F. B. SEGUR.

MACHINE FOR FORMING ELECTRIC CONDUCTING COILS.

APPLICATION FILED OCT. 9, 1912.

1,116,933.

Patented Nov. 10, 1914.

4 SHEETS—SHEET 1.

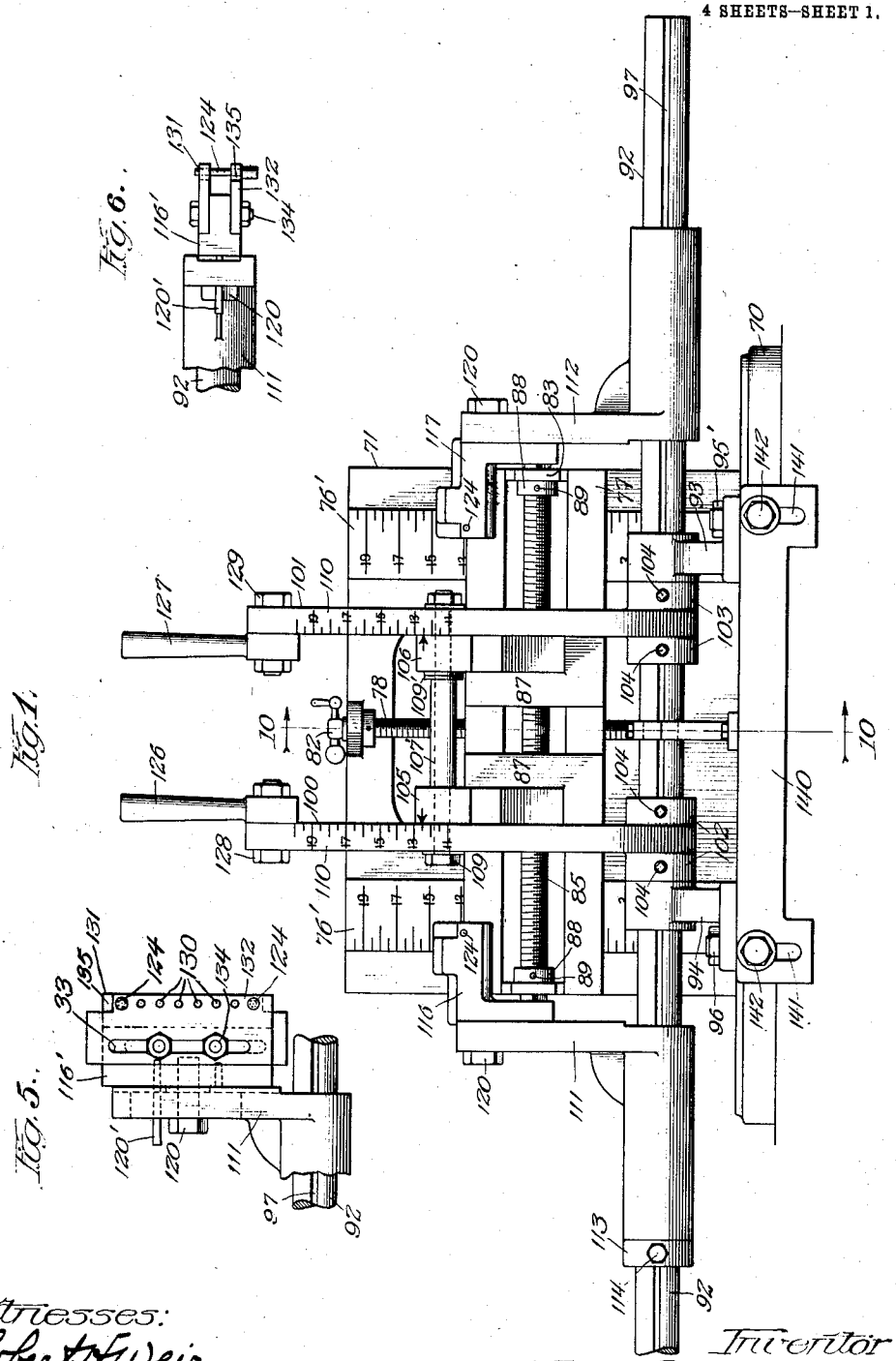


Fig. 1.

