(No Model.)

3 Sheets—Sheet 1.

A. J. OEHRING.

INSTRUMENT WINDING DEVICE.

No. 598,273. Patented Feb. 1, 1898.

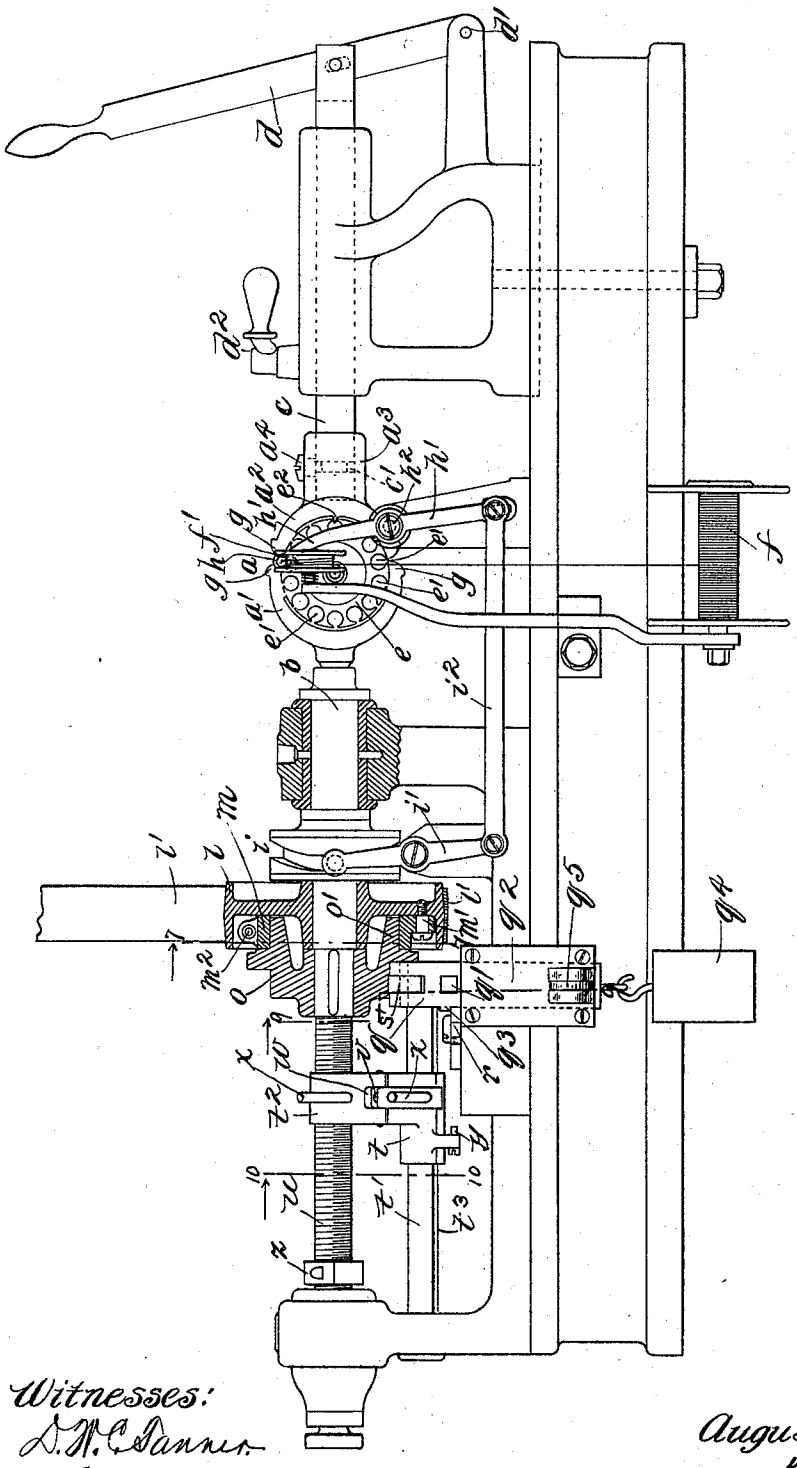


Fig. 1.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.)

