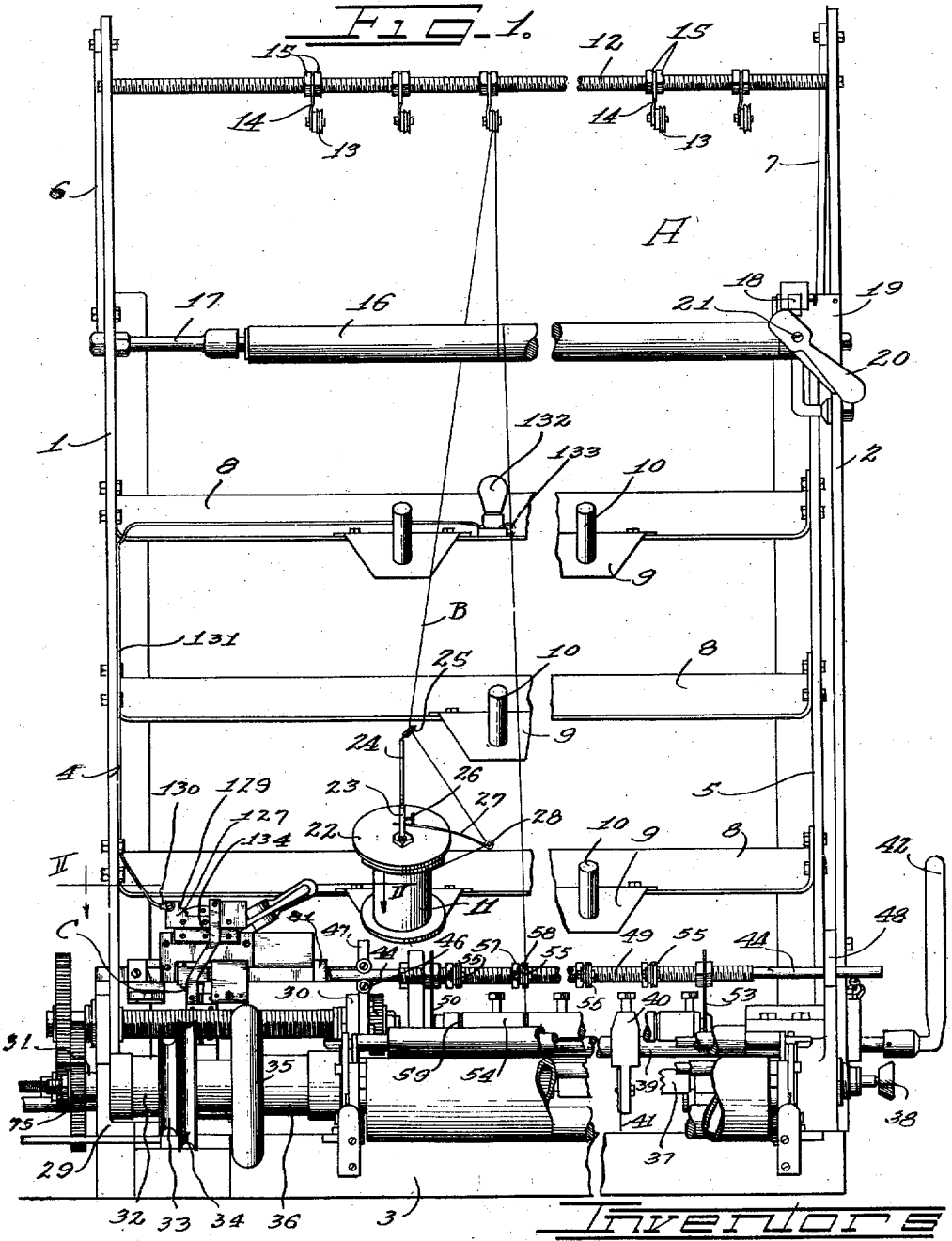
July 3, 1934. A. HELGASON ET AL 1,964,946

APPARATUS FOR MAKING STEPPED COILS

Filed Nov. 11, 1932 4 Sheets-Sheet 1

FIG. 1.



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APPARATUS FOR MAKING STEPPED COILS

Filed Nov. 11, 1932 4 Sheets-Sheet 2

FIG. 2.