Fig. 6.

Fig. 5.

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4 SHEETS—SHEET 2.

FIG. 3.

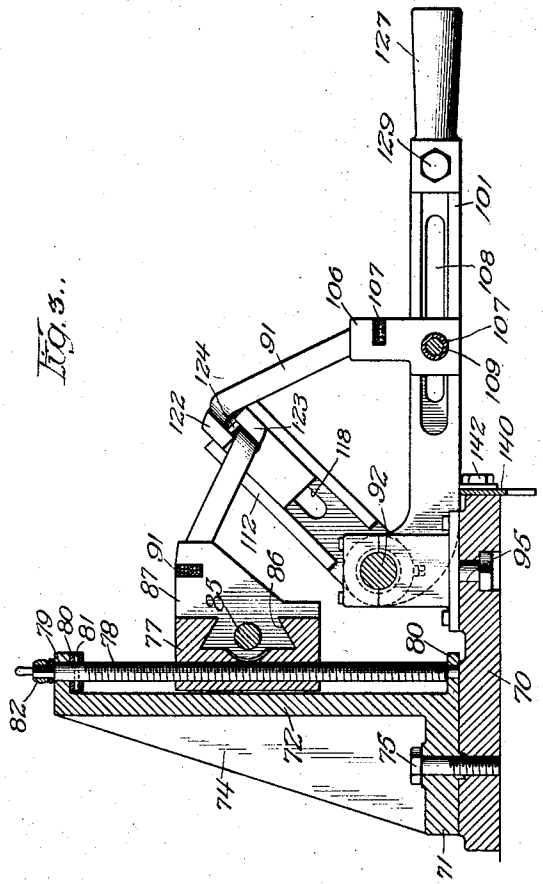
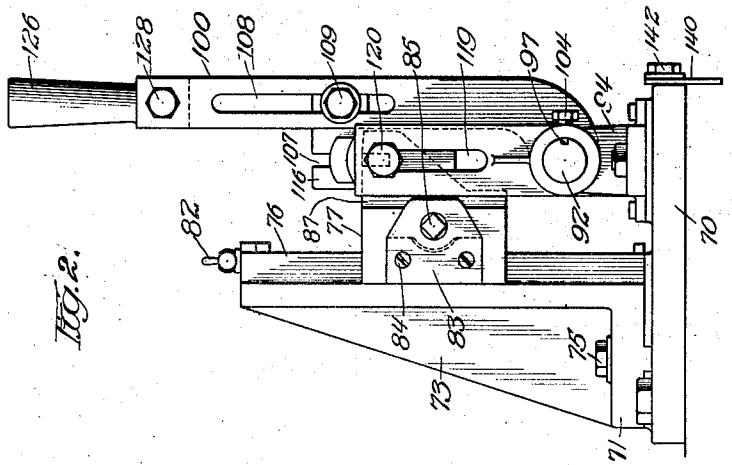


FIG. 2.



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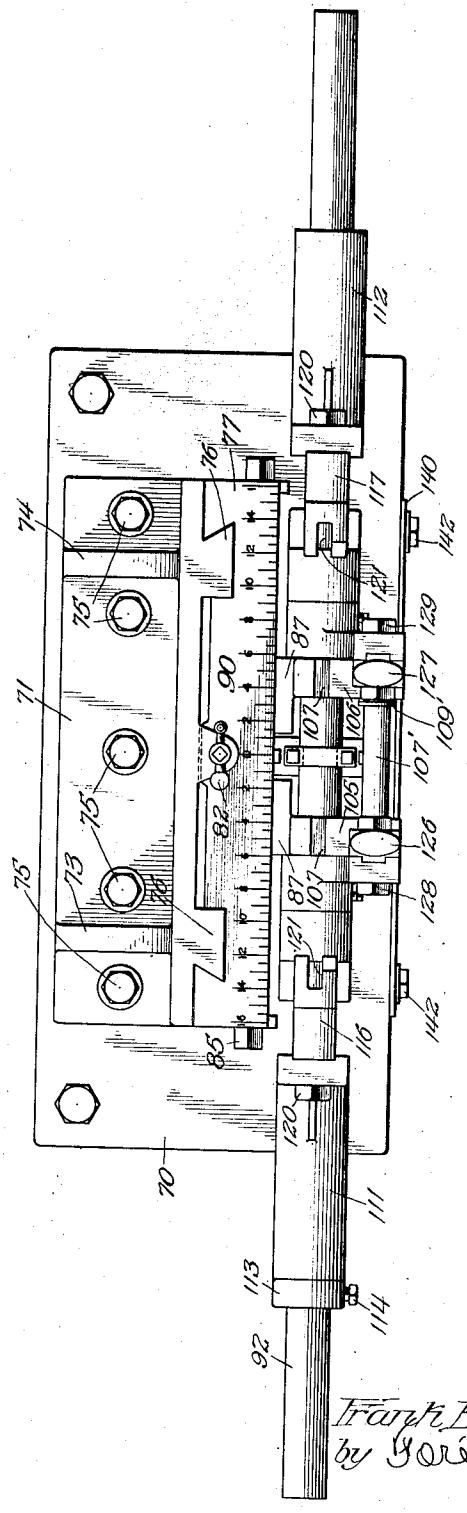
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4 SHEETS—SHEET 3.