3 Sheets—Sheet 2.

A. J. OEHRING.

INSTRUMENT WINDING DEVICE.

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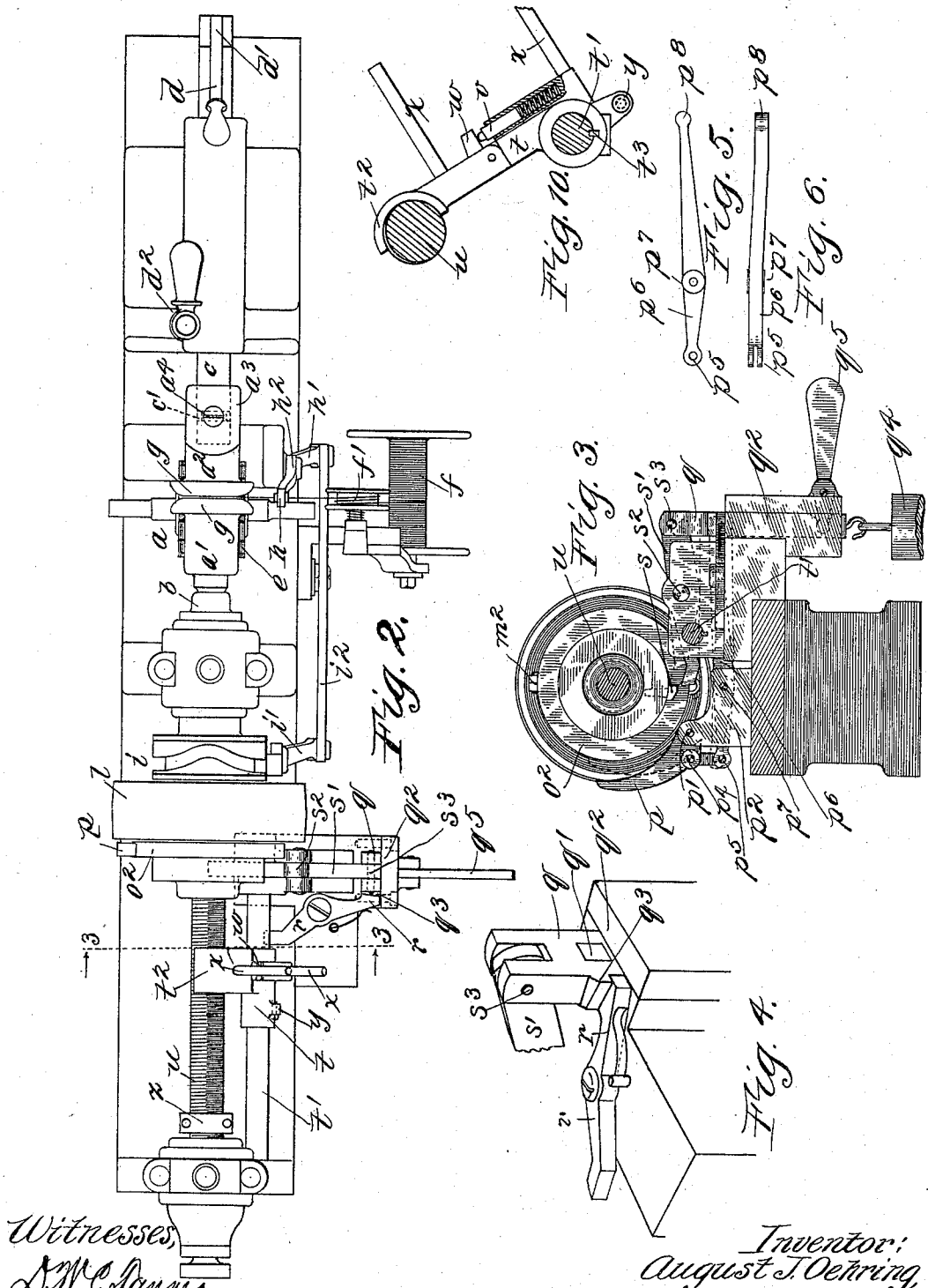


Fig. 2.