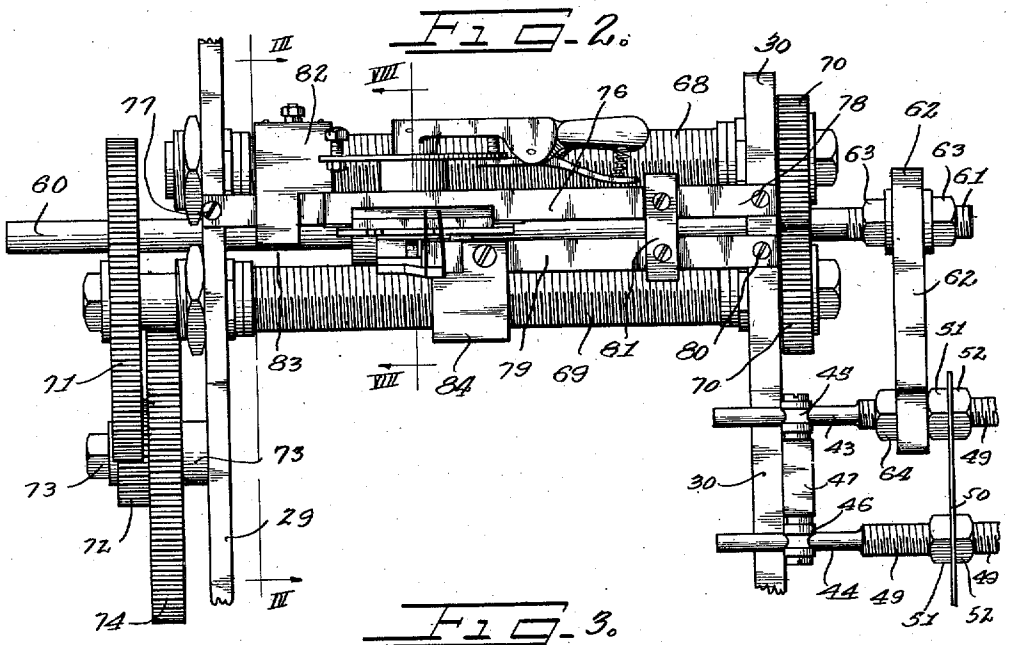
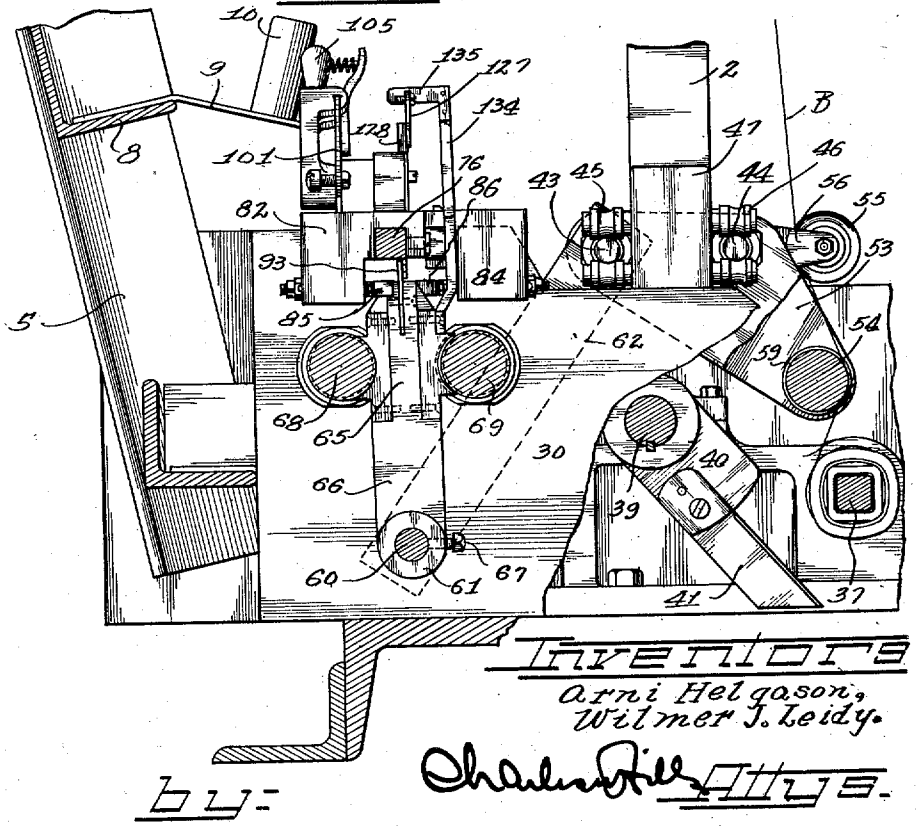


FIG. 3.



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July 3, 1934. A. HELGASON ET AL 1,964,946

APPARATUS FOR MAKING STEPPED COILS

Filed Nov. 11, 1932 4 Sheets-Sheet 3

FIG. 4.

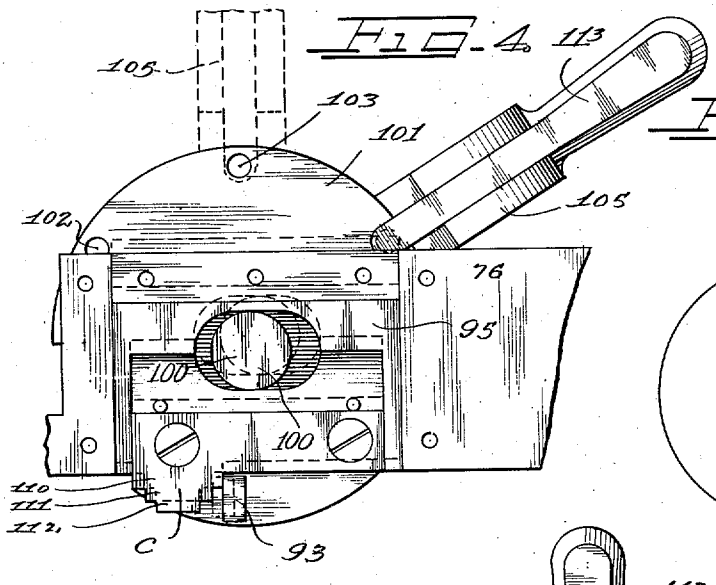


FIG. 5.

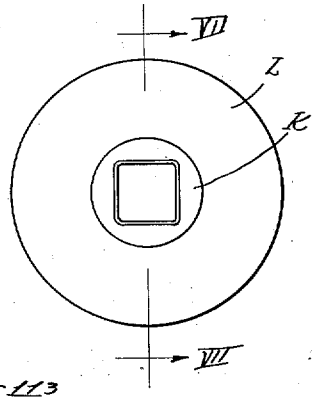


FIG. 6.

