March 1, 1927. 1,619,415

A. B. GOMORY

ARMATURE CORE INSULATION

Original Filed Feb. 3, 1923

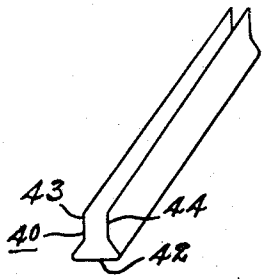

Fig. 1

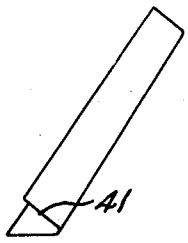

Fig. 2

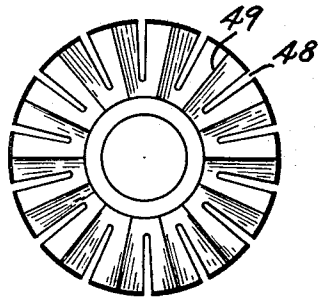

Fig. 3

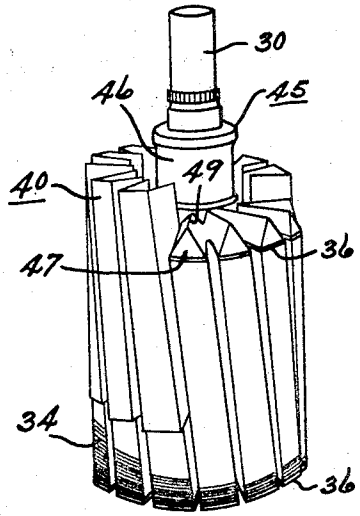

Fig. 4

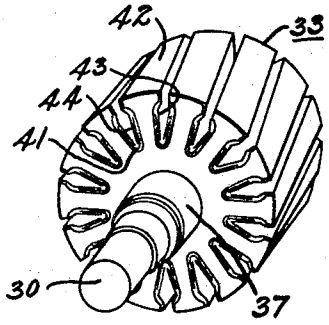

Fig. 5

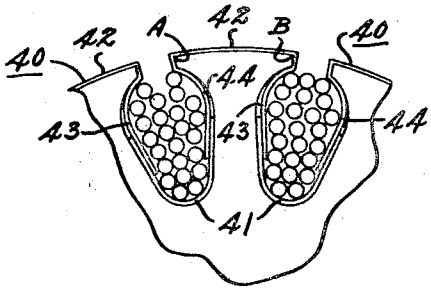

Fig. 6

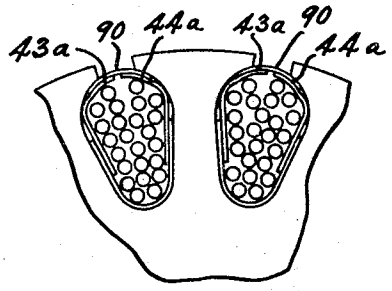

Fig. 7

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UNITED STATES PATENT OFFICE.

ALBERT B. GOMORY, OF ANDERSON, INDIANA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO DELCO-REMY CORPORATION, OF DAYTON, OHIO, A CORPORATION OF DELAWARE.

ARMATURE-CORE INSULATION.

Original application filed February 3, 1923, Serial No. 616,842. Divided and this application filed September 26, 1924. Serial No. 740,057.

This invention relates to the manufacture of armatures for dynamo electric machines and particularly to armatures having open slotted cores.

This application is a division of my co-pending application Serial No. 616,842, filed February 3, 1923.

It is an object of this invention to improve the manner of insulating the armature core in order that during the winding operation the liability of injuring the insulation of the core or the insulation on the armature conductors will be minimized.

A further object of the invention is to provide suitable apparatus for carrying out the process described herein.

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

In the drawings:

Figs. 1 and 2 are perspective views of core slot insulating strips;

Fig. 3 is a plan view of an assembling tool for facilitating the application of the insulating strips to the armature core;

Fig. 4 is a perspective view of an armature core showing the process of inserting the slot insulation;

Fig. 5 is a perspective view of an armature core provided with slot insulation;

Fig. 6 is a fragmentary sectional view of the armature on an enlarged scale with windings in the slots; and

Fig. 7 is a view similar to Fig. 6 and shows a further step in the insulating process.

The armature shown in Fig. 4 includes a shaft carrying a laminated core having iron laminations 34 and nonconducting end laminations 36. Adjacent the laminations 36, the shaft 30 is provided with insulating tubes (one of which is indicated at 37 in Fig. 5) formed preferably by wrapping around the shaft several turns of insulating paper and pasting down the free end.

Before winding the wire upon the armature core it is necessary that the core slots be provided with linings of thin insulating material such as insulating paper or other fibrous material. Especially where the armature coils are to be wound upon the core by a winding machine. It is desirable that the outer periphery of the core teeth as well as the stems of the core teeth which define the winding slots, be covered with insulating paper in order that the insulating wrapping of the wire will not come in contact with any metal part and be injured. It is also desirable that the insulating lining material be arranged so that there will be no edges of it which are located in the path of movement of the wire as it is wound into the armature slots. Heretofore it has been the practice to apply a continuous strip of sheet insulating material against the armature core in a manner such that each core tooth will be entirely covered by a smooth insulating covering. When the windings are applied to a core which has been insulated in this manner the windings tend to press the core insulating material against the stems of the core teeth which define the winding slots. Because the paper cannot stretch to any appreciable degree it will be torn in the effort to push it against the sides of the core teeth. The present invention overcomes this difficulty by providing a novel method of manufacturing an armature which will now be described.