Fig. 10.

Fig. 5.

Fig. 6.

Fig. 3.

Fig. 4.

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(No Model.) 3 Sheets—Sheet 3.

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INSTRUMENT WINDING DEVICE.

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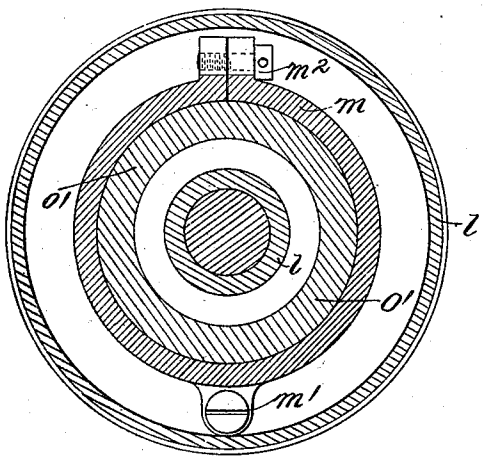


Fig. 7.

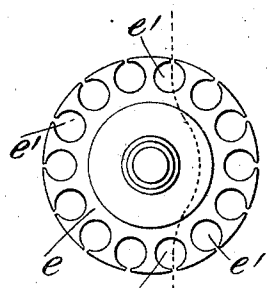


Fig. 8.

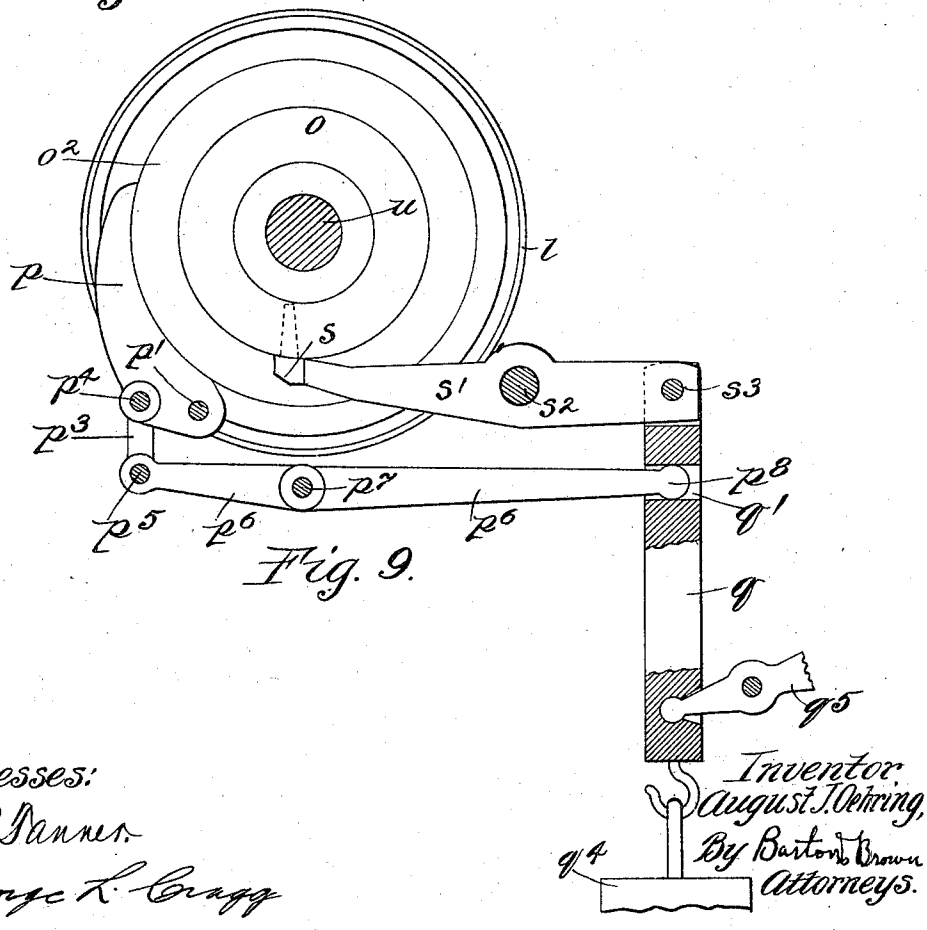


Fig. 9.

