

A. B. CHEW.
MACHINE FOR FORMING ARMATURE COILS.

APPLICATION FILED OCT. 30, 1911. RENEWED FEB. 24, 1913.

1,057,933.

Patented Apr. 1, 1913.

3 SHEETS—SHEET 1.

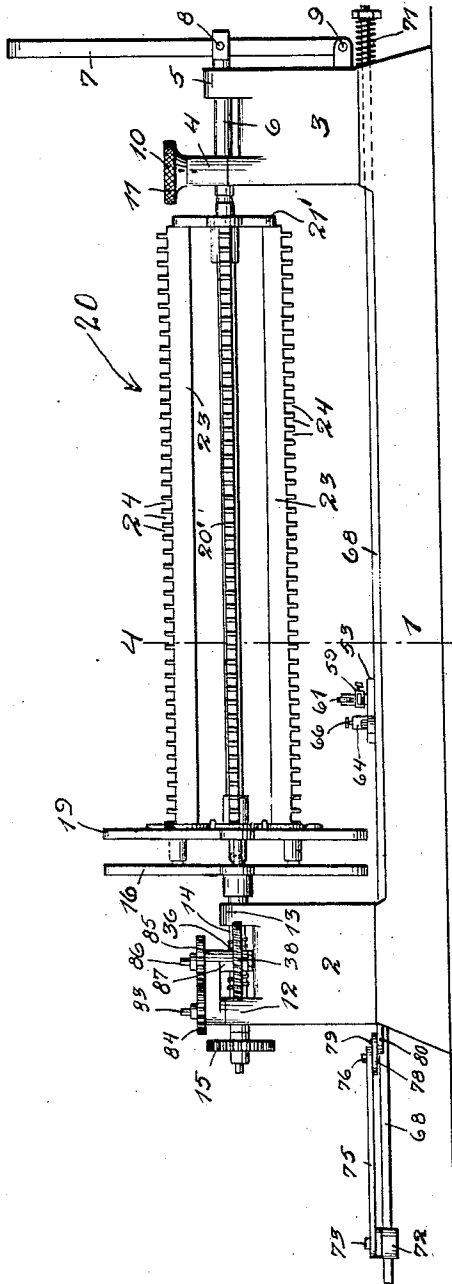


Fig. 1

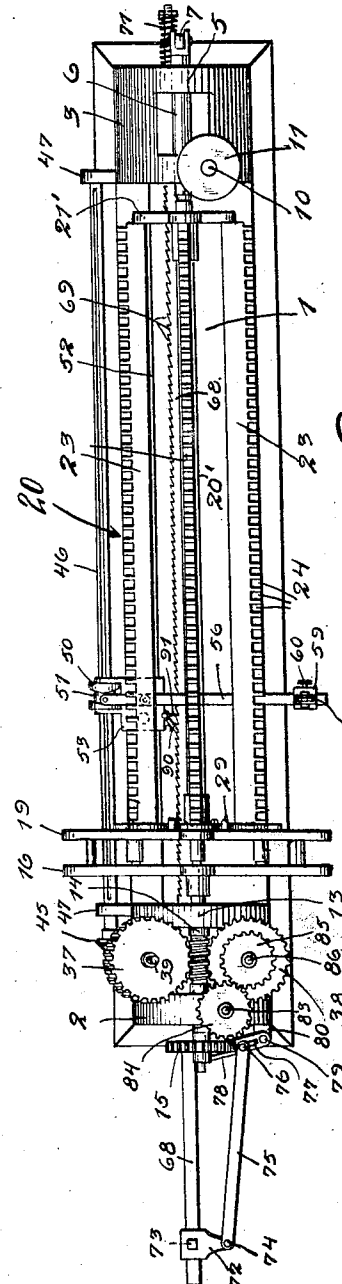


Fig. 2

Witnesses

