Aug. 8, 1933. V. G. APPLE 1,921,112

WIRE WOUND ARMATURE

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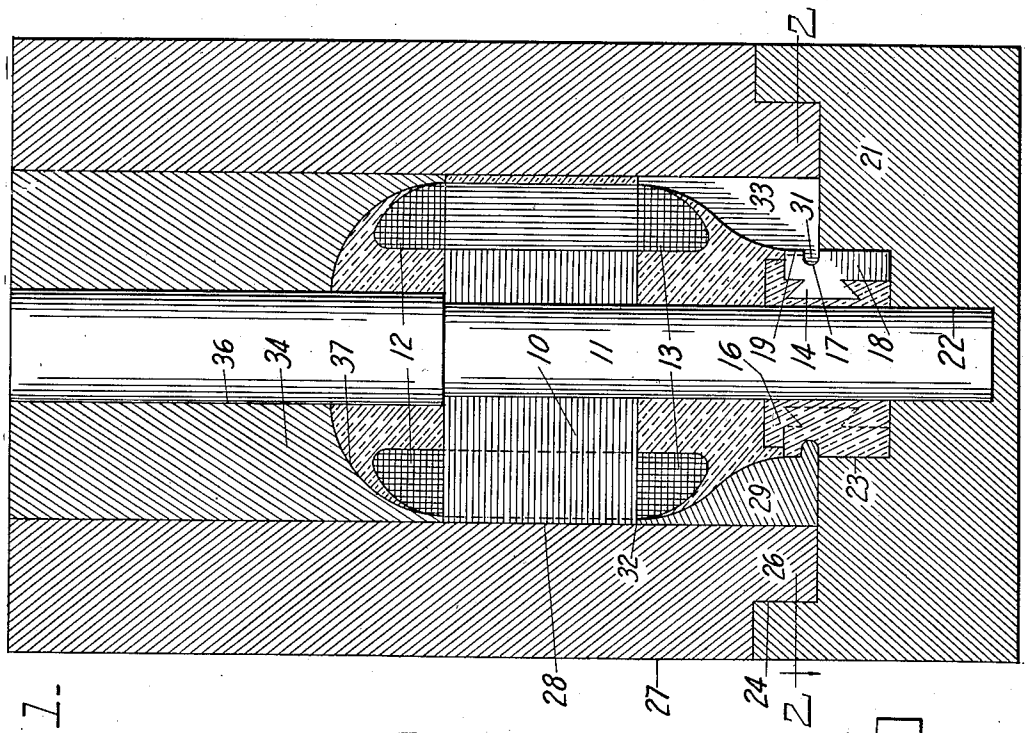


Fig. 1.

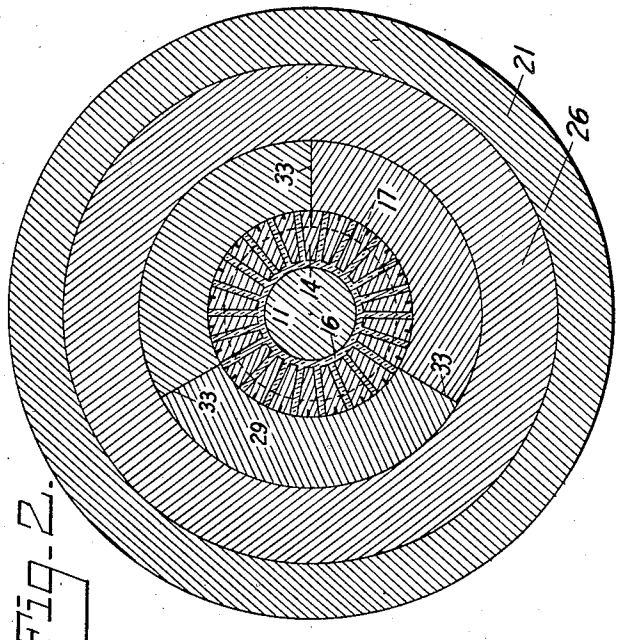


Fig. 2.

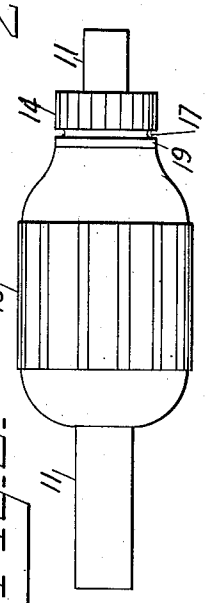


Fig. 3.

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UNITED STATES PATENT OFFICE

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WIRE WOUND ARMATURE

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6 Claims. (Cl. 171—206)

This invention relates to armatures of the class comprising a magnetizable core, a commutator and a wire winding having leads connected to the bars of the commutator.

The object of this invention is to generally improve an armature of this class.

More specifically the objects are to provide an armature wherein the winding is embedded in and surrounded by a mass of hard molded insulation which also extends over and around a part of the commutator, through the interstices of the winding to the shaft, so cementing the several parts together as to effectively prevent relative movement of the core and commutator or of the turns of the wire one with another, to the end that destruction of the armature due to breakage of the fine wires is eliminated, deterioration due to the absorption of oil, moisture and other foreign matter by the winding is prevented, a better running balance will be had, less air resistance to rotation of the armature will be encountered, and better driving relation between the driving and driven elements will be established.

I attain these objects by the structure illustrated in the drawing wherein—

Fig. 1 is an axial section through a mold in which my armature is completed.

Fig. 2 is a transverse section taken at 2—2 of Fig. 1.

Fig. 3 shows the completed armature on a reduced scale.

Similar numerals refer to similar parts throughout the several views.

