July 5, 1932. R. J. EMMERT 1,865,461

ARMATURE WINDING MACHINE

Filed April 11, 1927 3 Sheets-Sheet 1

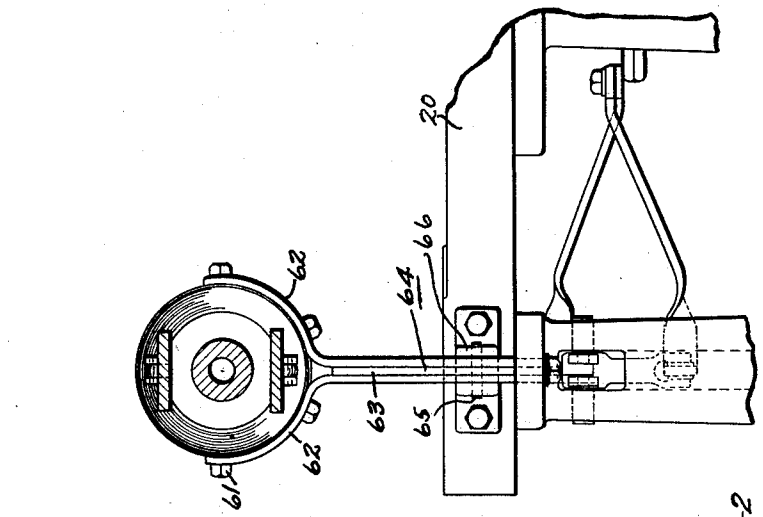


Fig. 2

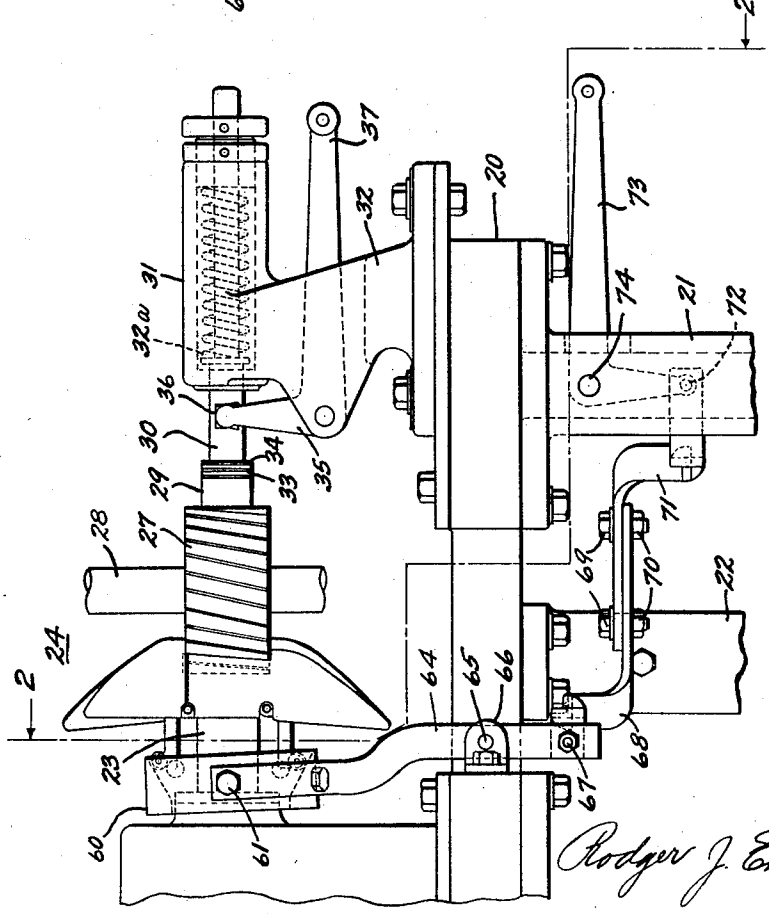


Fig. 1.

