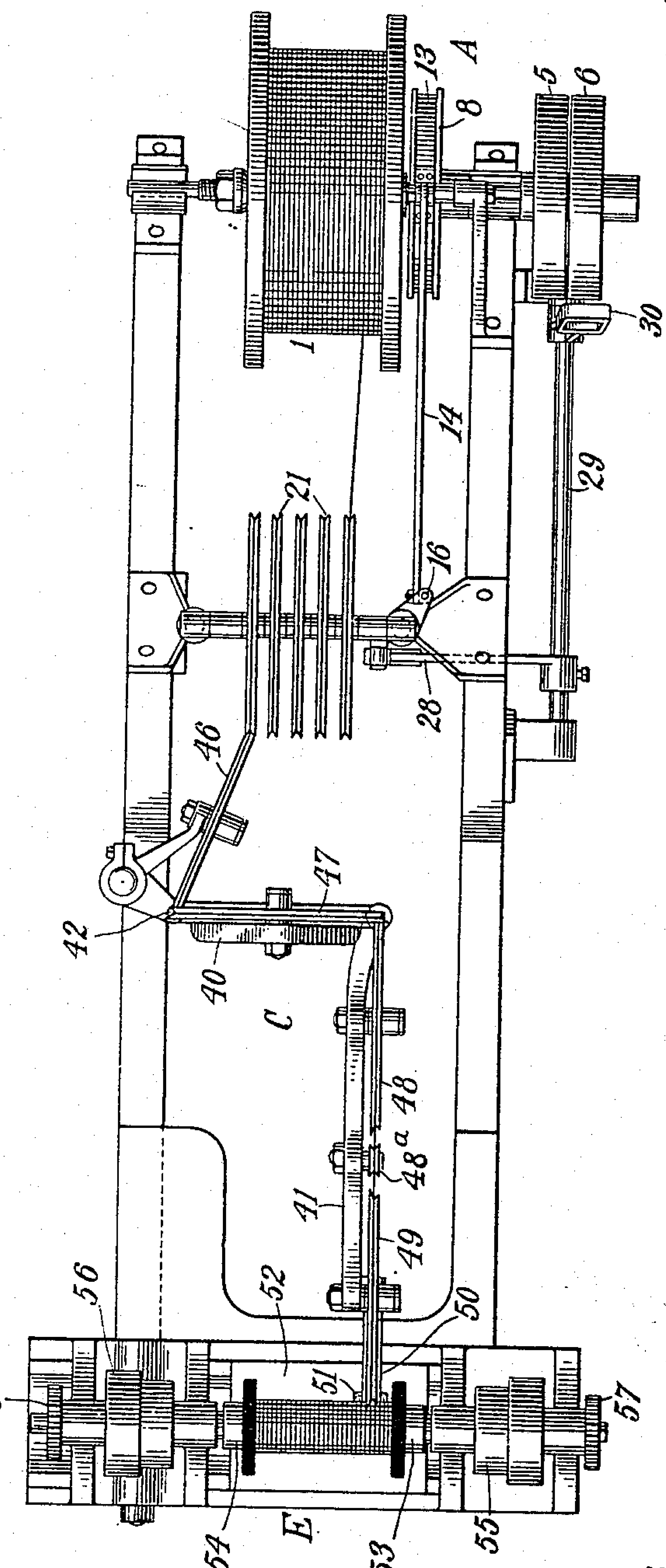

Fig.1.