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UNITED STATES PATENT OFFICE.

AUGUST J. OEHRING, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

INSTRUMENT-WINDING DEVICE.

SPECIFICATION forming part of Letters Patent No. 598,273, dated February 1, 1898.

Application filed November 28, 1896. Serial No. 613,780. (No model.)

To all whom it may concern:

Be it known that I, AUGUST J. OEHRING, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Instrument-Winding Devices, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to electrical instruments, and has for its object the provision of improved means for winding electrical conductors about the cores of electromagnets.

In an application of Henry H. Wait, Serial No. 615,707, filed December 14, 1896, is shown and described a device for winding the cores of electrical instruments, consisting in its preferred form of a rotatably-mounted chuck adapted to secure a core in position, said chuck being provided with guiding-lips to direct the conducting-wire upon the core or within the recesses provided in the core. In my application, Serial No. 608,605, filed October 12, 1896, I have shown and described improvements upon the device set forth in the said application of Wait, the essential features thereof being a magnetized chuck adapted to secure the core in position, additional guides to direct the wire upon the core, and a counting device for numbering the rotations of the core to insure the same number of turns in two or more distinct coils of wire upon the core.

The operator in using either of the above appliances has to exercise considerable care in manipulating the wire and in preserving the number of turns in the distinct coils uniform.

My present invention consists of a machine having as its principal features automatic means for directing the wire into the guides associated with the core, and automatic means for discontinuing the winding of a coil when a predetermined number of turns of wire have been received thereby.

The machine of my invention has additional novel features, which will be hereinafter pointed out.

My invention will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of an electrical instrument-winding machine made in accordance with my invention. Fig. 2 is a plan view thereof. Fig. 3 is a transverse sectional view taken on line 3 3 of Fig. 1. Fig. 4 is a perspective view of a portion of the brake-operating mechanism. Fig. 5 is an elevation of a lever employed in connection with the mechanism shown in Fig. 4. Fig. 6 is a plan view of the lever shown in Fig. 5. Fig. 7 is a view in cross-section of a portion of the brake mechanism on line 7 7 of Fig. 1. Fig. 8 is a side view of one of the cores adapted to be wound by my machine. Fig. 9 is a partial sectional view on line 9 9 of Fig. 1 with certain parts removed to clearly show the construction. Fig. 10 is an elevation, partly in section, along line 10 10 of Fig. 1.

Like letters indicate like parts throughout the different figures.

A metal chuck a is composed of two sections or jaws a' a^2, which are secured, respectively, to the live spindle or shaft b and to the dead-spindle c. Section a^2 of the chuck is provided with a cylindrical extension a^3, adapted to receive one end of the dead-spindle c. Spindle c is provided with an annular groove c', which engages a stud a^4, secured to said extension a^3. The chuck is thus capable of being rotated by the live-spindle, while the dead-spindle remains in a fixed position. The dead-spindle is connected with a lever d, pivoted at d'. By shifting this lever the dead-spindle may be reciprocated to separate or bring the jaws a' a^2 together to release or engage the core. The dead-spindle may be secured in adjustment by the well-known clamping device d^2.

My invention has been particularly employed in the winding of armature-cores of the type illustrated. The core e is constructed of laminæ of sheet-iron or low-grade steel, each sheet having circular holes near the periphery thereof, slots being provided in said periphery, which communicate with said holes. In assembling the core-plates these slots and holes are alined, a longitudinal recess e' being thus provided in the core adapted to receive the armature-wire.