Inventor
Rodger J. Emmert
By Spencer Hardman & Fehr
his Attorneys

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ARMATURE WINDING MACHINE

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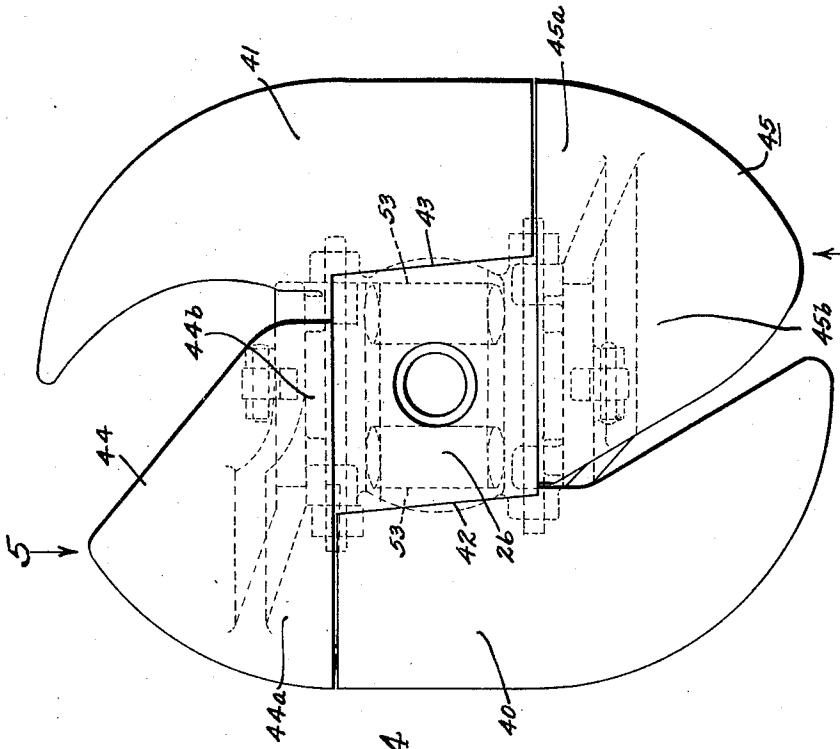


Fig. 4.

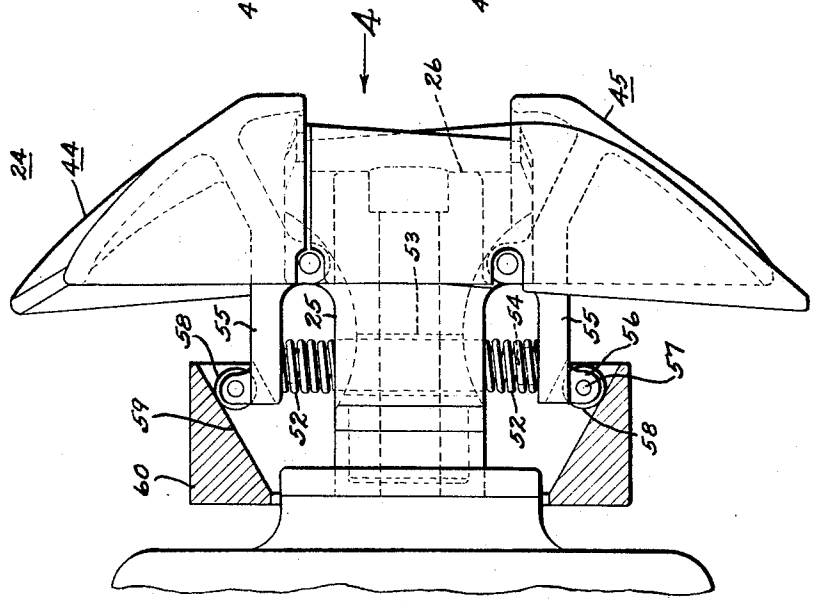


Fig. 3.

Inventor

Rodger J. Emmert

By Spencer Hardman & Fehr

his Attorneys

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ARMATURE WINDING MACHINE

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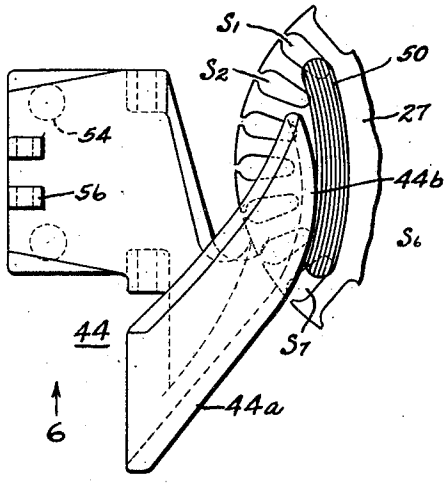