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334

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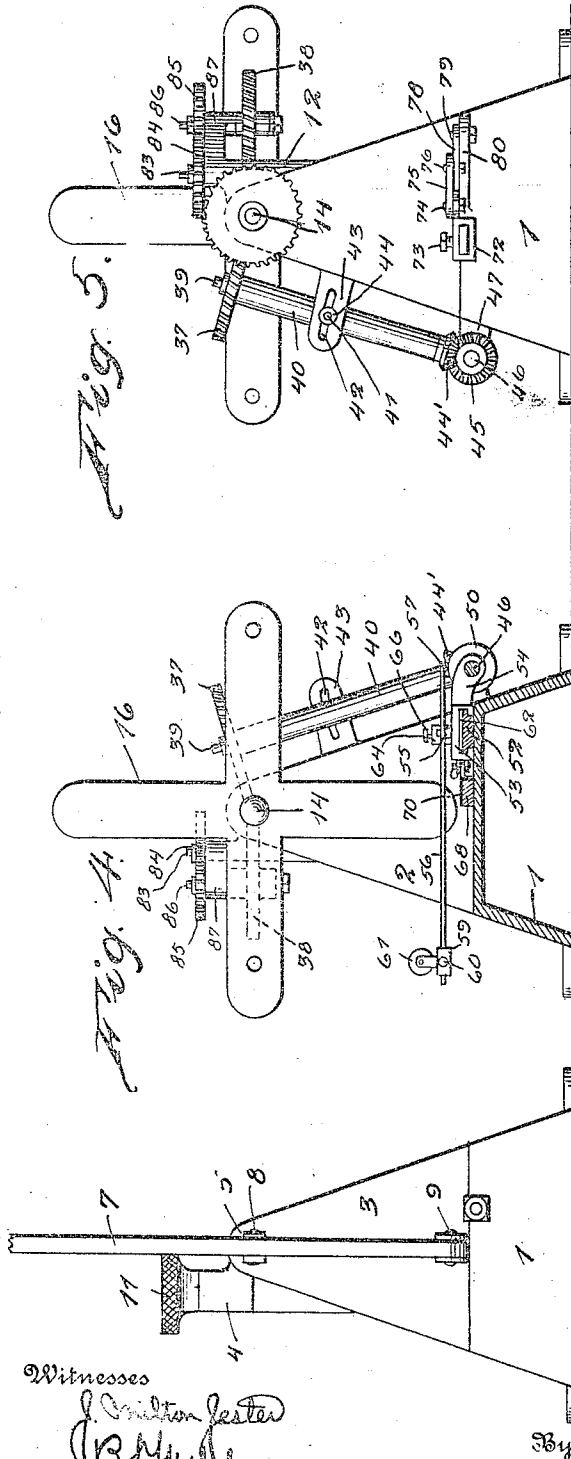
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J. B. H. H. H. H. H.

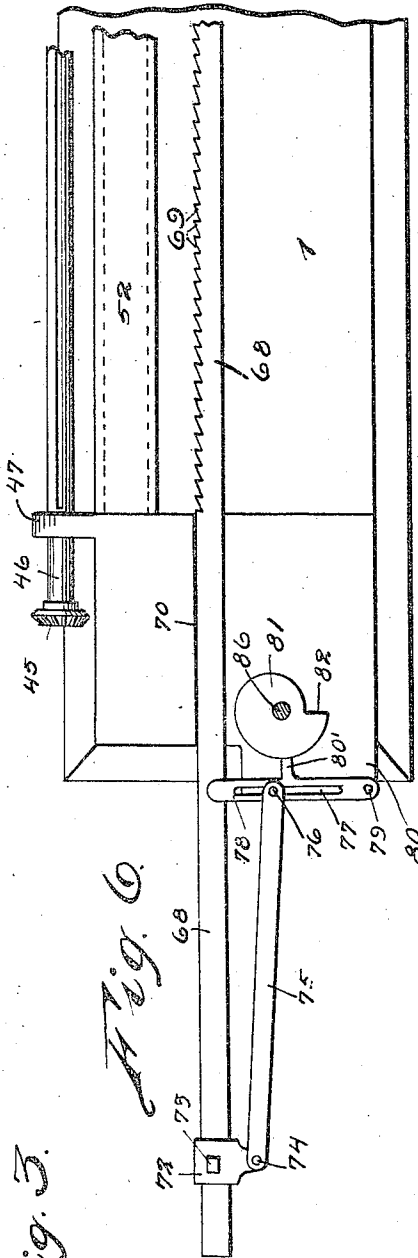


Fig. 6.