The armature-core is disposed within the chuck with opposite recesses in which a coil of wire is to be disposed, placed between the

opposing lips g g of the chuck-jaw, said lips forming guides for the armature-wire, as fully set forth in the aforesaid Wait application. A lug e^2 is provided upon one of the jaws of the chuck, which is adapted to enter one of the recesses in said core to prevent said core from rotating after having been adjusted within its chuck. The armature-wire is attached at one end to the core and is unwound from the bobbin f as the core is rotated. To wind the wire tightly upon the core, I mount a friction-pulley f' upon the bed of the machine, about which the wire is passed several times before passing to the core to preserve said wire in a taut condition.

The laminæ composing armature-cores are frequently assembled upon the armature-shafts. In winding a core thus constructed I interpose a guide h between the friction-pulley f' and core through which the wire passes and provide means for shifting said guide to one side as the shaft approaches the wire to withdraw said wire from the path of the shaft, said means consisting, preferably, of an oscillating lever h', pivoted at h^2, upon which said guide is carried. The required motion is imparted to lever h' by a cam i, secured to the live-spindle b, this motion being imparted through the medium of the centrally-pivoted lever i' and a link i^2, connecting levers h' and i' at their lower extremities, lever i' supporting a roller at its upper extremity which engages said cam. As the core is rotated the cam, through the intermediate mechanism above described, oscillates the lever h' to remove the guide h and wire from the path of the shaft as it is being turned from a horizontal to a vertical position, while said guide and wire are restored as said shaft approaches a horizontal position, the path of guide h being indicated by the dotted line in Fig. 8. The guide h is thus in position to direct wire between the lips g g when said lips and shaft are in a horizontal position, said guide being removed from this position as said shaft and lips are being moved to a vertical position by the cam and lever mechanism after the wire has been directed into the recess in the core.

After a coil has been wound upon the core the machine is stopped, the wire is cut, the core readjusted within its chuck, and the armature-wire reattached to the core preparatory to winding the next coil. To insure an equal number of turns in each coil, I provide automatic means for stopping the rotation of the chuck when the predetermined number of turns have been made. The preferred form of mechanism for accomplishing this result will now be described.

A loose pulley or sleeve l is journaled upon the live-spindle, which is adapted to be driven by a belt l'. A friction band or clutch m (shown most clearly in Fig. 7) is secured at m' to said pulley, the free ends whereof are adjustably united by a bolt m^2. A friction pulley or sleeve o is secured upon the live-spindle or an extension thereof. A shoulder o' upon said pulley is surrounded and frictionally engaged by the band m, whereby rotary motion imparted to pulley l may be imparted to the pulley o and the live-spindle. A brake-shoe p is pivoted at p' upon a stationary block p^2. A link p^3 is united at p^4 p^5 with said brake-shoe and a lever p^6, pivotally mounted at p^7 upon said stationary block p^2. The other end p^8 of lever p^6 is enlarged and rounded. A vertically-disposed sliding bar q is provided with a slot q', which engages the end p^8. This bar is adapted to travel vertically within a stationary casing q^2, secured upon the machine, the bar being normally held in its elevated position shown by the engagement of a detent r with a shoulder q^3, formed thereon. When the predetermined number of turns of wire have been put upon the core, detent r is tripped, as will be hereinafter set forth, whereupon bar q is permitted to descend. The brake-shoe p is thereby caused to engage shoulder o^2 of the pulley o, this engagement being reinforced by a weight q^4, attached to the bar q. The friction between the brake-shoe p and the shoulder o^2 is sufficient to overcome the engagement between the friction-band m and shoulder o', whereby rotation of pulley o is checked. Inasmuch as the action of the brake-shoe upon pulley o may not be uniform throughout the operation of the machine, I provide a positive stop mechanism in addition to the brake-shoe, which stops the rotation of the live-spindle immediately upon the completion of the predetermined number of turns of wire and at the same point in the rotation of the spindle. This mechanism preferably consists of a detent s, secured to the pulley o, which is brought into engagement with lever s', pivoted at s^2 and connected with bar q at s^3, this engagement being effected by the descent of bar q a short time after the brake-shoe has been applied to the pulley. The rotation of said pulley having been thereby checked, the force of the impact between said detent and lever s' is thus lessened. After the core has been adjusted to receive the next coil the bar q is reëlevated and the shoulder q^3 thereon again brought into engagement with detent r to secure the bar in its elevated position. A hand-lever q^5 is provided to elevate the bar q.