Fig. 4.



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4 SHEETS—SHEET 4.

Fig. 7.

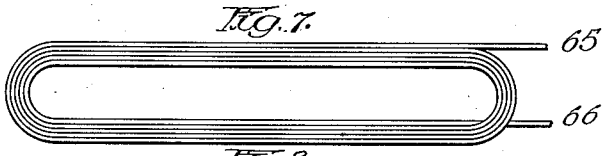


Fig. 8.

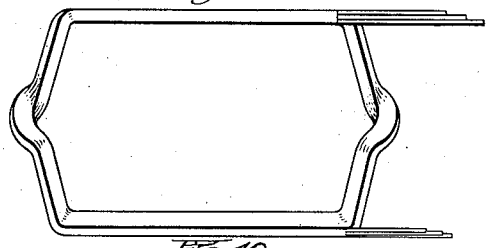


Fig. 9



Fig. 10.

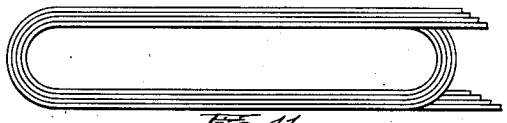


Fig. 11.

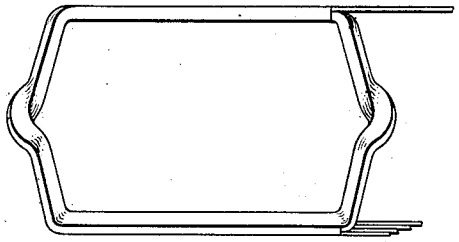


Fig. 12.



Fig. 13.

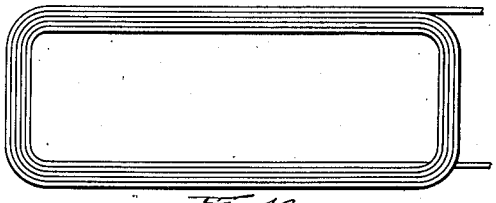


Fig. 14.

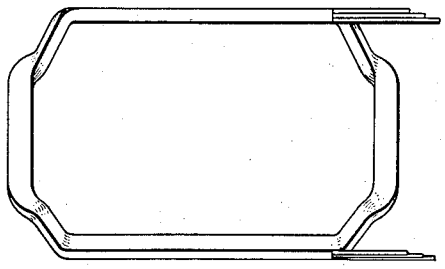


Fig. 15.



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UNITED STATES PATENT OFFICE.

FRANK B. SEGUR, OF CHICAGO, ILLINOIS.

MACHINE FOR FORMING ELECTRIC CONDUCTING-COILS.

1,116,933. Specification of Letters Patent. Patented Nov. 10, 1914.

Application filed October 9, 1912. Serial No. 724,690.

To all whom it may concern:

Be it known that I, FRANK B. SEGUR, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Forming Electric Conducting-Coils, of which the following is a specification.

My invention relates to improvements in machines for forming electric conducting coils for use on armatures and stators for dynamo electric machines.