Fig. 5

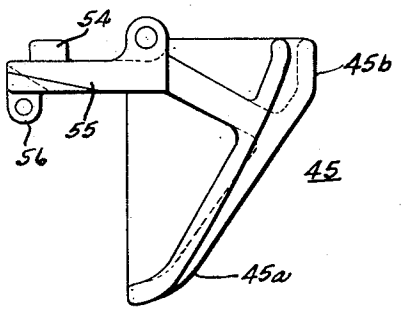


Fig. 8.

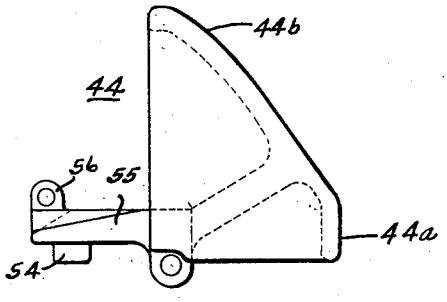


Fig. 6

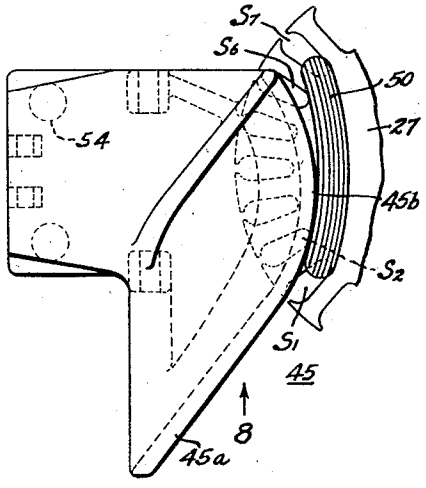


Fig. 7

Inventor

Rodger J. Emmert

By Spencer Hardman & Fehr

his Attorneys

Patented July 5, 1932 1,865,461

UNITED STATES PATENT OFFICE

RODGER J. EMMERT, OF DAYTON, OHIO, ASSIGNOR TO DELCO-REMY CORPORATION, OF DAYTON, OHIO, A CORPORATION OF DELAWARE

ARMATURE WINDING MACHINE

Application filed April 11, 1927. Serial No. 182,602.

This invention relates to apparatus for winding armatures for dynamo electric machines.

One object of the present invention is to provide a machine for winding wire into slots of an armature core, said machine being constructed so as to prevent the wire which passes around the ends of the core, from covering any portion of those slots which are between the slots into which the wire is wound. If, in winding wire upon an armature core into the slots which are spaced relatively closely, the wire portions which lie adjacent the ends of the core are drawn taut, these wire portions will cover portions of the core slots intermediate those slots into which the wire is being wound. Such performance would prevent the use of all of the winding space available in slots which are subsequently to be filled with conductors. When hand winding such a core the wires must be manipulated so that they are pushed toward the center of the core in order that the space adjacent the ends of the wound slots will be kept open. The present invention provides a winding head which guides the wire, as the core is rotated about an axis at right angles to its own axis, in such a manner that the wire lying adjacent the ends of the core will be kept out of the winding region of other coils to be wound.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of one form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a fragmentary side view of a machine constructed in accordance with the present invention.

Fig. 2 is a sectional view on the line 2—2 of Fig. 1.

Fig. 3 is a view on a larger scale than Fig. 1 and shows a side view of the winding head, the part of the control of which is shown in section.

Fig. 4 is a view of the head shown in Fig. 3 looking in the direction of the arrow 4 of Fig. 3.

Fig. 5 is a view looking in the direction of the arrow 5 of Fig. 4 and shows one of the adjustable wire guiding plates of the winding head.

Fig. 6 is a view of the plate shown in Fig. 5 looking in the direction of the arrow 6 in Fig. 5.

Fig. 7 is a view similar to Fig. 5 and shows the other adjustable wire guiding plate of the winding head and is a view looking in the direction of arrow 7 in Fig. 4.

Fig. 8 is a view looking in the direction of arrow 8 in Fig. 7.

