No. 802,359. PATENTED OCT. 17, 1905.

C. F. NICKEL.

WINDING MACHINE.

APPLICATION FILED APR. 27, 1904.

3 SHEETS—SHEET 1.

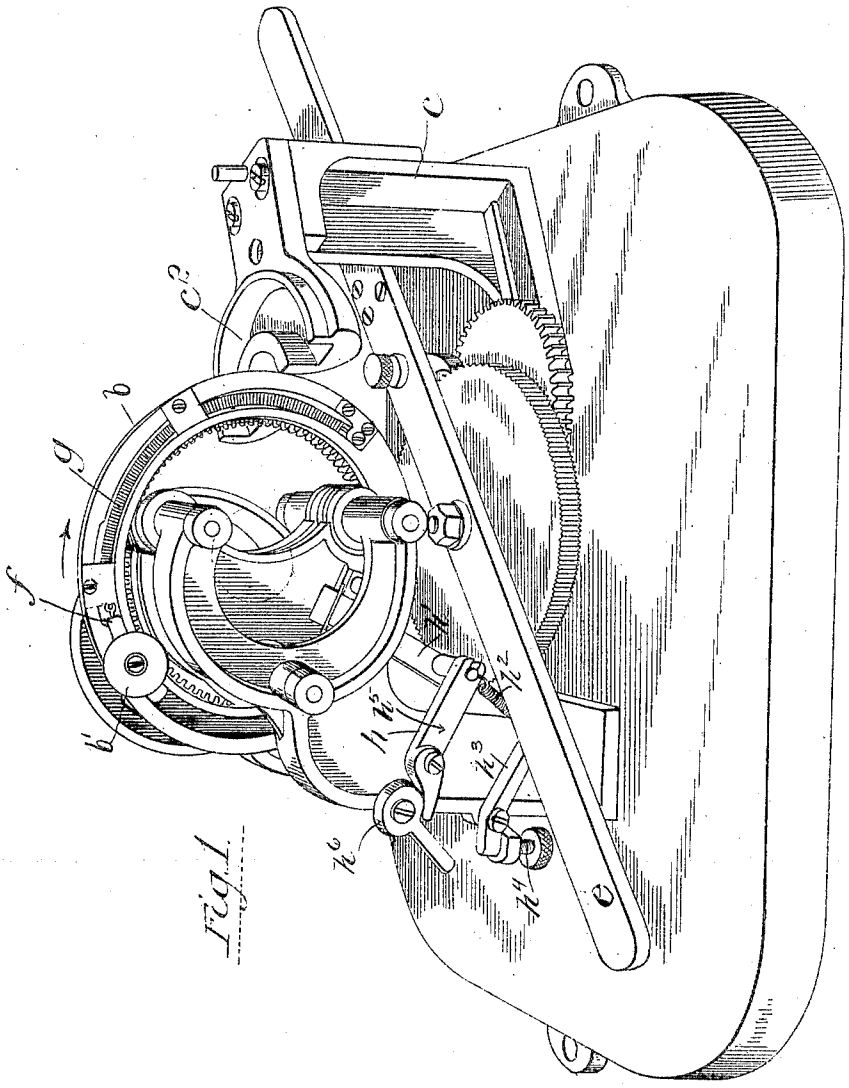

Fig. 1.