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See Varley, 798641, 33

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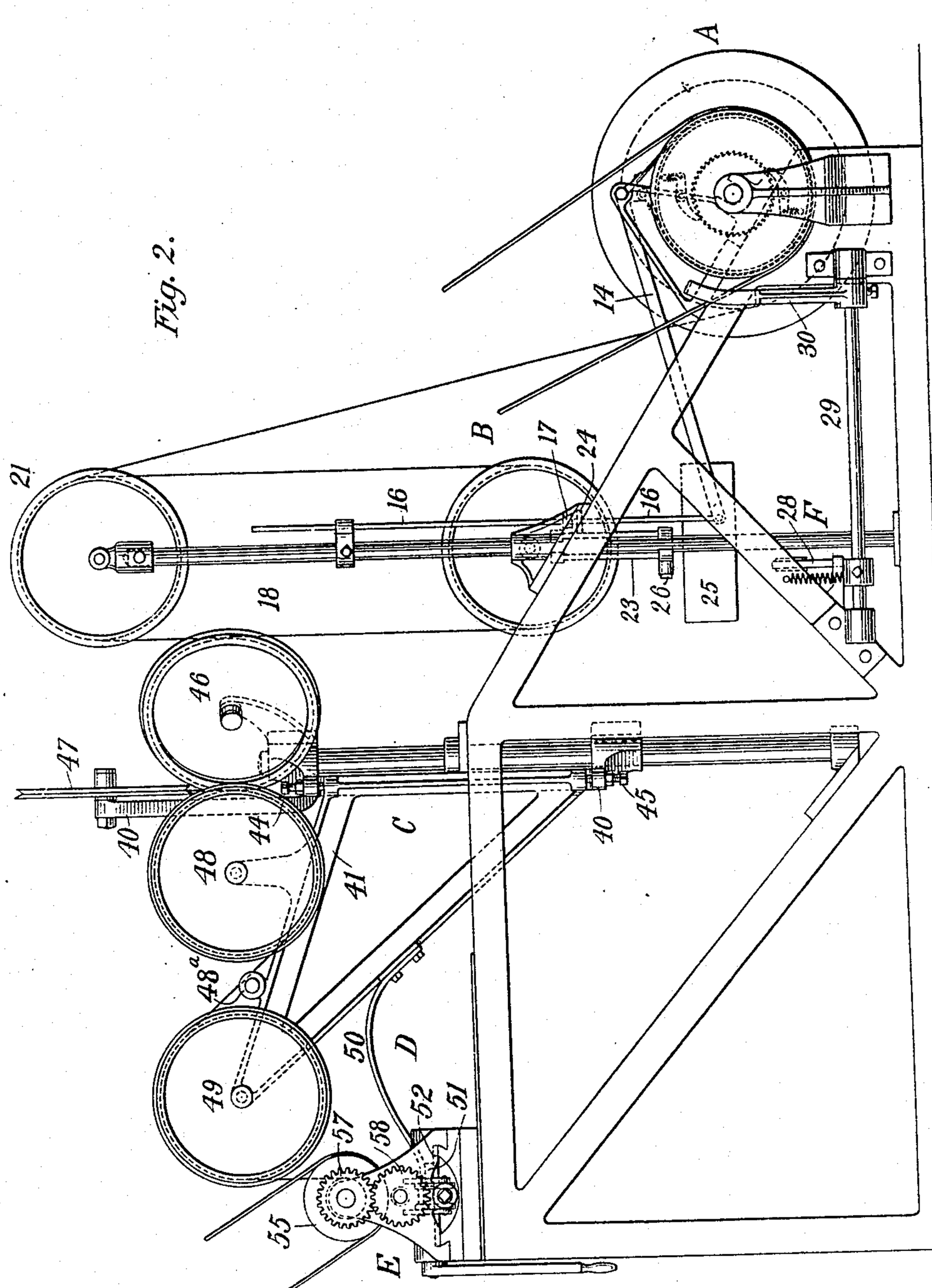
4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 4.