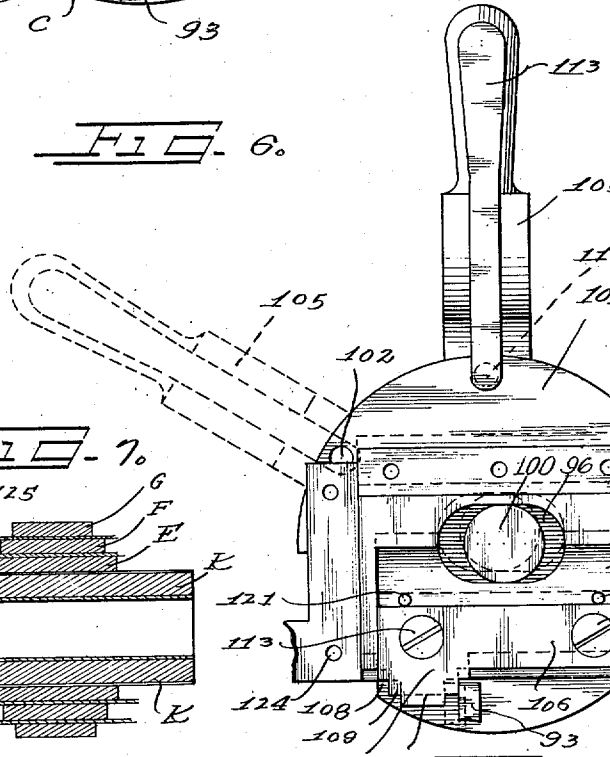


FIG. 7.

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APPARATUS FOR MAKING STEPPED COILS

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FIG. 8.

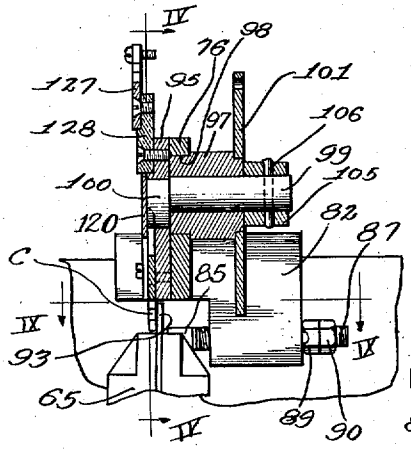


FIG. 9.

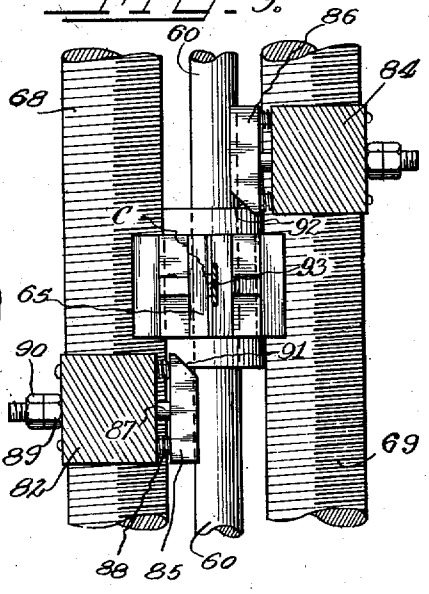
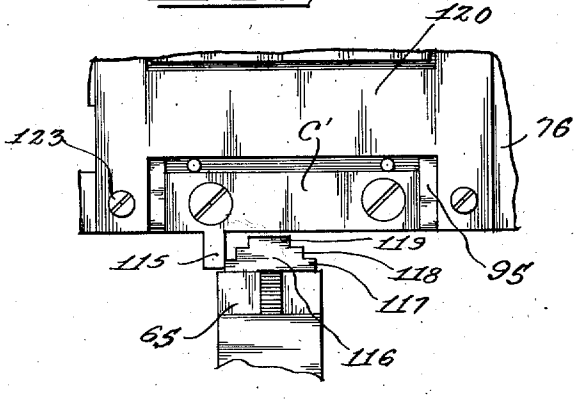


FIG. 10.



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Patented July 3, 1934 1,964,946

UNITED STATES PATENT OFFICE

1,964,946

APPARATUS FOR MAKING STEPPED COILS

Arni Helgason and Wilmer J. Leidy, Chicago, Ill., assignors to Chicago Transformer Corporation, Chicago, Ill., a corporation of Illinois

Application November 11, 1932, Serial No. 642,150

8 Claims. (Cl. 242—9)

The present invention relates to a coil winding machine for making stepped coils.

The machine of the present invention contemplates one wherein means are provided for controlling the wire guiding and laying on device in such manner that a stepped coil is fashioned without stopping the machine.

A further object of the invention is to provide an apparatus for making stepped coils.

A still further object of the invention is to provide means for controlling the wire guide and coil winding machine so as to make stepped coils in quantity production without stopping the operation of the machine.

Another and yet further object of the invention is to provide means, in a coil winding machine, for varying the throw or travel of the wire guide to fashion stepped coils.

The above, other and further objects of the invention will be apparent from the following description, accompanying drawings and appended claims.

Embodiments of the various aspects of the present invention are illustrated in the accompanying drawings and the views thereof are as follows:

Figure 1 is a front elevational view of a coil winding machine, with parts fragmentarily shown, with some parts omitted and others partially shown, embodying principles of the present invention.