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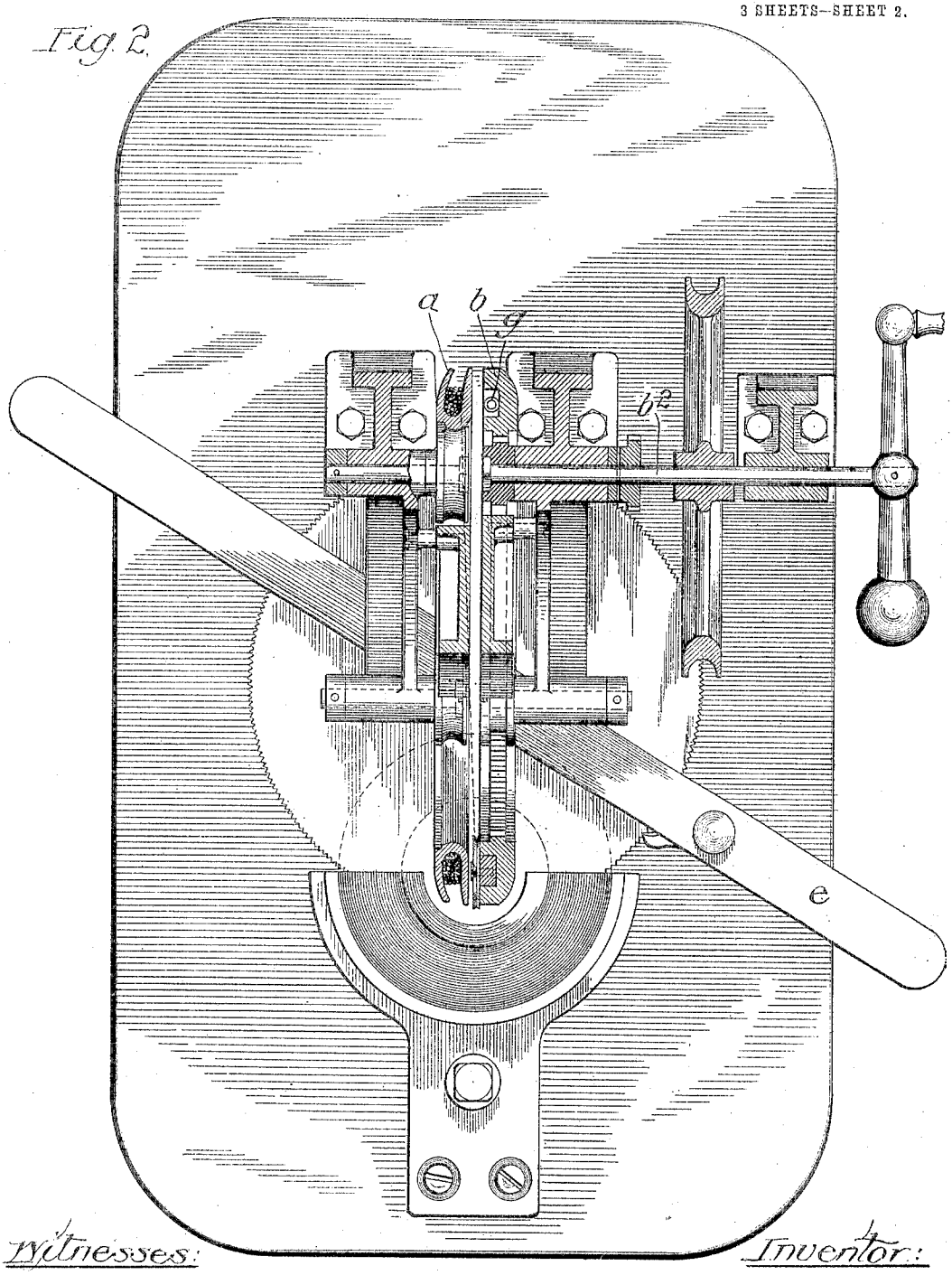
3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

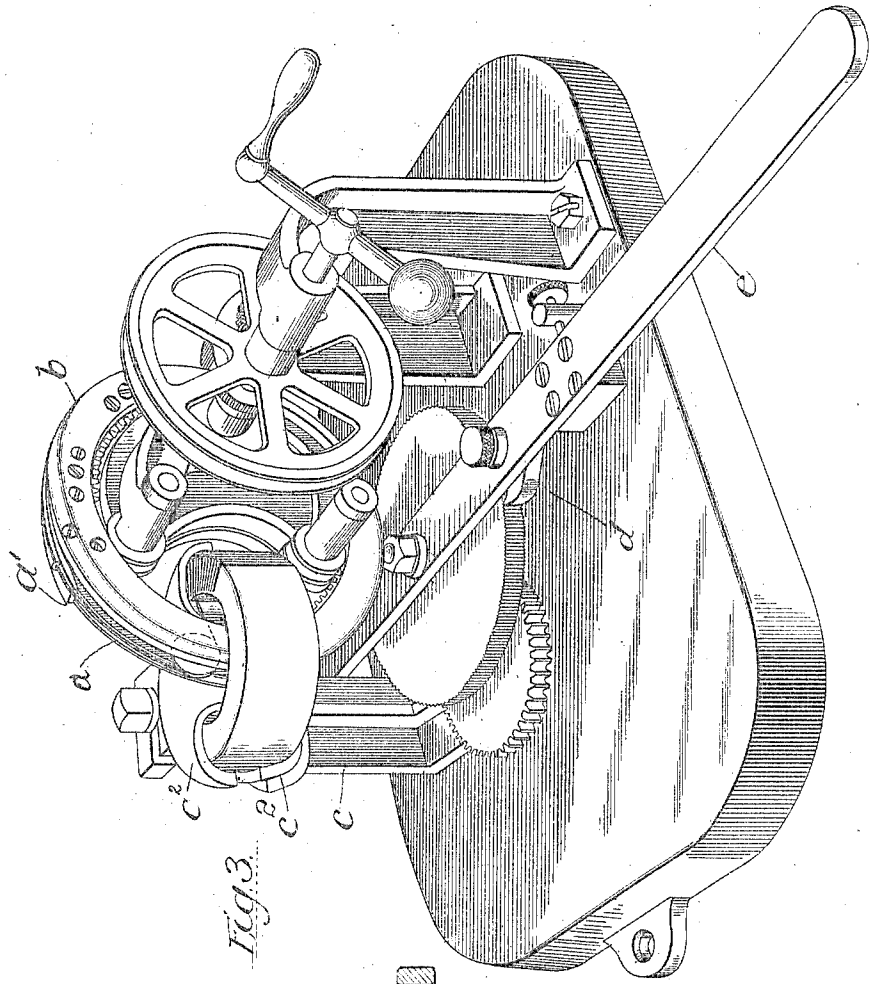

Fig. 3.