A carriage t is supported and adapted to travel longitudinally upon a rod t'. A half-nut t^2 is supported upon the upper end of the carriage, said nut being provided with threads which engage corresponding threads upon an extension u of the live-spindle. The carriage t is formed in two sections, the lower section being prevented from rotating upon rod t' by a spline t^3, while the upper section is hinged upon the lower section. A spring-actuated plunger v, mounted upon the lower section of the housing, engages with a lug w, formed upon the upper section of the housing, this plunger serving to maintain the half-nut in engagement with the extension u.

Handles x x are provided, by grasping which the half-nut t^2 may be disengaged from extension u to enable the carriage t to be freely shifted upon rod t'. A post y is supported by the carriage, which is adapted to engage and trip the detent s. When a coil of wire is to be disposed upon a core, the carriage t is shifted to the rear of the machine, the handles x x having been grasped to disengage the half-nut t^2 from the rod u. An adjustable collar z serves to limit the rearward motion of the carriage. When the carriage has been placed to the rear of the machine and the half-nut reëngaged with the extension u, the brake mechanism is released from pulley o, thereby permitting the pulley l to rotate pulley o through the medium of friction-band m, thereby causing the rotation of the live-spindle, extension u, &c. The extension u in rotating advances the carriage t upon its rod t', the rate of advancement being proportioned to the number of threads upon shaft u. When the carriage reaches the forward limit of its excursion, detent s is engaged and tripped by post y, when further rotation of the live-spindle is prevented, as above set forth.

The threads upon shaft u may be proportioned to the number of turns of wire it is desirable to form in coils that are being disposed upon the core. The adjustable collar z is provided to adjust the length of travel of the carriage, so that the number of turns in a coil may be varied at will.

It is obvious that there are features of my invention that may be employed for other purposes and in winding material other than wire upon core-bodies, and in the claims I use the term "wire" in the sense of threads or strings or bands composed of any material.

I have purposely omitted the enumeration of modifications which may be made without departing from the spirit of my invention, because to set these forth at length would obscure rather than make clear the more essential features.

Having, however, fully set forth one form of mechanism embodying my invention, I claim, and desire to secure by these Letters Patent, the following:

1. In a drum-armature-winding machine, the combination with an oscillating guide h for guiding the wire upon the core, of means for relatively rotating the armature-core and guide for the purpose of winding wire upon the core, and means for oscillating said guide upon each relative revolution of the armature-core, whereby the armature-wire may be laid about the shaft of the armature, substantially as described.

2. In a drum-armature-winding machine, the combination with means for rotating a core for the purpose of winding wire thereon, with a guide adapted to lay the wire about the armature-shaft, and a cam adapted to receive motion from said means, said guide being adapted to be oscillated by said cam, substantially as and for the purpose described.

3. The combination of a chuck adapted to secure a core in position, with a live-spindle adapted to rotate said chuck for the purpose of winding wire on said core, a cam i adapted to be rotated by said live-spindle, and a guide h adapted to engage the wire as it is being wound upon said core, and also adapted to be shifted from side to side by means of said cam, substantially as and for the purpose described.

4. The combination of a chuck adapted to secure a core in position, with a live-spindle adapted to rotate said chuck for the purpose of winding wire on said core, a cam i adapted to be rotated by said live-spindle, lever i' engaging said cam, lever h', link i^2, connecting levers i' and h', guide h supported upon lever h' and adapted to engage the wire as it is being wound upon said core, substantially as and for the purpose described.

5. In an armature-winding machine, the combination of means for rotating the armature-core for the purpose of winding coils of wire thereon, with automatic means for stopping the rotation of said core when each coil has received its predetermined number of turns, substantially as described.