Figure 2 is an enlarged horizontal sectional view taken substantially in the plane of line II—II of Figure 1.

Figure 3 is a fragmental view, partially in section, taken substantially in the plane of line III—III of Figure 2.

Figure 4 is an elevational view, with parts broken away, showing the illustrated embodiment of the invention for regulating or effecting different amplitudes of movement or throws on the wire guide device, showing in full lines one position of the parts, and in dotted lines another position of the parts.

Figure 5 is an end view of a coil of the present invention and is constructed in accordance with the method of and the apparatus of the present invention.

Figure 6 is a view similar to Figure 4 showing the parts in different positions, from that illustrated in Figure 4.

Figure 7 is a central sectional view taken substantially in the plane of line VII—VII of Figure 5.

Figure 8 is a sectional view taken substantially in the plane of line VIII—VIII of Figure 2.

Figure 9 is a view partially fragmental in plan and partially in section, taken substantially in the plane of line IX—IX of Figure 8.

Figure 10 is a fragmental view showing another arrangement for securing variations in throw or travel of the wire guide.

The drawings will now be explained.

A frame designated generally at A is supported on a table, bench or like structure for convenient operation in coil winding. The frame is so mounted that an operator, standing on the floor, may comfortably operate the machine without discomfort.

The frame, as illustrated, comprises side members 1 and 2 which, at the bottom, are fastened to a base member 3. Rear frame members 4 and 5 extend upwardly and rearwardly from the base member 3 and are suitably connected by members 6 and 7 to the upper ends of the side members 1 and 2. At intervals in the height of the members 4 and 5 cross bars 8 are connected, which bars in turn have lips 9 supporting pins 10 for spools 11 carrying the supply of wire to be wound in the coil formed by the machine.

A threaded bar 12 is supported in the upper ends of the side members 1 and 2 and extends across the machine. A plurality of individually grooved wheels 13 are supported on the bar 12 by means of hangers 14 which are adjusted along the length of the bar by means of nuts 15 arranged one on each side of a hanger so as to properly position the guide wheels 13 for receiving the wire from the several spools 11 during the winding operation. There are as many of the wheels 13 as there are spools 11 in the machine.

Supported below the bar 12, in the side members 1 and 2, is a tension roller 16 supported for rotation on a shaft 17. The wires in the several spools 11 are passed about the tension roller 16 preferably with one turn per wire and downwardly to the wire guides, thence to the rotative bobbin support or mandrel. Suitable tension is applied to the roller 16 by a weighted arm 18 pivoted in a portion 19 of the frame structure and bearing against the roller 16. A cam member 20 is pivoted at 21 to the structure 19 for releasing the arm 18 from braking engagement with the roller 16.

The spools 11 are provided with tension devices at the spools. A spool tension device consists of a circular plate 22 having a cylindrical

portion, not shown, for entering the spool 11 from the upper end. This cylindrical portion is hollow and carries an upstanding rotatable bar 23 which in turn carries a rod 24. The rod 24 at its upper end has a leader 25 through which passes the wire B from a spool 11. A screw 26 is threaded into the bar 23. An arm 27 is positioned within the bar 23 below the screw 26 in such manner that the head of the screw bears against the arm 27 for tensioning it. The arm 27 extends laterally from the bar 23 and the rod 24 and at its outer end carries a leader 28 through which passes the wire B inwardly of the spool 11. The arm 27 is bent to bear against the edge of the plate 22, and the adjustment of the screw 26 regulates the bearing engagement of the arm 27 against the plate 22 for regulating friction. In this manner the wire as it leaves the spool 11 is placed under tension thus preventing uneven winding and also serving to lead off the wire in such manner as not to kink it.

The leaders 25 and 28 may be provided with agate linings so as not to damage the wire. The wire B is led first from the spool through the eye 28, thence upwardly through the eye 25 and over one of the guide pulleys 13, thence downwardly and given one turn about the tension roller 16, thence downwardly to the laying on device.

Supported on the base 3 are two plates 29 and 30 (Fig. 1) which are illustrated as disposed near the front left end of the machine. These plates are suitably secured to the base 3 in any convenient manner.

A drive shaft 31 is journalled in the plates 29 and 30. A hub 32 is rotatable on the shaft 31 and carries, in the present instance, two pulleys 33 and 34, of different diameters. A hand wheel 35 forms a part of a hub 36 which is also rotatable on the shaft 31. The hub 36 is clutched to the hand wheel 35 and also to the hub 32 for driving the wheel 35 from the shaft 31. The hand wheel 35 may be grasped by the operator and immediately declutched, allowing the pulleys 33 and 34 to rotate without actuating the winding spindle or mandrel as will be more fully explained.

The hub 36 is provided with a reduced end, not shown, which extends through the plate 30 and is adapted for receiving one end of a bobbin, spindle or mandrel 37. The other end of the mandrel 37 is received in a slide operable by a hand wheel 38 which may be moved axially thereof for the purpose of disconnecting the mandrel for application thereto of a coil or bobbin as well as for the removal therefrom of a coil or bobbin when wound. Such removability also enables substitution of mandrels of different sizes and shapes such, for instance, as square, cylindrical, or any other shape used to produce a series of coils having the desired cross-sectional contour.