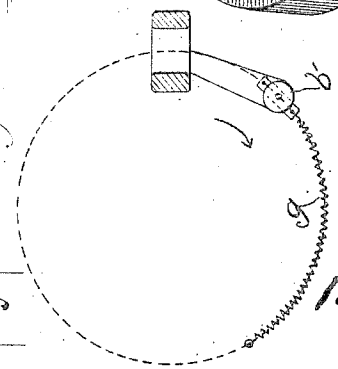

Fig. 4.

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UNITED STATES PATENT OFFICE.

CHARLES F. NICKEL, OF NEW YORK, N. Y., ASSIGNOR TO WESTERN ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

WINDING-MACHINE.

No. 802,359. Specification of Letters Patent. Patented Oct. 17, 1905.

Application filed April 27, 1904. Serial No. 205,090.

To all whom it may concern:

Be it known that I, CHARLES F. NICKEL, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Improvement in Winding-Machines, of which the following is a full, clear, concise, and exact description.

My invention relates to a machine for winding wire upon closed cores, the machine being particularly adapted for winding "loading-coils" for telephone-circuits. Such coils consist of a ring-shaped core of laminated iron having two wire helices wound upon semicircular segments thereof. It has been my object to construct an improved machine for winding closed cores in which the wire being wound will at all times be held under a constant and uniform tension and the formation of slack wire prevented.

My invention contemplates a winding-machine having a spool-ring and a winding-ring mounted close together, so as to rotate independently of each other, said rings being adapted to be interlinked with a closed core and a guide being provided over which the wire to be wound is led from the spool-ring to the core. The guide is suitably mounted within the winding-ring, so as to be capable of movement about the circumference thereof, and is provided with a yielding connection with the winding-ring, whereby as the winding-ring is rotated the guide is allowed to move in its mounting sufficiently to maintain the wire being wound under a constant and uniform tension and take up any slack which may tend to form.

I will describe my invention particularly by reference to the accompanying drawings, and the parts, improvements, and combinations which I consider novel will be pointed out in the appended claims.

Figure 1 is a view in elevation of a machine for winding closed cores, with the spool-ring removed to show the means which I have devised for preventing the formation of slack wire. Fig. 2 is a plan view of the machine. Fig. 3 is a perspective view of the machine, taken from the side opposite to that shown in Fig. 1; and Fig. 4 is a diagrammatic view illustrating the operation of my improved device in preventing the formation of slack wire.

The same letters of reference are used to designate the same parts wherever they are shown.

The principal operating parts of the machine are the spool-ring a and the winding-ring b, which are mounted side by side, so as to rotate independently of each other, both of said rings being provided with removable segments, so that a closed core may be interlinked therewith, the winding-ring carrying a winding sheave or pulley b' substantially in the central plane between the two rings. The wire to be wound upon the core is led from the spool-ring a, upon which it is first wound in the usual way over the bridge-piece a', around the winding-sheave b', carried by the winding-ring b, and thence to the core. The winding-ring b may be rotated by a suitably-driven shaft b^2, which may operate a pinion meshing with internal gear of the winding-ring. The winding-ring is adapted to carry the winding-sheave around and through the core, and in its rotation the wire is pulled off the spool and wrapped around the core, the spool being arranged to be frictionally rotated by the pull of the wire as it is wound to feed the same.

The core to be wound is held horizontally in a standard c by clamps c^2 c^2, the standard being pivoted to the bed-plate of the machine in such a way that the core may be rotated about a vertical axis coinciding with the axis of the core while the machine is in operation to guide the wire which is being applied to said core through a semicircumference. The standard may be rotated by means of a gear-train actuated by a ratchet-pawl d, carried upon an oscillating hand-lever e. When one half of the core has been wound, it may be taken out of the holding-clamps c^2 c^2 and turned around, whereupon the other half may be wound in the same manner.

During the operating of the machine it will be noted that the wire is pulled off the spool-ring a, while the sheave or pulley b' is moving away from the coil at a rate much faster than during the other half of the revolution, while the guiding-sheave is moving toward the coil. This would tend toward the formation of slack wire, due to the fact that more wire is pulled off the spool than is called for by the semicircumference of the coil, and in

order to avoid this difficulty the winding-sheave b' is journaled upon a support f, slidably mounted in the side of the winding-ring b, the winding-sheave b' thus lying approximately in the central plane between the two rings a b. The support f is provided with a yielding connection with the winding-ring, which may be a spring g, as illustrated. Said spring is attached to the support f and passes partially around the circumference of the winding-ring b, being anchored to said ring, the spring preferably lying in a slot formed in the side of the winding-ring b.