The next step is to line the core slots with bifurcated or U-shaped strips 40 shown in Fig. 1 and with bifurcated or V-shaped strips 41 shown in Fig. 2. Each slot is provided first with a V strip 41 as shown in Fig. 5, and then the U strips 40 are placed around the core teeth with the base portion 42 adjacent the periphery of the tooth and the branch portions 43 and 44 adjacent the stem of the tooth and located outside the V strips 41. To facilitate assembling the U strips upon the core there is provided an assembling tool 45 having a hub 46 which is adapted to embrace the shaft 30 and the insulating tube 37 thereon, and a plurality of fingers 47 of triangular cross section which extend radially from the hub 46. The widest space (indicated at 48 in Fig. 3) between the bases of the fingers 47 is substantially as wide as the space between adjacent core teeth at the periphery of the core. The strips 40 and 41 are preferably of stiff insulating paper and the portions 43 and 44 of the strip 40 are formed so that they have a tendency to spring together. The tool 45 is assembled upon the armature as shown in

Fig. 4 after the V strips 41 have been assembled in position, and each strip 40 is assembled by moving one end thereof adjacent a finger 47 so that the upper edge 49 of the finger acts as a wedge to spread apart the branch portions 43 and 44 of the strip 40, and to cause these portions to enter readily into adjacent armature slots. As each strip 40 is assembled, the branch portions 43 and 44 will spring back into closer relation to each other and will tend to bear against the V strips 41. There is sufficient resiliency in the branches of the insulating strips 41 to cause them to spread out and cling to the sides of the slot. The branch portions of the strip 40 tend to spring together and cling to the V strips 41. In this manner the core slot insulation strips are held prior to the winding operation in properly assembled position simply by means of frictional engagement with the core. The armature is now ready for the winding process.

The winding of the core is performed preferably by means of apparatus and according to a process disclosed in my copending applications Serial No. 616,842 and Serial No. 740,058. The winding of the wires into the core slots causes the V strips 41 to be drawn toward the center of the core while the branches 43 and 44 of the U strips 40 are pressed toward the core teeth. If the slot lining is made of a continuous strip, there is a tendency for the slot lining to tear because there is a tendency to stretch it as the windings are pressed down into the armature slots. In the present method of slot insulation, the branches of the strips 40 and 41 may slide relative to one another so that the lining material may be packed against the sides of the slots without tearing. The strips 41 and 42 are long enough so that their ends come flush with the outer faces of the core insulating disc 36.

After the winding process the armature strips 40 are cut along the edges A and B so that the base portion 42 of each strip 40 can be discarded. The outer edges of the branch portions 43 and 44 are packed down against the armature conductors as indicated at 43^a and 44^a and these edges and the wires are held in position by means of strips of stiff paper 90 shown in Fig. 7. These strips are located between the armature core teeth and the folded down lining portions 43^a and 44^a. A subsequent operation of impregnating the armature with an insulating varnish and baking will cause the lining members to adhere to one another and to the core teeth, and the tendency of the conductors to move out radially due to centrifugal force causes the strips 90 to be clamped even more firmly against the core teeth to prevent the portions 43^a and 44^a assuming a radial position.

While the process and apparatus herein shown and described constitute a preferred embodiment of the invention, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What I claim is as follows:

1. The process of making an armature, having a core provided with open slots which are defined by spaced core teeth having stem portions which are narrower than the portions of the teeth adjacent their outer peripheries, which includes placing within each slot an insulating member which lines the bottom of the slot and portions only of the sides of the slot, placing over each tooth an insulating member which covers the tooth outer periphery and is provided with portions extending within the slot and overlapping those portions of the first insulating member which line the sides of the slot, in winding wire into each slot to cause the bottom of the first lining member to be drawn against the bottom of the slot and the overlapping portions of both lining members to be pressed against the sides of the slot, said overlapping portions sliding the one relative to the other in order to conform to the core teeth sides, and then removing those portions of the second mentioned insulating members which cover the teeth outer peripheries.

2. The process of making an armature, having a core provided with open slots which are defined by spaced core teeth having stem portions which are narrower than the portions of the teeth adjacent their outer peripheries, which includes placing within each slot an insulating member which lines the bottom of the slot and portions only of the sides of the slot, placing over each tooth an insulating member which covers the tooth outer periphery and is provided with portions extending within the slot and overlapping those portions of the first insulating member which line the sides of the slot, in winding wire into each slot to cause the bottom of the first lining member to be drawn against the bottom of the slot and the overlapping portions of both lining members to be pressed against the sides of the slot, said overlapping portions sliding the one relative to the other in order to conform to the core teeth sides, then removing those portions of the second mentioned insulating members which cover the teeth outer peripheries, folding the remaining portions of the second mentioned insulating members against the windings in each slot and inserting a retaining insulating member in each slot between the folded insulating parts and the core teeth ends which define the entrance of the slot.

3. The process of making an armature, having a core provided with open slots which are defined by spaced core teeth having stem

portions which are narrower than the portions of the teeth adjacent their outer peripheries, which includes lining each slot with a bifurcated insulating member having a part for lining the bottom of the slot and branches for lining portions only of the sides of the slot, and lining the sides of each slot with the branch portions of bifurcated insulating members which have yoke portions covering the outer peripheries of the core teeth and branch portions extending within the slots, the branch portions of the lining members overlapping within the slots, in winding wire into each slot to cause the bottom of the first lining member to be drawn against the bottom of the slot and the overlapping portions of both lining members to be pressed against the sides of the slot, said overlapping portions sliding the one relative to the other in order to conform to the core teeth sides, and then removing those portions of the second mentioned insulating members which cover the teeth outer peripheries.

In testimony whereof I hereto affix my signature.

ALBERT B. GOMORY.