A rocker shaft 39 is suitably supported in the side frame members 1 and 2 and at intervals in its length carries cutters 40, which may be adjusted along the length of the shaft and when the shaft is rocked the knives 41 thereof are brought into engagement with the wound core for severing the several coils from the wound core so fashioned. This shaft is rocked by a handle 42.

The wire guide and laying on device of the illustrated embodiment of the invention includes two parallel rods 43 and 44 which are axially reciprocable. At one end these rods are supported by rollers 45 and 46 carried by an extension 47 attached to the plate 30 with the rollers disposed above the upper end of this plate. The opposite ends of the rods 43 and 44 are supported in an apertured portion 48 of the side frame member 2. Inwardly of the ends of these rods the bodies thereof are enlarged and threaded as at 49.

A triangular plate 50 is connected to the rods 43 and 44 and to the enlarged threaded portion 49 thereof by means of nuts 51 and 52 engaging each side of the plate on each of the rods. A similar plate 53 is secured near the opposite ends of the threaded portions of the rods in a similar manner. These plates 50 and 52 carry, in a position below the rods 43 and 44, a roller 54 which preferably is provided with axially spaced circumferential grooves for receiving the wire immediately before it is wound onto the bobbin support or mandrel.

A series of guide rollers 55 are secured to the front rod 44 by means of carriers 56 which are attached to the rod 44 in axially adjusted position by means of nuts 57 and 48 engaging opposite sides of a carrier to fasten it to the rod 44. In this manner a suitable number of guide rollers 55 are carried by the front rod 44 of the laying on device. The rollers 55 are set to align with the grooves 59 in the roller 54.

The laying on device is given to and fro or reciprocable motion for laying on purposes, in the following manner:

Supported in the plates 29 and 30, and rearwardly of the rods 43 and 44, is an axially movable rod or bar 60. The end of this bar which projects outwardly from the plate 30 is threaded at 61 and has attached to it a connection 62, by means of lock nuts 63, the other end of which connection is fastened to the rod 43 between nuts 51 and 64. As the rod 60 is reciprocated its movement is translated to the laying on device for reciprocation of the same in service.

Endwise or axial movement of the rod 60 is accomplished by means of a double faced nut 65 carried at the end of an arm 66 loose on rod 60 and movable with the rod 60 by means of collars 61 secured to the rod 60 on each end of the arm 66, by means of set screws 67. Disposed for engagement alternately by the threaded portions of the nut 65 are two parallel screws 68 and 69 which are mounted for rotation in the plates 29 and 30. The inner ends of each of these screws are provided with gears 70 which are enmeshed with each other to thereby rotate the screws in opposite directions. One of these screws, for instance 69 has a gear 71 attached to it outwardly of the plate 29 which gear meshes with a smaller gear 72 carried on a stub-shaft 73 supported in the end plate 29. Another and larger gear 74 is also supported on the stub-shaft 73 which gear in turn meshes with a gear 75 on the driving shaft 31. In this manner, as the machine is operated, the parallel screws 68 and 69 are rotated in opposite directions.

The nut 65 is adaptable for meshing engagement with one of the screws whereby the nut is moved in one direction of travel and then the nut is switched for meshing engagement with the other of the screws to travel in the opposite direction. In this manner, reciprocating motion is imparted to the laying on device.

Supported on plates 29 and 30 is a plate 76, fastened to the plates 29 and 30 respectively by bolts 77 and 78. Attached to the plate 76 is a parallel bar 79, fastened at one end by a bolt 80 to the plate 30 and supported in parallel relation with respect to the plate 76 by a bridge piece 81.

Fastened to the plate 76, for adjustment therealong, is a block 82 positioned thereon by means

of a screw 83. A similar block 84 is adjustably positioned along the bar 79. The blocks 82 and 84 carry spring-pressed shoes 85 and 86 respectively. These shoes are carried on pins 87 which engage suitably disposed apertures in the blocks and are maintained normally away from the blocks by means of springs 88 engaging about guide pins carried by the shoes. The pins 87 extend all the way through the blocks 82 and 84 and are removably retained therein by nuts 89 and lock nuts 90 on threaded portions of the pins which serve also as means for adjusting the outward extent of movement of the shoes 85. The adjacent ends of the shoes 85 and 86 are obliquely cut in plan to provide inclined faces 91 and 92. The shoes 85 and 86 are alternately engageable by the nut 65 and serve as switching means for moving the nut from meshing engagement with one of the screws 68 and 69 into meshing engagement with the other, as the nut reaches its limit of travel in its to and fro movement.

The nut 65 is provided with an upstanding finger which engages alternately the opposite sides of a guide plate designated generally at C. The engagement of the pin 93 with the guide plate C determines the length of travel of the nut 65 in either direction, and consequently determines the length of travel of the wire guide of the laying on device for governing the lengths of coils wound on the machine of the present invention. As the nut 65 is switched from, say its meshed engagement with the screw 68 into meshed engagement with the screw 69 by means of the spring mounted shoe 85, the finger 93 will then engage the right side of the guide plate C as observed in Figs. 3, 8 and 9. The engagement of the finger 93 with the guide plate maintains the nut 65 in engagement with the screw 69 until the finger reaches the ends of the plate in the then direction of movement of the nut. As soon as the finger reaches the end of the plate, the shoe 86 becomes effective to switch the nut into meshing engagement with the screw 68 whereupon the finger 93 then engages against the left side of the plate C and thus maintains the nut in engagement with the shoe 68 for imparting reverse direction of movement of the nut and its connected wire guide device.