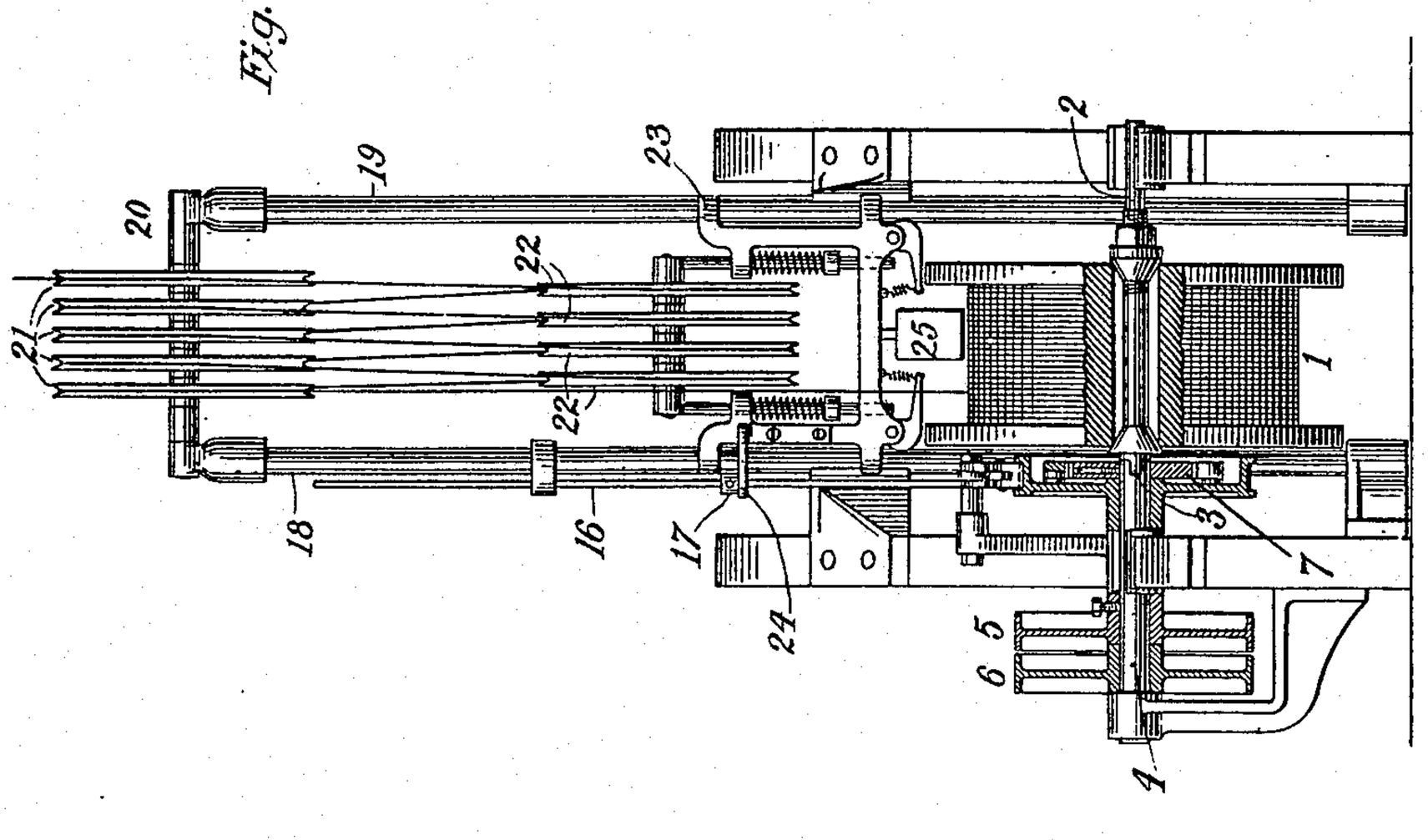