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3 SHEETS-SHEET 3.

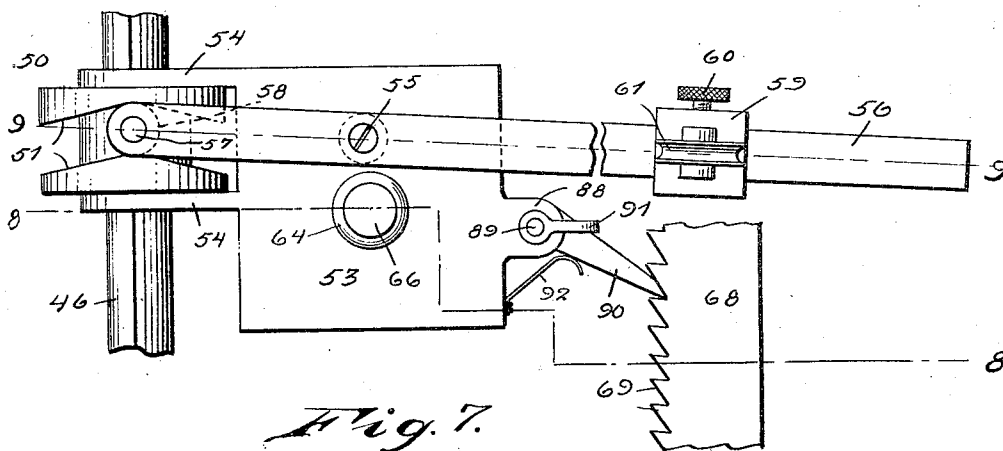


Fig. 7.

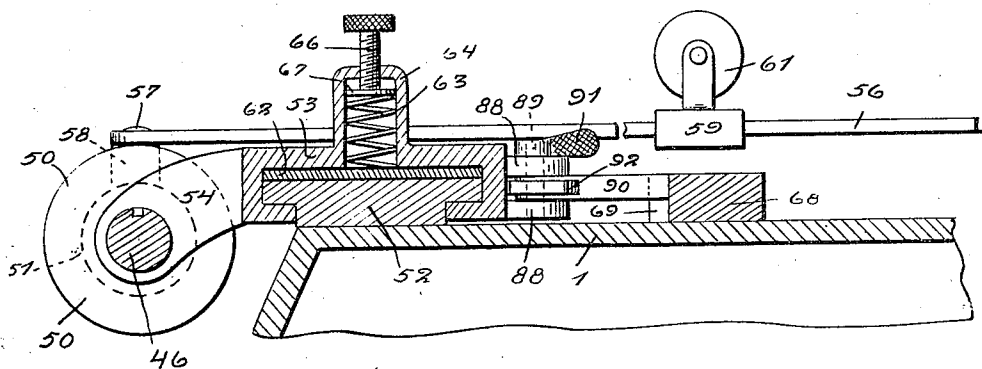


Fig. 8.

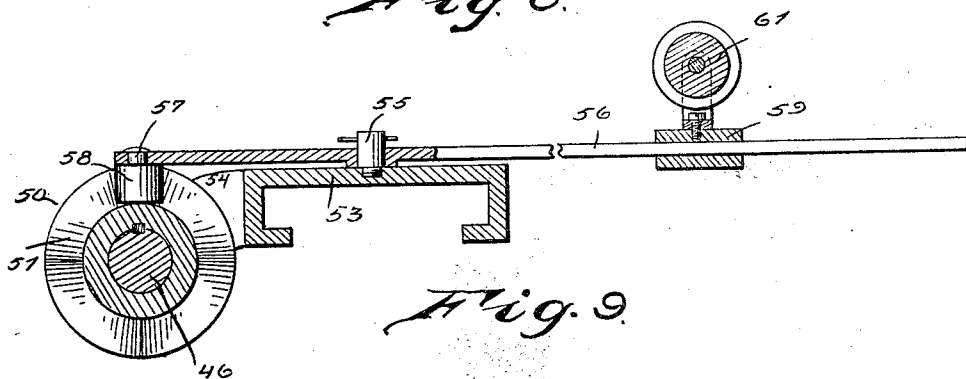


Fig. 9.