Referring to the drawings, a table 20 which is supported by legs 21 and 22 supports a power driven shaft 23 to which a winding head 24 is attached. The head 24 includes a hub 25 providing a recess 26 of cylindrical formation for receiving a slotted armature core 27 which is mounted upon a shaft 28. The core 27 is maintained in engagement with the head 24 as shown in Fig. 1 by a block 29 which is rotatably supported by a rod 30 movable endwise through a guide 31 provided by a bracket 32 attached to the table, 20. A spring 32*a* housed within the guide 31 urges the block 29 against the core 27. In order that the block 29 may rotate freely, an anti-friction thrust bearing 33 is interposed between the block 29 and a flange 34 provided by the rod 30. In order to permit locating the core relative to the winding head the block 29 is retracted from the core 27 by a bell crank lever 35 having an arm engageable with a recess 36 in the side of the rod 30 and an operating arm 37 to which a treadle mechanism not shown may be attached.

The winding head 24 provides wire guiding plates 40 and 41 which meet the cylindrical wall of the recess 26 at edges 42 and 43 respectively. These edges are so spaced that they will coincide with the edges of certain teeth of the armature core in order that the wire will be guided properly by the plates 40 and 41 into certain spaced core slots in a manner which is similar to those using armature winding machines.

In order that the wire which crosses the ends of the core will be directed in such a manner as not to cover the ends of any of

the core slots intermediate those into which a coil is wound, the winding head 24 is provided with other wire guiding or camming plates 44 and 45 having parts 44*a* and 45*a*, respectively, which form continuations of the relatively fixed plates 40 and 41, respectively. The plates 44 and 45 are provided with portions 44*b* and 45*b* respectively which overlie the ends of the core and provide in effect end walls for the recess 26.

Figs. 5 and 6 show the winding of a coil 50 into slots S1 and S7 of the core 27. If the end portions of the coil 50 were drawn straight between the bottoms of the slots S1 and S7 it is apparent that the ends of the slots S2 and S6 would be covered. This would interfere with winding into these slots during subsequent winding operation. The camming surfaces 44*b* and 45*b* are so constructed and arranged that the wires of the coil 50 will be directed against the ends of the core 27 in such a manner as to leave the ends of the slots S2 and S6 open.

The plates 44 and 45 are yieldingly urged against the ends of the core and the wire which may overlie the ends of the core by springs 52 which pass through holes 53 provided in the hub 25 of the winding head 24. Each end of a spring 52 encircles a lug 54 provided by an arm 55 integral with each of the plates 44 and 45. Each arm 55 is provided with a pair of apertured ears 56 carrying a pin 57 for supporting a roller 58. Each roller 58 is engageable with a conical surface 59 of a ring 60. The ring 60 is attached by bolts 61 to bent plates 62 which together with an intermediate plate 63 provide a fabricated lever 64. The lever 64 is pivoted upon a pin 65 supported by bracket 66 attached to the table 20. The lower end of the lever 64 is pivotally connected at 67 with a link bar 68 which is clamped by screws 69 and nuts 70 to a link bar 71. The link bar 71 is pivotally connected at 72 with a bell crank lever 73 which is pivoted at 74 upon the leg 21 of the table 20. The screw 69 may pass through round holes in one of the bars 68 or 71 and through slots in the other of these bars in order that an adjustment may be made horizontally between the pivotal connections 67 and 72. In this way the normal position of the ring 60 may be adjusted relative to the position of the operating lever 73. If desired, the lever 73 may be operated by treadle mechanism not shown.

After winding a coil upon the core 27, both the levers 37 and 73 are pressed downwardly in order to free the core from the block 29 and from the winding plates 44 and 45. When the core is turned to a new position for the next winding operation the lever 37 may be released to permit the spring 32 to move the block 29 into engagement with the core 27 and the lever 73 is released to permit the springs 52 to urge the wire camming plates 44 and 45 toward the ends of the armature core and against any windings which may be wound thereon. Since the application of windings to the core may vary the distance to which the wire camming plates 44 and 45 may approach the core before engaging the wires, the plates are not urged in this manner by a non-yielding resistance but by the springs 52 which simply move the camming plates 44 and 45 as far as they will move toward the core and then yieldingly press them against the core or the windings which cross the ends of the core.