To produce an armature according to my invention I assemble the core 10 on the shaft 11 then put on the wire winding, the back head 12 and the front head 13 extending beyond the core in the usual manner. The commutator comprising a plurality of segments 14 imbedded in a hub 16 of insulation is then pressed lightly on to the shaft, the press fit being sufficient only to temporarily hold the commutator placed until the wire winding leads are connected to the commutator bars, after which further means are applied to permanently hold the commutator in place.

The commutator has a groove 17 encircling it at its outer diameter dividing its length into two parts, the part 18 being used for the brush track and the part 19 having a longitudinal groove in the top of each segment into which the wire leads are placed and soldered or otherwise electrically connected.

After all connections are made the armature is placed in the mold Fig. 1 which comprises the base 21 having an opening 22 to receive shaft 11, a larger opening 23 to receive part 18 of the commutator and a still larger opening 24 to receive the downwardly extending neck 26 of the mold body 27.

The body 27 has an opening 28 of the diameter of the core 10 all the way through. At the lower end of opening 28 is a collar 29 which surrounds and fits the front winding head 13 closely, having also an annular rib 31 extending into the groove 17 of the commutator. The upper edge 32 of the collar rests against the core 10 so that there is no tendency for the core to be pushed toward the commutator when downward pressure is subsequently applied to the core. The collar is divided into three parts separated by radial planes 33.

In the upper end of the opening 28 of body 27 is the plunger 34 having the central opening 36 to admit the shaft 11 and the cupped out portion 37 at the lower end to fit over the back head 12 snugly.

In placing the armature in the mold the commutator part 18 is first put into the opening 23 of the base 21, the shaft 11 extending through the opening 22. The three parts of collar 29 are then put around the head 13 with the rib 31 in the groove 17. The body 27 is then brought downward with its opening 28 over the core 10 and over the three part collar 29. The insulation is then put in the upper end of the opening 28, the plunger 34 entered and forced downward to the position shown forcing the insulation while fluid through, between and about the winding heads and through, between and about the wires in the core slots, and since the end heads are formed of wires which to a great extent cross over each other the insulation readily penetrates these heads extending through the heads to the shaft 11 to make contact therewith and adhere thereto, so that after the fluid is solidified by such process as the nature of the insulation requires there will be a solid mass of insulation which cements the shaft, the core, the commutator and the windings together, providing driving relation between the shaft and the driven parts, the windings being imbedded in and surrounded by the insulation, that portion surrounding the front head 13 extending also over the hub 16 of the commutator to surround it so as to effectively prevent rotative or axial movement of the commutator relative to the core, either movement being destructive to the armature because the connections of the wires to the segments are usually broken thereby.

Fig. 3 shows the completed armature after re-

moval from the mold, and, considered in connection with the foregoing description, it will be apparent that a better running balance is obtained, less air resistance to rotation is encountered, protection against absorption by the windings of oil, moisture and other foreign matter is assured, relative positioning of the several parts is more firmly secured, and better driving relation between the driving and driven parts is established.

Holding this view of the scope of the invention, I claim—

1. In an armature, a magnetizable core, a winding of insulated wire on said core, a commutator comprising a plurality of metal segments insulatedly spaced apart in a hub in axial alignment with said core and having its segments attached to flexible leads emanating from said winding, and a separate concentric collar of hardened insulating cement extending from the core to the hub of the commutator cementing them together thereby maintaining their spaced apart relation, said winding being imbedded in and surrounded by said collar.

2. In an armature, a magnetizable core, a winding of insulated wire on said core, a commutator comprising a plurality of metal segments insulatedly spaced apart in a hub in axial alignment with said core and having its segments attached to flexible leads emanating from said winding, and a separate concentric collar of hardened insulating cement extending from the core to the commutator and overlapping the inner end of the commutator cementing them together thereby maintaining their spaced apart relation, said winding being imbedded and completely enclosed in said collar.

3. An armature comprising a magnetizable core, a commutator in axial alignment with said core, said commutator being composed of a plurality of segments of conductive material imbedded in a hub of molded insulation, a winding on said magnetizable core composed of a plurality of turns of wire having flexible leads at intervals joined to bars of said commutator, and a separate concentrically molded collar of insulating cement extending from the core to the commutator and overlapping the insulation hub of said commutator cementing the core and commutator together thereby maintaining their spaced apart relation, said winding being imbedded and completely contained in said collar.

4. An armature comprising a shaft, a magnetizable core on said shaft, a commutator comprising a plurality of metal segments insulatedly spaced apart in a hub on said shaft said hub being axially spaced apart from said core, a winding on said core extending beyond the end thereof and surrounding said shaft, flexible lead wires emanating from said winding and connected to said commutator, and a smooth, round, concentric collar of molded insulating cement extending from the core to the commutator hub and through the winding to the shaft completely enclosing the winding and cementing the commutator and winding to the shaft to maintain driving relation therebetween.

5. A method of assembling and permanently uniting a wire wound armature core, an armature shaft, and a commutator, which consists of placing the core on the shaft, placing the winding on the core, lightly pressing the commutator on the shaft, connecting the winding to the commutator, placing the assembled structure in a mold, holding the commutator and core from moving toward or away from each other by a portion of the mold, pressing a mobile insulating cement around the shaft, through and around the winding and the connections, between the winding and the commutator and around the end of the commutator, hardening the cement, then removing the structure from the mold.

6. Steps in the method of making an armature which consists of winding a plurality of turns of insulated wire into the slots of a core leaving circumferentially spaced apart wire leads extending, molding a core of insulation into a plurality of circumferentially spaced apart commutator segments, axially aligning the wound core and the commutator, electrically joining one wire lead to each commutator segment, then molding a separate ring of insulation to permanently align the wound core and commutator and cover and include the winding, the leads and the joints between the leads and the commutator bars.

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