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UNITED STATES PATENT OFFICE.

ALBERT B. CHEW, OF WASHINGTON, DISTRICT OF COLUMBIA.

MACHINE FOR FORMING ARMATURE-COILS.

1,057,933.

Specification of Letters Patent.

Patented Apr. 1, 1913.

Application filed October 30, 1911, Serial No. 657,526. Renewed February 24, 1913. Serial No. 750,413.

To all whom it may concern:

Be it known that I, ALBERT B. CHEW, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Machines for Forming Armature-Coils, of which the following is a specification.

The present invention relates to a machine for winding armature coils.

An important object of this invention is to provide means whereby a plurality of individual armature coils may be wound upon a form from a continuous strand of wire, and subsequently easily removed therefrom ready to be secured to an armature drum.

A further object of my invention is to provide a coil winding machine which is quick, automatic, and reliable in operation. A further object of this invention is to provide novel means to so feed the wire to a form that the turns of each individual coil will be wound flat and even.

Other objects and advantages of this invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same, Figure 1 is a side view of the machine, Fig. 2 is a plan view thereof, Fig. 3 is a right end view of the same parts being omitted, Fig. 4 is a transverse sectional view taken on line 4-4 of Fig. 1, Fig. 5 is a left end view of the machine, Fig. 6 is a fragmentary plan view of the left end of the base of the machine, Fig. 7 is an enlarged detail view of a guide pulley and associated elements, Fig. 8 is a sectional view on line 8-8 of Fig. 7, and Fig. 9 is a similar view taken on line 9-9 of Fig. 7.

In the drawings wherein is illustrated a preferred embodiment of my invention, the numeral 1 designates a base of the fixed frame or supporting structure of the machine. Upon opposite ends of this base are disposed uprights 2 and 3, as shown. Formed upon the upper end of the upright 3 are spaced extensions or lugs 4 and 5, through which is mounted a longitudinally movable bearing 6, preferably forked at its outer end to have pivotal connection with the intermediate portion of a lever 7, as shown at 8. This lever is pivotally con-

nected with the upright 3, as shown at 9. The bearing 6 is locked in adjustment at different positions with respect to the upright 3 by a clamping screw 10, operating through an opening in the extension 4 and carrying at its upper end a thumb nut 11. The other upright 2 is provided with extensions or lugs 12 and 13, through which is journaled a rotatable shaft 14, which is incapable of having any perceptible longitudinal movement with respect to the upright 2. The shaft 14 is provided at its outer end with a pinion 15, receiving rotation from suitable means (not shown).

Rigidly mounted upon the shaft 14 is an outer cross 16, having suitable detachable connection with an inner cross 19, included in a rotatable form 20. This form comprises generally longitudinal bars 23 provided with spaced openings 24 to receive the wire. The bars 23 are pivotally connected at one end with the inner cross 19 and have a similar connection at their opposite ends with a small cross 21'. The crosses 19 and 21' are both rigidly mounted upon a central shaft 20', having its ends in engagement with the ends of the shafts 14 and 6. As no claim is made to this rotatable form *per se*, it is thought that the above brief description will suffice.

The shaft 14 is provided midway its ends with a worm 36, engaged upon one side by a worm wheel 37 and upon the opposite side by a worm wheel 38, as most clearly shown in Fig. 2. The worm wheel 37 is rigidly mounted upon the upper end of a shaft 39, which is journaled through a tubular bearing 40, as more clearly shown in Fig. 5. The tubular bearing 40 is provided midway its ends with a trunnion 41 operating through a slot 42 formed through an ear 43 carried by the upright 2. The trunnion 41 is screw-threaded for the reception of a clamping nut 44. It is thus seen that means are provided whereby the bearing 40 may be angularly adjusted and securely locked in such adjusted position. At its lower end the shaft 39 carries a bevel gear 44', rigidly connected therewith and engaging a bevel gear 45, rigidly mounted upon a shaft 46 (see Figs. 5 and 6). The shaft 46 is rotatably mounted in bearings 47, the same being free to turn therein but incapable of partaking of any perceptible longitudinal movement with relation thereto. Splined

upon the shaft 46 is a pulley 50, provided upon its periphery with a cam groove 51.