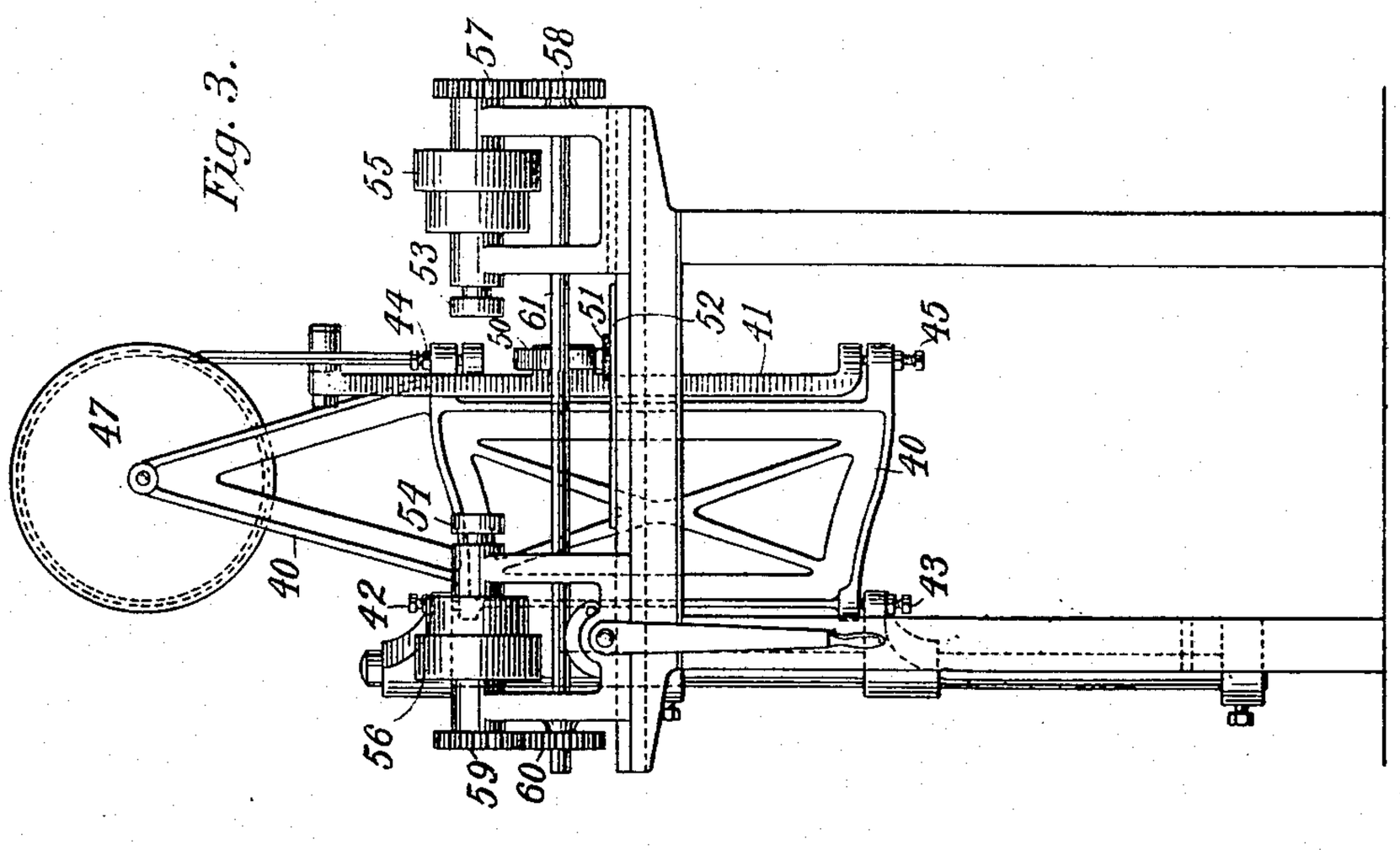