The present invention, among other things, contemplates the provision of a stepped guide plate C so fashioned and arranged as to automatically vary the amplitude of movement of the nut 65 and its connected wire guide device.

Figures 4, 6 and 8 illustrate details of the illustrated form of the invention for accomplishing this purpose. Fig. 10 shows the stepped plate attached to the nut and the cooperating finger formed as a part of the guide plate.

The bar 76 is provided in one face with a recess 94 formed in the front face of the bar and extending from top to bottom of the same. A flat block 95 is vertically reciprocably mounted in this recess. The block is provided with a centrally disposed somewhat elliptical opening 96. A boss 97 is provided against the rear side of the plate 76 and fitted into an opening 98 formed in said plate. The boss is centrally apertured to carry a shaft 99. The shaft 99 has at its front end a cylindrical head 100 engageable within the opening 96 of the plate 95. The head 100 is eccentrically mounted on the shaft 99 to serve as a cam for vertically moving the plate 95 as the shaft 99 is oscillated in a manner to be hereinafter explained. A disc 101 is fastened at the rear of the boss 97. This disc is provided with a plurality of openings 102, 103 and 104, with more or less as desired, for a purpose to be later explained. A handle member 105 is secured to the rear end of the shaft 99 by means of a pin 106 for oscillating the shaft 99, as later explained.

The front face of the plate 95 carries a removable guide plate C. The form of the plate C illustrated in Figs. 4 and 6 comprises an elongated body 106 and a depending portion 107 which depending portion constitutes the operative portion of the guide C. The depending portion 107 is, in the drawings, provided with a series of steps 108 and 109 thus providing three pin engaging areas or zones 110, 111 and 112. The guide plate C is removably associated with the plate 95 and is secured to the latter by means of bolts 113. It is therefore possible to change the guide plate to provide any number or series of steps thus affording active pin engaging zones of any desirable length and number.

The utilization of the guide plate as appearing in Figs. 4 and 6 produces a stepped winding as illustrated in section in Fig. 7.

Fig. 4 shows in full lines the position of the handle 105, the cam head 100, plate 95, and its attached guide plate C in lowermost position to present the longest active zone or area 110 of the guide plate for contact by the finger 93 of the reversing nut. As long as the plate 95 is in the lowermost position shown in Fig. 4, the nut and its connected wire guide device will move back and forth to wind a coil of the length shown at E in Fig. 7. Let it be assumed that the coil E is in length approximately 700 turns. After a portion E of the coil has been built up to the sufficient number of turns, radially of the coil, the handle 105 is then shifted to the dotted line position of Fig. 4 or the full line position of Fig. 6. This movement of the handle raises the plate 95 and its attached guide plate C to present the second area or zone 111 in position for engagement by the finger 93 of the reversing nut. This area or zone 111, it will be observed, is shorter than the zone 110; consequently, shorter travel or amplitude of movement is thus imparted to the reversing nut and its connected wire guide device. Engagement of the finger 93 with the zone 111 produces a coil of the length shown at F in Fig. 7, say 500 turns in length. When the coil F has been built up to proper radial dimensions, the handle 105 is then shifted from full line position of Fig. 6 to the dotted line position of Fig. 6 thus raising the plate 95 and its guide plate C to present the zone 112 for engagement by the pin 93. The zone 112 is the shortest zone or area presented thus providing the shortest stroke or amplitude of movement of the laying on device and resulting in a corresponding portion of the coil G as shown in Fig. 7.

Fig. 4 illustrates the finger 93 as it appears when it reaches the right-hand end of the zone 110 of the guide plate C and in this position is switched by the proper one of the switching shoes into meshing engagement with the proper one of the driving screws for driving the nut to the left as viewed in Figs. 4 and 6.

The handle 105 is provided with a detent lever 113 having a pin 114 disposed to engage in any one of the openings 102, 103, and 104 of the plate 101 for thus locking the handle in any position to which it is moved for properly positioning the various stepped portions of the guide plate D for controlling the amplitude of reciprocating movement of the wire guide device.

It is obvious that more than three of the open-

ings in the plate 101 may be made or that other arrangement for locking the handle 105 in adjusted position may be employed. It is furthermore obvious that the guide plate C might be provided with more or less than the three active zones or areas herein illustrated.

Fig. 10 illustrates a modification wherein the guide plate, therein designated as C', is provided with a depending finger 115 and the stepped portion of the cooperating element 116 is fastened to the nut 65. With this re-arrangement of parts, the same effect is accomplished and the manner of varying the amplitude of to and fro movement of the nut and its connected laying on device is the same. The stepped zones of the plate 116 are represented at 117, 118, and 119. An H-plate 120 is removably secured over the plate 95 to retain it in position in the recess 94 of the bar 76 also to overlie the cam 100 and cover the cam slot 96 in the plate 95. The plate 95 is provided with guide pins 121 which engage in grooves (not shown) formed in the base of the recess 94 for preventing canting or displacement of the plate 95 as it is raised and lowered by means of the cam 100. The base of the plate 95 is recessed at 122 to receive the guide plate C so that the face of the same will be flush with the plate 95.