Formed upon the base 1 adjacent the rear edge thereof and extending parallel with the shaft 46, is a fixed track 52, T-shaped in cross-section, as more clearly shown in Fig. 7. Mounted upon this track to move longitudinally thereof is a carriage 53, having spaced ears 54 formed upon one edge thereof, such ears being apertured to receive the shaft 46, whereby said shaft is capable of freely turning in the ears and said ears are capable of moving longitudinally of the shaft. Pivotally mounted intermediate its ends upon the carriage 53, as shown at 55, is a shifting lever 56, provided at one end with a depending bolt 57, carrying a roller 58, operating in the cam groove 51 of the pulley 50. Attention is called to the fact that this pulley 50 is disposed between the ears 54 and is thus made to travel longitudinally with the carriage 53. A carriage or sleeve 59 is longitudinally adjustably mounted upon the forward or free end of the pivoted shifting lever 56, and means in the form of a clamping screw 60 are provided to lock the carriage or sleeve 59 in adjustment at different positions upon said shifting lever 56. A grooved guide pulley 61 is carried by the carriage 53, as shown.

Means are provided for effecting a quick step-by-step movement of the carriage 53, and the same will be described hereinafter. In order that the carriage may not be moved longitudinally too freely and go beyond the desired point, I preferably interpose a strip or plate 62 between the upper surface of the track 52 and the carriage 53, as shown. The frictional engagement between the strip 62 and the track 52 is regulated by a compressible coil spring 63, disposed within a housing 64, formed upon the carriage 53. The tension of this spring 63 may be changed by proper manipulation of a bolt 66, engaging a disk 67 operating in the housing 64 and also engaging the spring 63. Means are provided for preventing the strip or plate 62 from having accidental displacement with relation to the carriage 53.

Extending longitudinally of the base 1 and slidably engaging the same, is a feed bar 68 included in the means to move the carriage 53. This feed bar is provided upon its rear edge and for the greater portion of its length with ratchet teeth 69, faced, as shown. The end portions of the feed bar 68 are free from the ratchet teeth and are slidably mounted in openings 70, formed adjacent the lower ends of the uprights 2 and 3. This feed rod is automatically moved to the right, when released, by a compressible coil spring 71. Longitudinally adjustably mounted upon the left end portion of the feed rod 68 is a bracket 72 and a clamping bolt 73 is provided to lock said bracket 72 in

adjusting at different positions on the rod 68. Pivotally connected with the bracket 72, as shown at 74, is a link 75, carrying at its opposite end a bolt 76, operating in a longitudinal slot 77 formed through a lever 78. The lever 78 is pivoted at one end, as shown at 79, with an extension or shelf 80. The lever 78 is provided midway its end with a laterally extending tooth or lug 80', engaging a cam 81, as shown. It is thus seen that the feed rod 68 is moved longitudinally to the left by this cam 81, operating through the medium of the lever 78 and the link 75. The feed rod 68 is moved longitudinally to the right by the spring 71, which occurs when the lug 80' is tripped by a shoulder 82 of the cam. The extent of the longitudinal movement of the feed rod 68 to the left may be regulated by changing the pivot point between the lever 78 and the link 75, which is accomplished by moving the bolt 76 longitudinally of the slot 77 and securing the same in its new position. When the bolt 76 is moved rearwardly toward the feed rod 68, the extent of the longitudinal movement of this feed rod to the left is increased.

The cam 81 is rigidly mounted upon the lower end of a vertically disposed rotatable shaft 83, to the upper end of which is rigidly connected a pinion 84, engaging an intermediate pinion 85, rigidly mounted on the upper end of a shaft 86, which is journaled through a bearing 87 and has connection therebelow with the worm wheel 88. It is thus seen that the shaft 83 is geared to the shaft 14 to be rotated at a reduced speed thereby, preferably one to fifty.