Fig. 3.



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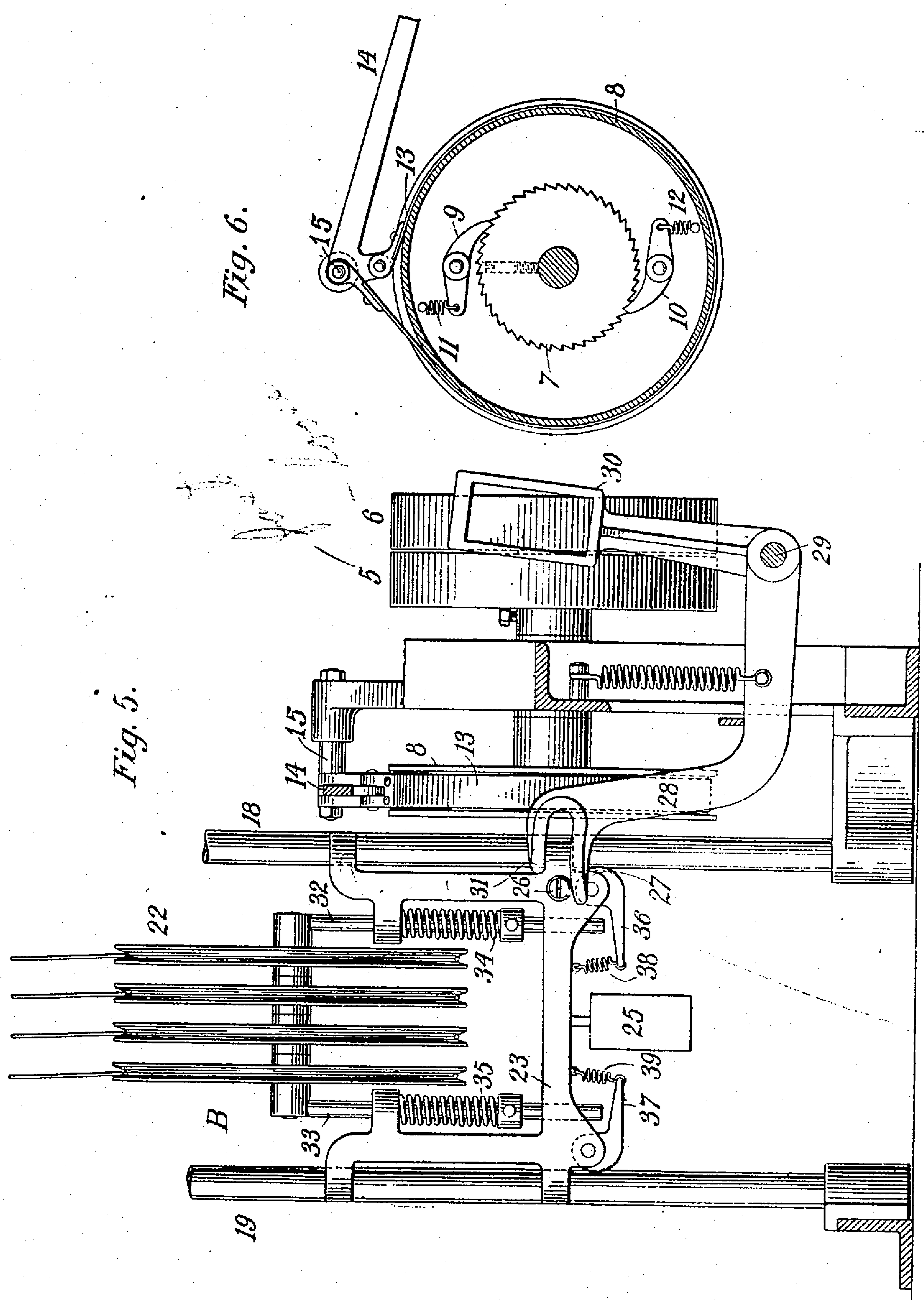
4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

ARCHIBALD D. SCOTT, OF PROVIDENCE, RHODE ISLAND.

WINDING-MACHINE.

No. 835,202. Specification of Letters Patent. Patented Nov. 6, 1906.

Application filed April 6, 1904. Serial No. 201,832.

To all whom it may concern:

Be it known that I, ARCHIBALD D. SCOTT, a citizen of the United States, and a resident of Providence, county of Providence, and State of Rhode Island, have invented a new and useful Improvement in Winding-Machines, of which the following is a specification.

This invention is primarily intended as an improvement upon the apparatus described in my Patent No. 807,133 for the winding of insulated wire into coils for electrical purposes, and contains such modifications of the apparatus shown in my application of even date herewith as to adapt the same particularly for the winding of wire of comparatively large gage.

In the accompanying drawings, Figure 1 is a plan view of my present apparatus. Fig. 2 is a side view of the same; Fig. 3, a front view of the same with the bobbin removed; Fig. 4, a rear view with a small portion broken away. Figs. 5 and 6 are details.