One of the objects of my invention is to provide a machine, for so shaping the coils after being wound that they may be immediately and directly placed upon the armature, or stator, of a dynamo electric machine, without the necessity of hand manipulation.

Another object of my invention is to provide, in a machine of this character, means for adjusting the various parts thereof, whereby the coil will be of proper dimensions after being formed or extended by the forming apparatus, and each of the wires of the coil will be properly disposed with respect to the other wires so that the coils may be instantly placed in their proper places upon the armature or within the stator.

Another object of my invention is to provide a coil-forming or extending apparatus comprising a relatively stationary coil-holding portion and a coil-extending portion pivoted or hinged together at such point or points as to simulate the axis of the armature and to provide adjusting devices on the two elements of the forming machine whereby the radial distance from the pivotal point may be readily changed or varied according to a scale thereon which indicates directly the length and diameter of the core of the armature. The adjustment of the coil-holding devices is radially movable, according to a scale indicating the diameter of the armature core, and said devices are readily movable or adjustable longitudinally, according to a scale indicating the length of the armature core.

Other and more specific objects of my invention will become readily apparent to persons skilled in the art from a consideration of the description when taken in conjunction with the drawings, wherein—

Figure 1 is a side elevation of the coil forming machine; Fig. 2 is an end elevation of the same; Fig. 3 is a central transverse section taken on line 10—10 of Fig. 1; Fig. 4 is a plan view of the forming machine; Fig. 5 is a side elevation of a knuckle, or device, for holding a square-ended coil; Fig. 6 is a plan view of same; Figs. 7 and 10 are elevations of coils as they appear when wound prior to forming; Figs. 8 and 9, 11 and 12 are side and end elevations of the respective coils as they appear after having been formed and taped; Figs. 13, 14 and 15 are similar views of a square ended coil.

In all the views the same reference characters indicate similar parts.

In the use and operation of my device it is essential that the coils should first be wound to proper dimension and then, preferably, taped, leaving the lead wires exposed at proper positions on the coil. It is then, subsequently, formed or shaped so that it will readily fall into position on the armature or in the stator of a dynamo-electric machine, without further manipulation. After the coils have been wound and taped, it becomes necessary that they shall be formed, or shaped, so that they will readily fit upon the active inductive surface of the armature core or within the inductive core of the stator of a dynamo-electric machine. I will therefore proceed to describe the machine which forms the coils substantially as they are shown in Figs. 8, 11 and 14 after they have been wound substantially as shown in Figs. 7, 10 and 13.

70 is a base upon which is mounted a vertical support 71 comprising a longitudinally extending plate 72 with tapering webs 73 and 74. The support 71 is firmly held on the base 70 by means of screws 75. Projecting inwardly from the plate 72 are two vertically extending tapering ribs 76 which afford guiding bearing for a relatively stationary coil holding head 77. This head is vertically movable and adjustable on the said rib supports by means of a screw 78 which is rotatably secured in projections 79 and 80 that extend inwardly from the plate 72. The screw 78 takes through a threaded perforation in the head 77 and is located between the ribs 76, near the center of the plate 72, so that when the screw 78 is rotated the head 77 may be raised or lowered,

as desired. The collar 80 is secured to the screw 78 by means of a pin 81 and a handle 82 is a convenient means for rotating the screw. The head 77 is dovetailed as at 86, for sliding engagement with the relatively stationary but laterally movable wire supports 87. The wire supports 87—87, may be moved toward and from each other, by means of the screw 85 which has left handed threads on one end and right handed threads on the other end. This screw is held in its end plates 83 by means of collar 88 that is secured to the screw by means of pin 89, and thus the relatively stationary wire supports are movable along the scales 90, which scales indicate the length of the core of the armature, or stator, for which the coils are intended. Wireholding notches 91 are provided in the relatively stationary coil supports and in Fig. 3 a coil is shown in the notch. The relatively stationary coil holders, therefore have two adjustments; one by means of a screw 78 which raises and lowers the head 77 bodily, which carries both of the coil supports 87—87 and another by means of the screw 85 which adjustably separates the two adjustable coil supports 87—87 to any desired distance within the limits of the machine.