At its forward edge the carriage 53 is provided with an apertured ear 88 through which extends a pivoted bolt 89, having rigid connection at its lower end with a pawl 90 and at its upper end with a handle or finger-hold 91. The pawl 90 is adapted to engage the teeth 69 of the feed rod 68 and is urged into such engagement by a spring 92.

In the operation of my machine, a spool of the wire of the desired cross-sectional area is suitably mounted in front of the machine and the free end of such wire is passed under and about the guide pulley 61. The wire is attached in the first notch to the left of one of the bars 23. The pinion 15 is now set in rotation at any desired speed whereby the collapsible form or frame including the bars 23 will be accordingly rotated. When the machine is first started the shifting lever 56 and guide pulley 61 are positioned adjacent and in alinement with the first set of notches 24, whereby the first coil will be formed or wound in these notches. As this coil is being wound the pulley 50 is being rotated at a much reduced rate compared to the shaft 14, and such rotation of this pulley effects a horizontal swinging or shifting movement of lever 56, whereby the guide pulley 61 is

shifted to feed the wire so that it will wind in flat even layers. Attention is called to the fact that the shaft 46 is rotated at the same speed as the shaft 83. The cam 81 is now being slowly rotated and accordingly engages the tooth 80' to effect a swinging movement of the lever 78. This lever operating through the medium of the link 75 causes the feed rod 68 to be moved longitudinally to the left. The pawl 90 is tripped over one tooth 69 subsequently to which the tooth 80' of the lever 78 is tripped by the shoulder 82 of the cam 81. The spring 71 will now advance the feed rod 68 to the right for the distance of the length of one of the teeth 69, or in other words, a proper distance so that the guide pulley 61 will be in alinement with the next set of notches 24. The next coil will now be wound in this set of notches and the same shifting movement of the lever 56 is had. In a similar manner each successive coil is wound until the last set of notches 24 to the right has been employed, subsequently to which the rotation of the shaft 14 is stopped. It is thus seen that automatic means are provided to give a quick step by step advance movement to the carriage 53, which carries the shifting lever 56, as above described. This carriage may be returned to its normal starting position by the operator swinging the handle 91 to the left, thus disengaging the pawl 90 and the ratchet teeth 69, subsequently to which said carriage may be moved to the left. The rotatable form may now be removed from between the stationary bearings 2 and 3, so that the coils of wire thereon may be further treated. This rotatable form 20 is collapsible so that the coils of wire formed thereon may be removed therefrom.

Having thus described my invention, I claim:—

1. In apparatus of the character described, a rotatable form, a carriage to move longitudinally thereof, a rotatable longitudinal shaft, an element splined on the longitudinal shaft and provided with a cam groove, a lever pivoted to the carriage, an element carried by the lever and operating in the cam groove, a wire guiding element

carried by the lever, and means to effect the longitudinal travel of the carriage.

2. In apparatus of the character described, a movable carriage, a rotatable shaft, an operating element splined upon the rotatable shaft, means connected with the carriage and engaging the operating element to effect the longitudinal travel thereof with the carriage, and a shifting traverse element connected with the carriage and driven by the operating element.

3. In apparatus of the character described, a rotatable shaft, an element splined thereon and provided upon its periphery with a cam groove, a longitudinally movable carriage having spaced ears to engage opposite ends of the element, and a lever pivotally connected with the carriage and carrying an element to operate within the cam groove of the splined element.

4. In apparatus of the character described, a supporting structure, a rotatable form, a longitudinally movable carriage, means to impart a quick step by step movement to the carriage in one direction, wire guide-means connected with the carriage to travel therewith during such step by step movement, and automatic means to impart a quick traverse to the wire guide-means, approximately longitudinally of the carriage, between the said step by step movement of the carriage.

5. In apparatus of the character described, a supporting structure, a rotatable form, a longitudinally movable carriage, means to impart a quick step by step movement to the carriage in one direction, wire guide-means including a lever pivoted with the carriage to bodily travel therewith and to be swung with relation thereto, automatic means to actuate the swinging lever between the step by step movement of the carriage, and means to drive said automatic means.

In testimony whereof I affix my signature in presence of two witnesses.

ALBERT B. CHEW.

Witnesses:

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