For convenience of description my machine may be divided into the following general parts—viz., the supply-spool tension mechanism A and B, (shown in Figs. 1, 2, and 4,) the crane mechanism C, (shown in Figs. 1, 2, and 3,) the crane lagging device D, (shown in Figs. 1 and 2,) the spindle mechanism E, (shown in Figs. 1 and 2,) and the supply-spool-reversing mechanism F. (Shown in Figs. 1, 2, and 5.)

Although the various general divisions of the machine hereinafter specifically described are preferably employed in combination, some of them may nevertheless be omitted and the balance operated in the machine with more or less success. Moreover, in describing the details of these various general parts of the machine I do not wish to be understood as thereby limiting my claims to such details unless so specified.

The tension mechanism A and B may be described as follows: 1 is the supply-spool, fixed to the removable shaft 2, having at 3 a tongue-and-groove connection with the permanent shaft 4, carrying the fast and loose pulleys 5 and 6. 7 is a ratchet-wheel fast to the shaft 4. 8 is a brake-pulley loose on the shaft 4. 9 and 10 are two pawls pivoted to the web of pulley 8 and held in engagement with the ratchet 7 by the springs 11 and 12. 13 is a band-brake applied to the periphery of the pulley 8 and operated by the lever 14, fulcrumed to the pin 15. 16 is a vertical rod mounted adjacent to the double column 18 and 19 and pivoted to the lever 14 and carrying a collar 17. 18 19 represent the double column, across the top of which extends the bearing 20 for the series of guide-wheels 21. 22 is a corresponding series of guide-wheels mounted upon a carriage 23, sliding freely upon said column. 24 is a finger fixed to said carriage and so located as to contact with the collar 17 in the movement of said carriage. 25 is a weight suspended by said carriage. The weighted carriage 23 is supported by the wire which extends from the supply-spool 1 to and repeatedly around the series of wheels 21 and 22. The descent of said weighted carriage acts as a take-up of the wire paid off of the supply-spool, and when said descent has proceeded far enough so that the finger 24 is carried out of contact with the collar 17 the descent of the rod 16 permits the lever 14 to apply the brake 13 and prevent the supply-spool from paying out any more wire until the weighted-carriage take-up has been raised by the progress of the winding sufficiently for the finger 24 to raise the collar 17 and again release the brake. The connection and the coaction between the brake and the supply-spool will be readily apparent, inasmuch as said supply-spool is fixed to the removable shaft 2, which in turn is connected with the shaft 4, on which shaft is made fast the ratchet-wheel, as aforesaid. The ratchet-wheel 7 is connected with the pulley 8 by the pawls 9 and 10, and the band-brake applied to the periphery of the pulley 8 operates through the above-mentioned parts to act upon the supply-spool 1.

The supply-spool-reversing mechanism F may be described as follows: When the reversal of the bobbin has returned enough wire to permit the weighted carriage 23 to descend to the point where the pin 26, fixed to the carriage, strikes the projecting lower lip 27 of the forked lever 28, which is fulcrumed at 29 and carries the shipper 30, it produces the movement of said lever necessary for transferring the belt from the movable pulley 6 to the fixed pulley 5 and starts the shaft 4 in reversed direction. The pawl-and-ratchet connection between the shaft 4 and the brake-wheel 8 enables the brake-wheel to remain stationary while the shaft is

turning in said reversed direction. Since the supply-spool 1 will rewind the wire faster than it is unwound from the bobbin, it will raise the weighted frame 23 and cause the pin 26 to move the lever 28 by contacting with the upper lip 31 of its fork, thus shifting the belt back again to the movable pulley 6. In this manner during the reverse winding the weighted frame 23 acts as a take-up of the wire returning from the bobbin and also automatically controls the reversed movement of the supply-spool, so that it rewinds the wire as fast as required.