The cam 100 may be raised and lowered by any suitable means. The illustrated form of cam actuating mechanism comprises a handle 105, a shaft 99 supported in the boss 97 attached to the bar 76. As the handle 105 is oscillated about the axis of the shaft 99, as a center, from left to right or right to left, as viewed in the several figures of the drawings, the cam 100 is correspondingly raised or lowered. This movement of the cam raises or lowers the plate 95 and thus selectively presents to the action of the finger 93 on the nut 65 any one of the several zones or areas of different lengths, forming part of the guide plate C and in this manner the lengths of travel or amplitude of movement of the wire laying on device may be varied. Movement of the handle 105, when the guide plate C' of Fig. 10 is utilized, would raise and lower the plate 95 and with it the finger 115 formed as a part of the guide plate C'. In this manner, the engagement of the finger could be adjusted to cause contact of the nut 65 with any one of the several zones or areas of different lengths on the stepped plate 116 which, in this form, is shown as attached to the nut 65.

The H-plate 120 is removably positioned on the bar 76 by means of bolts 123 passing through suitable apertures in the plate and engaging threaded openings 124 in the bar 76.

The diagrammatic representation of the coil appearing in Fig. 7 includes an inner winding A and stepped outer windings E, F and G. Three of the stepped windings are shown because of the fact that the guide plates C and C', and the cooperating elements, are arranged with three steps. However, it is within the contemplation of the invention to make the guide plate with as many stepped areas or zones as may be desired to reproduce in a finished coil.

The stepped windings E, F and G are shown as separated by insulating strips 124 and 125 which are inserted during the formation of the coil. In this form of the coil, the intervening insulating strips between the various courses of the wire are not shown, simply for the sake of expedience.

Attached to the upper end of plate 95 is a plate 127 which is spaced from the plate 95 by an insulating block 128. The upper margin of the plate 127 has formed in it a series of steps 129 which correspond in number with the steps of the guide plates C or 116. One terminal 130 of an electric conductor 131 is electrically connected to the plate 127. A signal light 132 is disposed on the frame A in any position convenient for observation by the operator. The conductor 131 is connected to this signal. A second conductor 133 from this signal is grounded to the frame.

An upstanding arm 134 is attached to the nut 65 and has a projection 135 lying within the stepped portion 129 of the plate 127.

As the nut is reciprocated as described, the arm 134 moves with it, and at the end of every stroke engages against a step of the plate 127 and thus closes the electrical circuit through the signal light 132, thereby indicating to the operator the fact that the nut has reached its end of travel in its then direction of movement. This signal feature is useful in enabling the operator to determine when to shift the guide plate C or C' to vary the stroke of the wire guide.

The invention is claimed as follows:

1. In a coil winding machine of the type wherein a wire guide is reciprocated by means of a nut alternately engageable with either of two parallel screws, of means for progressively shortening the travel of the nut for the purpose of winding stepped coils, said means including a guide plate for the nut engageable alternately on opposite sides thereof by the nut in its to and fro movement, said plate having a series of steps formed in it thus providing a plurality of nut contacting surfaces of progressively decreasing lengths, said plate in a direction perpendicular to the direction of movement of the nut at determined intervals to present said surfaces successively for engagement by the nut to vary the length of travel of the wire guide.

2. In a coil winding machine of the type wherein a wire guide is reciprocated by means of a nut alternately engageable with either of two parallel screws, of means for progressively shortening the travel of the nut for the purpose of winding stepped coils, said means including a guide plate alternately engageable on opposite sides thereof by the nut in its to and fro movement, said plate having a series of steps formed in it thus providing a plurality of nut contacting surfaces of progressively decreasing lengths, said plate in a direction perpendicular to the direction of movement of the nut at determined intervals to present said surfaces successively for engagement by the nut to vary the length of travel of the wire guide, the lengths of travel of the wire guide depending upon which of the stepped surfaces is engaged by said nut, the changing of stroke lengths by varying the engagement of the nut with the stepped plate being accomplished without stopping the operation of the winding machine.

3. In a coil winding machine, means for controlling the length of travel of a wire guide in to and fro manner, said means including a reciprocable member connected to said guide for moving it, means for reciprocating said member, a second member cooperating with said first member for governing its length of reciprocatory movement, one of said members carrying a flat stepped plate and the other of said members carrying a part engageable alternately with opposite sides of said plate, said part and said plate being adapted for progressive engagement of said part and the steps in said plate to effect

corresponding variations in length of movement of the wire guide.

4. A coil winding machine including a rotative bobbin mandrel with means for rotating it, a wire guide disposed to travel parallel to said mandrel, a pair of parallel screws, means for rotating said screws in opposite directions, a double faced nut between said screws adapted to alternately mesh with said screws, means for switching said nut from one screw to the other, driving means for said guide connected to said nut, a plate engageable by said nut to maintain it in meshing engagement with said screw, said plate being stepped and movable perpendicularly to the nut, said plate being adapted for movement to present different lengths thereof for nut-engagement to vary the length of travel of said nut and its connected wire guide.

5. A coil winding machine including in combination, a bobbin support, a pair of parallel screws, means for rotating said screws, a nut between said screws alternately engageable with either of said screws, the nut being moved in one direction when in mesh with one screw and in the opposite direction when in mesh with the other screw, guiding and switching means for said nut, said guide means comprising a plate having stepped ends providing guide surfaces of different lengths for engagement by said nut, said plate being adapted for movement for a selected presenting of a desired one of said guide surfaces in position for engagement by said nut, said plate being adaptable for presenting said guide surfaces of different lengths for successive engagement by said nut thereby automatically varying the amplitude of movement of said nut by a screw, means for rotating said bobbin support, and means controlled by the travel and reversal of said nut for laying a wire on a bobbin on said support.