6. In an armature-winding machine, the combination of means for winding coils of wire upon the armature-core, with automatic means for discontinuing the winding of each coil when a predetermined number of turns have been received thereby, substantially as described.

7. The combination with a shaft, of a pulley or sleeve loosely mounted with relation thereto, a second pulley or sleeve engaged or adapted to be engaged with said shaft, means for rotating one of said pulleys which thus becomes the driving-pulley, a friction-clutch adapted to mechanically engage the driving-pulley with the remaining pulley which thus becomes the driven pulley, and a brake adapted to engage the driven pulley to counteract the engagement of the friction-clutch, substantially as described.

8. The combination with a shaft, of a pulley loosely mounted with relation thereto, a second pulley fixed upon said shaft, means for rotating one of said pulleys, a friction-clutch adapted to unite said pulleys, a friction-brake adapted to engage one of said pulleys to decrease the speed thereof, and positive means for stopping said pulley at a fixed point, substantially as described.

9. The combination with a shaft, of a pulley loosely mounted with relation thereto, a second pulley fixed upon said shaft, means for rotating one of said pulleys, a friction-clutch adapted to unite said pulleys, a brake adapted to engage one of said pulleys, a weight connected with said brake to operate the same, a detent normally engaging said weight to remove its influence from the brake, and means

for tripping said detent, substantially as described.

10. The combination with a rotating pulley or shaft, of a brake adapted to engage the same, a weight connected with said brake to operate the same, a detent normally engaging said weight to remove its influence from the brake, and means for tripping said detent, substantially as described.

11. In an instrument-winding machine, the combination with a rotating pulley or shaft, said pulley or shaft being adapted to rotate a core upon which wire is to be wound, a brake adapted to be brought into engagement with said pulley or shaft, and automatic means for operating said brake, when the predetermined number of turns of wire have been formed upon the core, substantially as described.

12. In an instrument-winding machine, the combination with a rotating pulley or shaft adapted to rotate a core upon which wire is to be wound, of a brake adapted to engage the same, a weight connected with said brake to operate the same, a detent normally engaging said weight to remove its influence from the brake, and means for tripping said detent, substantially as described.

13. In an instrument-winding machine, the combination with a rotating pulley or shaft adapted to rotate a core upon which wire is to be wound, of a friction-brake adapted to engage the same, a weighted lever q, a lever p^6 connecting said weighted lever with said friction-brake, a detent s fixed upon said pulley, a lever s' adapted to be brought into engagement with said detent by the lever q, a detent r adapted to normally remove the influence of said lever from brake p and lever p^6, and means for tripping detent r, substantially as described.

14. In an instrument-winding machine, the combination of a spindle adapted to rotate a core upon which wire is to be wound, said spindle or an extension thereof being provided with threads, a carriage provided with threads which engage the threaded portion of said spindle, whereby said carriage is caused to travel, and means actuated by said carriage for stopping the rotation of said spindle, substantially as and for the purpose described.

15. In an instrument-winding machine the combination of a spindle adapted to rotate a core upon which wire is to be wound, said spindle or an extension thereof being provided with threads, a carriage provided with threads which engage the threaded portion of said spindle whereby said carriage is caused to travel, means actuated by said carriage for stopping the rotation of said spindle, and a collar z provided upon said spindle to adjust the length of the travel of said spindle, substantially as described.

16. In an instrument-winding machine the combination of a spindle adapted to rotate a core upon which wire is to be wound, said spindle being provided with threads, a carriage provided with threads which engage the threaded portion of said spindle whereby said carriage is caused to travel, brake mechanism for stopping the rotation of said spindle, a weight adapted to actuate said mechanism, and a detent which normally engages said weight to remove the influence thereof from said lever mechanism, said carriage being adapted to release said detent from its engagement with said weight, substantially as and for the purpose described.

In witness whereof I hereunto subscribe my name this 17th day of September, A. D. 1896.

AUGUST J. OEHRING.

Witnesses:
GEORGE L. CRAGG,
JNO. W. SINCLAIR.