The safety-clutch is provided to prevent the fall of the weighted carriage in case the wire should suddenly be released, either by breakage or the loosening of the bobbin end thereof. This consists in mounting the bearings for the series of pulleys 22 on the rods 32 and 33, which are normally held by the tension on the wire in the position shown in Fig. 5, so as to hold the coiled springs 34 and 35 under compression. The relaxing of the tension of the wire for any cause will permit said coiled springs to force said rods downward, so that their lower ends shall force the dogs 36 and 37 into clutching engagement with the column members 18 and 19 and support the carriage until the wire is repaired or again secured to the bobbin. The dogs 36 and 37 are normally held out of engagement with the column members by the springs 38 and 39.

The crane mechanism C consists of the members 40 and 41. The member 40 is braced, as shown, and the member 41 is of triangular form, so that each member is of a construction affording the greatest stiffness for the least weight. The crane member 40 is mounted between the fixed centers 42 and 43 and in turn carries the centers 44 and 45, between which the crane member 41 is mounted. The fixed guide-wheel 46 and the guide-wheel 47, mounted on the crane member 40, are so positioned that the strand of wire passing between them is in alinement with the centers 42 and 43. The guide-wheel 47 and the guide-wheel 48 on the other member of the crane are so positioned that the strand of wire passing between them is in alinement with the centers 44 and 45. I provide a small guide-roller, as at 48ª, to support the strand of wire running from the wheel 48 to the wheel 49, the latter being a winding guide-wheel mounted on the front of the crane. All of said guide-wheels 46, 47, 48, and 49 overhang their bearings and are provided with flanges of different depths, as shown, so as to facilitate the placing of the wire upon them by the operator.

The crane lagging device D, whereby the movements of the crane are caused to lag behind the strand of wire being wound, may consist of a spring-finger 50, fixed to the crane member 41 and provided with a leather pad 51, pressed by the spring of said finger against the horizontal plate 52. Said pad is preferably located in alinement with the strand of wire running from the winding-guide 49 to the bobbin. In this manner as the winding-guide 49 makes its traverses the strand running from the guide to the bobbin being wound moves in a substantially vertical plane parallel to the axis of the bobbin, the lagging force of the friction of the pad 51 on the plate 52 is exerted substantially in said plane.

The spindle mechanism E consists of the head and tail chucks 53 and 54, between which the coil-receiver or bobbin is clamped and which are driven and provided, respectively, with the cone-pulleys 55 and 56, driven by a belt from an overhead countershaft, the direction of movement of which is reversible. The two chucks are geared together by the gears 57, 58, and 59 60 and the shaft 61.

The operation is as follows: Since the crane supports the axis of the winding guide-wheel 49 in such manner as to have substantial freedom of movement in a horizontal plane, the strand of wire being wound will control the position of said guide not merely during the several traverses, but also by the contact of the strand with the heads of the bobbin it will control the change from one traverse to the next. This control causes the strand running from the guide-wheel to the bobbin to move in planes substantially parallel with the axis of the bobbin, and the lagging mechanism tends to retard the movement of the guide in these planes, so that the strand keeps very slightly ahead of the wheel. This tends to prevent the piling up of the wire at the end of the traverse. In large gages of wire a very powerful tension is requisite; but the construction is such that any degree of tension that may be required can be supplied by the weight 25. As soon as the winding has proceeded far enough to raise the weighted frame 23 to a point where a further supply is required from the supply-spool said frame by releasing the brake from the supply-spool will permit such additional wire to be furnished without in any way interrupting the winding or substantially varying the tension of the wire. If the wire being wound is defectively insulated, it will be necessary to reverse the belt driving the bobbin to enable the wire to be unwound and repaired. This reversing may be done in any suitable manner, as by moving a shipper-rod, such as is employed in reversing an engine-lathe. Whenever the operator reverses the belt driving the bobbin, the descent of the weighted frame 23 will automatically reverse the supply-spool to the extent that may be necessary to rewind the wire given off by the

bobbin. If at any time the wire becomes broken or disconnected from the bobbin, the safety-clutch will hold the weighted frame from falling.