Located in the same vertical plane (Fig. 2) with the notches 91 carrying the coil, as illustrated in Fig. 3, is a shaft 92, supported in brackets 93 and 94 carried on the base plate 70. The base plate 70 is slotted, as shown at 95, so that the brackets 93 and 94 may be moved to selected positions in a longitudinal direction along the base and secured in such positions by means of screws 95′ and 96 respectively. On this shaft is supported a coil expanding frame consisting of the levers 100 and 101 terminating in bosses 102 and 103 respectively. These bosses are threaded and contain set screws 104 which enter the spline or feather way, 97 in the shaft 92, so that the shaft 92 may be rotated positively with the said movable frame. When the brackets 93 and 94 are moved to selected position, along the base 70, the levers 100 and 101 may also be moved to the same extent and secured in selected positions by means of the set screws 104.

The levers 100 and 101 each carry a coil holding bracket 105, 106 and each of the brackets is provided with a coil receiving slot 107. A bolt, 109 passes through each of the brackets 105 and 106 which are spaced apart by the spacing tube 107′. Any one of a number of spacing tubes 107′, may be employed so that the distance apart that the levers 100 and 101 may be maintained may thereby be varied, in accordance with the length of the tube 107′, and the levers will be positively held in place by means of the bolt 109. For a refinement of adjustment washers 109′ may be used. The coil holding means, employed on the movable coil expanding levers 100 and 101, are vertically adjustable, bodily, in the slots 108 in accordance with the scales 110, made on the surface of the handles 100 and 101, which indicate the diameter of the armature for which the coil is intended; the scale number is started at the pivotal point of connection of the stationary coil holding member and the laterally movable coil expanding member, assuming such pivotal point to be the substantial axis of the armature or of the stator.

Slidable on the shaft 92, and rotatable independently thereof are brackets 111 and 112. These brackets are free to slide inwardly, but one of them may be restrained against outward sliding movements by means of a collar 113, which is secured in selected positions on the shaft by means of a set screw 114. These brackets, each, carry a coil holding knuckle 116 and 117 respectively, that are vertically adjustable in slots 118, 119, respectively, and that are held in place by means of screws 120, which take through the slots into the knuckles. These knuckles are provided with vertically extending slots 121, for the reception of the ends of the coil to be formed and each is provided with inwardly directed projections 122 and 123. The levers 100 and 101 are provided with handles 126—127 secured to the respective levers by means of bolts 128, 129.

The vertical dimensions of the projections, or lips, 122 and 123 of the knuckles, 116 and 117, respectively, may be enlarged for making the "nose" of the coil longer. These knuckles may also be transposed; the knuckles changing places on the brackets 111 and 112, and this will result in increasing the length of the nose of the coil. For coils of smaller diameter the knuckles may also be inverted so that the active part of the knuckle may be made to approach nearer the axis of the machine. When greater variations, in the length of the nose of the coil are required, as in rectangular coils, the adjustable form shown in Figs. 12 and 13 may be employed wherein the plates 131 and 132 may be readily shifted in a vertical direction.

The modified knuckle, for forming square ended, or rectangular coils, illustrated in Figs. 13 to 15 inclusive, is shown in Figs. 5 and 6. In this case a plurality of holes, 130, are provided in the side members 131, 132, for reception of pins 124, of which two are required for each knuckle, which pins are inserted in one plate at the offset, and in the other plate in any one of the other holes. The side pieces 131, 132, are vertically adjustable, with reference to each other and to the main portion 116′, by the slot 133, which is provided in each of the side pieces 131 and 132, and in the knuckles, by means of bolts

134, which pass through the parts. An offset, 135, is provided in each of the side pieces, one being above and the other below the median line thereof, as shown in dotted lines, in Fig. 5 and in the holes nearest these offsets, the pins are inserted. The knuckle may be freely turned on the bolt 120 except when restrained by a removable pin 120′ for changing the angle of the nose with reference to the side portions of the coils.