While the form of embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A winding head for armature winding machines comprising, a hub adapted to be mounted on a shaft and providing a recess for receiving an armature core, means for guiding portions of armature coils into certain spaced slots of the core, and means for guiding those portions of the armature coils which overlie the ends of the core upon those parts of the core ends which are inside the bottoms of those core slots located between the slots into which armature coils are being wound.

2. A winding head for armature winding machines comprising, a hub adapted to be mounted on a shaft and providing a recess for receiving a cylindrical armature core, wire guiding plates extending from the hub and having camming surfaces constructed and arranged so as to guide wire into certain spaced slots of the armature core, and independently movable, self adjustable devices attached to the hub and so constructed as to substantially completely cover the ends of the core slots between those slots into which armature coil portions are being wound in order to prevent those portions of said coils which overlie the ends of the core from crossing over the ends of those core slots located between the slots into which armature coils are being wound.

3. A winding head for armature winding machines comprising, a hub adapted to be mounted on a shaft and providing a recess for receiving a cylindrical armature core, wire guiding plates extending from the hub and having camming surfaces constructed and arranged so as to guide wire into certain spaced slots of the armature core, and other wire guiding plates, and means for self-adjustably connecting said other guiding plates with the hub, the said other wire guiding plates being so constructed and arranged as to overlie the ends of the core and to cause wire to be wrapped against the ends of the core without covering the ends of those core slots

between the slots into which wire is being wound.

4. A winding head for armature winding machines comprising, a hub adapted to be mounted on a shaft and providing a recess for receiving a cylindrical armature core, wire guiding plates extending from the hub and having camming surfaces constructed and arranged so as to guide wire into certain spaced slots of the armature core, and other wire guiding plates hingedly connected with the hub and constructed and arranged so as to overlie the ends of the core and to cause wire to be wrapped against the ends of the core without covering the ends of those core slots between the slots into which wire is being wound, and springs for urging said other wire guiding plates towards the ends of the core.

5. An armature winding machine comprising, a shaft, a winding head having a hub attached to the shaft and providing a recess for receiving an armature core, means for retaining the armature core in said recess, wire guiding plates extending from the hub and constructed and arranged so as to guide the wire into certain spaced slots of the armature core, and other wire guiding plates movably secured to the hub and constructed and arranged so as to overlie the ends of the core and to prevent the wire, being wrapped about the ends of the core, from covering the ends of those slots between the slots into which wire is being wound, springs for urging said other wire guiding plates into engagement with the core or the wire located upon the ends thereof, and means for retracting said other wire guiding plates from the ends of the core.

6. A rotatable winding head for armature winding machines comprising means for guiding wire into certain spaced slots of the core, wire guiding plates for guiding those portions of the armature coils which overlie the ends of the core upon those parts of the core ends which are inside the bottoms of those core slots located between the slots into which armature coils are being wound, and means for self adjustably connecting said wire guiding plates with the head.

7. A rotatable winding head for armature winding machines comprising means for guiding wire into certain spaced slots of the core and pivotally supported wire guiding plates constructed and arranged so as to overlie the ends of the core and to cause wire to be wrapped against the ends of the core without covering the ends of those core slots between the slots into which wire is wound, and means for resiliently urging said plates toward the ends of the core.

8. An armature winding machine comprising a shaft, a winding head supported by the shaft, and including means for guiding the wire into certain spaced slots of the armature core and including wire guiding plates movably supported by the head and constructed and arranged so as to overlie the ends of the core and to prevent the wire, being wrapped around the ends of the core, from covering the ends of those slots between the slots into which the wire is being wound, means for resiliently urging said plates into engagement with the core or the wire located upon the ends thereof, and means for retracting the wire guiding plates from the core.

9. In an armature winder, the combination of means for holding the armature core by its ends, means for revolving the holding means, and wire guides mounted on the holding means and disposed at an angle to the plane of revolution of the armature core and so arranged as to lead the wire in from the side.

10. In an armature winder, the combination of means for holding the armature core by its ends, means for revolving the holding means, wire guides mounted on the holding means and disposed at an angle to the plane of revolution of the armature core and so arranged as to lead the wire in from the side, and finger guides located adjacent the wire guides, and arranged to throw the coil being wound beyond the direct line between the two slots in which the coil is being wound.

In testimony whereof I hereto affix my signature.

RODGER J. EMMERT.