The multifolding of the wire for the support of the weighted frame possesses many advantages, such as the storage of a greater quantity of wire to meet the demands of both the forward and backward winding and also the decrease of the strains upon the wire due to the inertia or momentum at starting or stopping of either the spindle or the supply-spool.

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

1. In a winding-machine, the combination with the frame thereof, of a revolving coil-receiver adapted to receive the material to be wound, a winding-guide, a frame supported by the multifolding of the material being wound, and guides along which said frame is adapted to slide.

2. In a winding-machine in combination, a revolving coil-receiver, a winding-guide, a sliding member supported by the material being wound, the movements of which member pay out or take up the material under tension, guides for the sliding member and means whereby the supply-spool is controlled by said member.

3. In a winding-machine in combination, the revolving coil-receiver, the winding-guide, a member supported by the material being wound, the movements of which member pay out or take up the material under tension, a brake on the supply-spool, and means whereby said brake is controlled by said member without substantial variation of tension.

4. In a winding-machine, the combination with the frame thereof, of a material-supplying device, a revolving coil-receiver, and means for paying out or taking up the material under tension, such means including guides and a member sliding on said guides interposed between the material-supplying device and the revolving coil-receiver, said member being supported by the material extending from the supplying device to the coil-receiver.

5. In a winding-machine, the combination with the frame thereof, of a supplying device, a coil-receiver, a winding-guide, guides, and a movable frame sliding on said guides and located between the supplying device and the winding-guide and supported by the material being wound, the movements of said frame paying out or taking up the material under tension.

6. In a winding-machine, in combination, the revolving coil-receiver, the winding-guide, a member, the movements of which pay out or take up the wire under tension, mechanism for reversing the supply-spool and means whereby said mechanism is controlled by said member.

7. In a winding-machine, in combination, the revolving coil-receiver, the winding-guide, a reciprocating member, the movements of which pay out or take up the wire under tension, and means whereby the movement of said member is arrested by the relaxing of tension.

8. In a winding-machine, in combination, the revolving coil-receiver, the winding-guide, a member, the movements of which pay out or take up the wire under tension, a brake on the supply-spool and mechanism for reversing the supply-spool and means whereby both said brake and said mechanism are controlled by said member.

9. In a winding-machine, in combination, the revolving coil-receiver, the winding-guide, a reciprocating member, the movements of which pay out or take up the wire under tension, means whereby the movement of the supply-spool is controlled by said member and mechanism whereby the movement of said member is arrested by the release of tension.

10. In a winding-machine, in combination, the revolving coil-receiver, the winding-guide, mechanism for supporting the guide whereby its traversing movements are substantially free to be controlled by the pull of the strand being wound and a guide lagging device.

11. In a winding-machine, in combination, the revolving coil-receiver, the winding-guide, mechanism for supporting the guide whereby its traversing movements are substantially free to be controlled by the pull of the strand being wound, a guide lagging device operating in approximate alinement with the strand being wound.

12. In a winding-machine, in combination, the revolving coil-receiver, the winding-guide, mechanism for supporting the guide whereby its traversing movements cause the strand to move in substantially vertical planes parallel to the axis of the coil-receiver and are substantially free to be controlled by the pull of the strand being wound, a supply-spool holder and a member interposed between said holder and said supporting mechanism by the movements of which the wire is paid out or taken up without substantial variation of tension.

13. In a winding-machine, in combination, the revolving coil-receiver, the guide, mechanism for supporting the guide whereby its traversing movements cause the strand to move in substantially vertical planes parallel to the axis of the coil-receiver and are substantially free to be controlled by the pull of the strand being wound, a member by the movement of which the wire is paid out or taken up and means whereby the supply-

spool is controlled by the movements of said member without substantial variation of tension.

14. In combination, a coil-receiver, a supply-holder, a member suspended by the strand and means whereby the movement of the supply-holder in taking up or paying out strand is controlled by said member.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ARCHIBALD D. SCOTT.

Witnesses:
J. A. MILLER, Jr.,
ADA E. HAGERTY.