When the machine is in operation and the winding-ring rotating in the direction of the arrow, Figs. 1 and 4, as the winding-sheave moves away from the core being wound the spring extends or elongates and allows the support f to move back, due to the pull of the wire being wound, far enough so that too great a strain will not be placed upon the wire, but so that the same will be under sufficient tension to maintain the wire taut. As the guide-sheave moves around and is approaching the core, the spring g contracts and pulls the sheave rapidly toward the core, thus taking up the slack which is tending to form and at the same time maintaining the tension upon the wire uniform. With a machine of this construction very fine wire may be wound without danger of breaking, as the wire will not be subjected to sudden and severe strains, but will be kept under an even and uniform tension while being wound.

In order to prevent the spool-ring from rotating any faster than is required by the amount of wire to be pulled off by the movement of the guide-sheave through a given arc, a braking mechanism or drag h is applied thereto. Said drag h may comprise a brake-arm h', normally maintained by a spring h^2 in position to effect the engagement of a brake-shoe carried thereby with the inner surface of the spool-ring. The power of said brake may be regulated by a lever h^3 and thumb-screw h^4, controlling the pull of said spring upon the brake-arm. Said arm is also secured to one end of a pivoted lever h^5, the other end whereof is adapted to be engaged by a cam-roller h^6 to remove the brake-shoe from contact with the spool-ring when desired.

I claim—

1. In a winding-machine, the combination with a rotatable ring adapted to be interlinked with an annular core, of a guide adapted to lead the wire onto the core, said guide having a relatively movable mounting upon said ring, and a yielding connection between said guide-mounting and said ring.

2. In a winding-machine, the combination with a rotatable ring adapted to be interlinked with an annular core, of a guide adapted to lead the wire onto the core, a support for said guide slidably mounted upon said ring, and a spring connecting said guide-support to said ring.

3. In a winding-machine, the combination with a rotatable ring adapted to be interlinked with an annular core, of a guide-sheave adapted to lead the wire onto the core, a support for said sheave upon which the same is journaled, said support being slidably mounted upon said ring, and a helical spring connecting said support to said ring, said spring lying in a groove formed in the side of said ring.

4. In a machine for winding closed cores, the combination with a spool-ring and a winding-ring adapted to be interlinked with a core to be wound, said rings being mounted to rotate independently, means for rotating said rings, a guide over which the wire to be wound is led from the spool-ring to the core, said guide being movably mounted upon said winding-ring, and a yielding connection between said guide and the winding-ring, said guide moving as the winding-ring is rotating to maintain the wire under a substantially constant tension.

5. In a machine for winding closed cores, the combination with a spool-ring and a winding-ring adapted to be interlinked with a core to be mounted, said rings being mounted to rotate independently, driving mechanism for the winding-ring, a guide over which the wire is led from the spool-ring to the core, means for rotating said spool-ring to feed the wire, a support for said guide slidably mounted upon said winding-ring, and a cushion-spring for said guide, said guide-support being moved by the spring as the winding-ring rotates to maintain the wire under a uniform tension and prevent the formation of slack.

6. In a machine for winding closed cores, the combination with a spool-ring and a winding-ring adapted to be interlinked with a closed core, said rings being mounted to rotate independently, driving mechanism for the winding-ring, a guide-sheave over which the wire is led from the spool-ring to the core, means for rotating said spool-ring to feed the wire to be wound, a support for said guide-sheave slidably mounted upon said winding-ring, and a helical spring secured to said support and anchored to the winding-ring, said guide-sheave being moved by the spring as the winding-ring rotates to maintain the wire under a uniform tension and prevent the formation of slack.

7. In a machine for winding closed cores, the combination with a spool-ring and a winding-ring having removable segments whereby they may be interlinked with a core to be wound, said rings being mounted side by side to rotate independently, driving mechanism for the winding-ring, the spool-ring being rotated by the pull of the wire to feed the same, a guide-sheave over which the wire to be wound is led from the spool-ring to the core,

a support for said sheave mounted in the side of said winding-ring to be movable about the circumference thereof, and a helical spring secured to said support and anchored to the winding-ring, said spring lying in a groove formed in the side of the winding-ring; whereby as the winding-ring is rotated the guide-sheave is moved by the pull of the wire being wound and said spring to maintain the wire under constant tension and prevent the formation of slack.

In witness whereof I hereunto subscribe my name this 8th day of March, A. D. 1904.

CHARLES F. NICKEL.

Witnesses:
H. S. SALT,
A. L. SALT.