6. In a coil winding machine of the type wherein a wire guide is reciprocated by means of a nut alternately engageable with either of two parallel screws, of means for progressively shortening the travel of the nut for the purpose of winding stepped coils, said means including a guide plate for the nut engageable alternately on opposite sides thereof by the nut in its to and fro movement, said plate having a series of steps formed in it thus providing a plurality of nut contacting surfaces of progressively decreasing length, a mounting for said plate, and a pivoted lever having a part engaging said mounting for moving said plate to present a desired step for engagement by the nut.

7. In a coil winding machine of the type wherein a wire guide is reciprocated by means of a nut alternately engageable with either of two parallel screws, of means for progressively shortening the travel of the nut for the purpose of winding stepped coils, said means including a guide plate for the nut engageable alternately on opposite sides thereof by the nut in its to and fro movement, said plate having a series of steps formed in it thus providing a plurality of nut contacting surfaces of progressively decreasing length, a mounting for said plate, said plate being adapted for movement in a direction perpendicular to the direction of nut travel for presenting different steps for nut engagement.

8. In a coil winding machine of the type wherein a wire guide is reciprocated by means of a nut alternately engageable with either of two parallel screws, of means for progressively shortening the travel of the nut for the purpose of winding stepped coils, said means including a guide plate for the nut engageable alternately on opposite sides thereof by the nut in its to and fro movement, said plate having a series of steps formed in it thus providing a plurality of nut contacting surfaces of progressively decreasing length, a mounting for said plate, said plate being adapted for movement to present a selected step in position for nut engagement, and for movement perpendicularly to the direction of nut travel.

ARNI HELGASON.
WILMER J. LEIDY.

CERTIFICATE OF CORRECTION.

Patent No. 1,964,946. **July 3, 1934.**

ARNI HELGASON, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, lines 111 and 126, claims 1 and 2, respectively, after "plate" insert the words being adapted for movement; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 7th day of August, A. D. 1934.

Leslie Frazer

(Seal) Acting Commissioner of Patents.

corresponding variations in length of movement of the wire guide.

4. A coil winding machine including a rotative bobbin mandrel with means for rotating it, a wire guide disposed to travel parallel to said mandrel, a pair of parallel screws, means for rotating said screws in opposite directions, a double faced nut between said screws adapted to alternately mesh with said screws, means for switching said nut from one screw to the other, driving means for said guide connected to said nut, a plate engageable by said nut to maintain it in meshing engagement with said screw, said plate being stepped and movable perpendicularly to the nut, said plate being adapted for movement to present different lengths thereof for nut-engagement to vary the length of travel of said nut and its connected wire guide.

5. A coil winding machine including in combination, a bobbin support, a pair of parallel screws, means for rotating said screws, a nut between said screws alternately engageable with either of said screws, the nut being moved in one direction when in mesh with one screw and in the opposite direction when in mesh with the other screw, guiding and switching means for said nut, said guide means comprising a plate having stepped ends providing guide surfaces of different lengths for engagement by said nut, said plate being adapted for movement for a selected presenting of a desired one of said guide surfaces in position for engagement by said nut, said plate being adaptable for presenting said guide surfaces of different lengths for successive engagement by said nut thereby automatically varying the amplitude of movement of said nut by a screw, means for rotating said bobbin support, and means controlled by the travel and reversal of said nut for laying a wire on a bobbin on said support.

6. In a coil winding machine of the type wherein a wire guide is reciprocated by means of a nut alternately engageable with either of two parallel screws, of means for progressively shortening the travel of the nut for the purpose of winding stepped coils, said means including a guide plate for the nut engageable alternately on opposite sides thereof by the nut in its to and fro movement, said plate having a series of steps formed in it thus providing a plurality of nut contacting surfaces of progressively decreasing length, a mounting for said plate, and a pivoted lever having a part engaging said mounting for moving said plate to present a desired step for engagement by the nut.

7. In a coil winding machine of the type wherein a wire guide is reciprocated by means of a nut alternately engageable with either of two parallel screws, of means for progressively shortening the travel of the nut for the purpose of winding stepped coils, said means including a guide plate for the nut engageable alternately on opposite sides thereof by the nut in its to and fro movement, said plate having a series of steps formed in it thus providing a plurality of nut contacting surfaces of progressively decreasing length, a mounting for said plate, said plate being adapted for movement in a direction perpendicular to the direction of nut travel for presenting different steps for nut engagement.

8. In a coil winding machine of the type wherein a wire guide is reciprocated by means of a nut alternately engageable with either of two parallel screws, of means for progressively shortening the travel of the nut for the purpose of winding stepped coils, said means including a guide plate for the nut engageable alternately on opposite sides thereof by the nut in its to and fro movement, said plate having a series of steps formed in it thus providing a plurality of nut contacting surfaces of progressively decreasing length, a mounting for said plate, said plate being adapted for movement to present a selected step in position for nut engagement, and for movement perpendicularly to the direction of nut travel.

ARNI HELGASON.
WILMER J. LEIDY.

CERTIFICATE OF CORRECTION.

Patent No. 1,964,946. **July 3, 1934.**

ARNI HELGASON, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, lines 111 and 126, claims 1 and 2, respectively, after "plate" insert the words being adapted for movement; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 7th day of August, A. D. 1934.

Leslie Frazer

(Seal) Acting Commissioner of Patents.