When a coil has been wound, as shown in Fig. 7, and properly taped, and it is desired that it shall then be formed into the shape substantially as shown in Figs. 8 and 9, the notch 107, in the forming brackets 105, is adjusted, as much above the stationary coil holding devices 87 as the upper longitudinal portion of the coil is above the lower portion thereof. The lower portion of the coil is then placed in the notches 91—91 of the stationary holding devices 87—87 and the upper portion is placed in the notches 107—107 of the movable forming brackets 105—106 and the curved ends are placed in the notches 121—121 provided in the knuckles 116—117 of the brackets 111, 112, which are freely rotatable upon the shaft 92, and then the pins 124—124 are inserted in the body portion of the knuckles so as to bridge the projections 122 and 123 and hold the coils securely in place as shown in Fig. 3. The forming frame, comprising the pivoted levers 100 and 101, and the handles 126 and 127, which carry the brackets 105 and 106, is then moved on the pivotal point, which is the shaft 92, to a position substantially, as shown in Fig. 3. As the forming portion is moved out the knuckles 111 and 112, move inwardly and freely on the supporting shaft 92, being drawn inwardly by means of the pins 124, as the coil is expanded in width and contracted in length.

In the position shown in Fig. 3, the body of the coil in slots 91—91, of a stationary coil holding bracket 87—87, is in a plane at substantial right angles to the plane in which is the body of the coil shown in slot 107, of the bracket 105 and the end configuration of the coil is substantially that shown in Fig. 9, both ends of the coil being alike. If it is desired that the sides of the coil shall not lie in planes that are at right angles to each other, but at an angle less than right angles, then the coil expanding frame should be moved to a less degree than that shown in Fig. 3, and to this end I have provided an adjustable stop consisting of an adjustable plate 140 slotted as at 141 and secured in adjusted position by means of the cap screws 142—142 that take into the sides of the base plate 70. When this plate, 140, is raised and secured in selected position, it affords a means for stopping the levers 100, 101, and therefore affords a means for controlling the extent to which the coil is expanded in the process of forming.

It will now be apparent that the configuration, and dimensions of the coil, as it will appear when placed upon the armature, or within the stator, of the dynamo electric machine is readily and directly determinable by indicating scales and indices that are placed upon the machine which determine the extent and the position to which the various parts of the machine must be moved preliminarily to forming the coils. By this means the artisan or the user, of the respective device, having in mind the dimension of the armature or stator, for which the coils are to be provided readily adjust the machine by the scales readable in the terms of the dimensions thereof. This is an important feature of my invention as it avoids the necessity of mental calculation or consulting dimension tables, and prevents confusion in the adjustment of the machine.

When the knuckle 116′ is used for forming rectangular coils, during the first part of the movement of the expanding frame, composed of the levers 100, 101, etc., it is restrained from pivotal movement on the bolt 120 by the pin 120′ which enters the slot 119 in bracket 111 and passes into a perforation made in the part 116′ of the knuckle. After sufficient movement of the coil expanding means has been effected, pin 120′ may be removed and the final or finishing coil expanding movement may be completed. This gives the proper conformation to the ends of the rectangular coil.

While I have herein described a single exemplification of my invention, in the various details for purpose of complete disclosure, it is obvious that many changes may be made in the specific constructions, without departing from the spirit and scope of the appended claims.

What I claim is:

1. A machine of the character described, comprising, in part, a coil forming machine consisting of a stationary member, provided with vertical guideways; a head, vertically adjustable on said guideways; two coil-receiving members, a single means for laterally positioning said coil receiving members with respect to each other; a movable coil forming member, hinged to said stationary member; two coil receiving members laterally and vertically adjustable thereon, and two freely movable coil holding members for engaging the ends of the coil to retain parts of said ends in substantially their original planes.

2. A machine of the character described, comprising, in part, a coil forming machine consisting of a stationary member, provided with vertical guide ways; a head, vertically

adjustable on said guide ways; two coil forming members; a single means, for laterally positioning said coil forming members with respect to each other; a longitudinally slotted shaft, journaled in said stationary member; two coil receiving members, laterally adjustable on said shaft; means carried by said shaft for engaging with the slots in the shaft; and two freely movable coil holding members journaled on said shaft for engaging the ends of the coil to retain parts of said end in substantially their original plane.

In testimony whereof I hereunto set my hand in the presence of two witnesses.

FRANK B. SEGUR.

In the presence of—
W. LINN ALLEN,
MARY F. ALLEN.