June 10, 1947. G. L. MOELLER 2,421,845

COMMUTATOR STRUCTURE

Filed Sept. 11, 1944

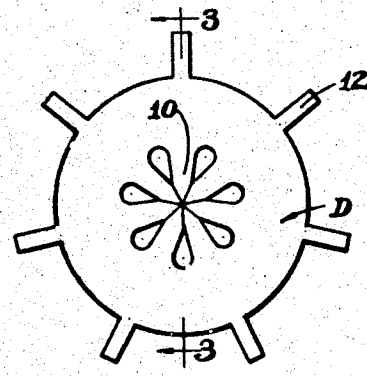


Fig. 1.

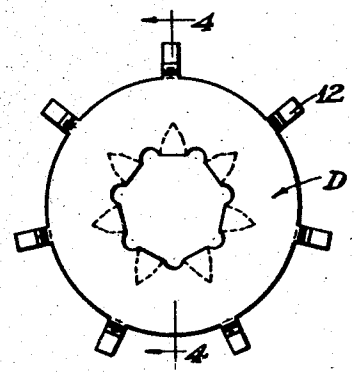


Fig. 2.

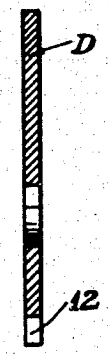


Fig. 3.

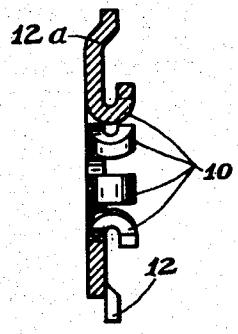


Fig. 4.

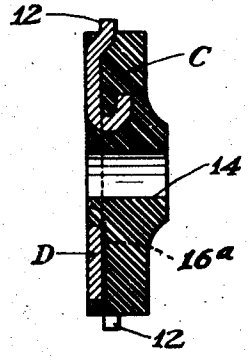


Fig. 5.

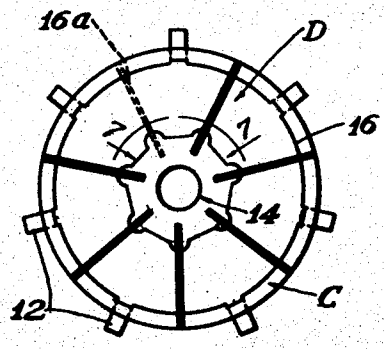


Fig. 6.

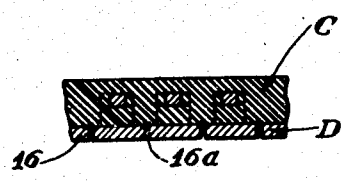


Fig. 7.

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UNITED STATES PATENT OFFICE

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COMMUTATOR STRUCTURE

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Application September 11, 1944, Serial No. 553,578

3 Claims. (Cl. 171—320)

1

My present invention relates to a commutator structure and to a method of manufacturing the same whereby I am able to produce a relatively inexpensive commutator of great resistance to disintegration by centrifugal force.

One object of the invention is to provide a commutator particularly for small motors which can stand rotational speeds as high as 50,000 to 100,000 R. P. M., a disc-type commutator being preferably selected for this purpose.

Another object is to provide a commutator of disc-like character in which the commutator segments may be formed of sheet metal stampings, preferably of course of copper sheet, and in which they are accurately spaced with relation to each other due to being formed initially as a single disc to which a core is molded.

Still another object is to provide a disc with displaced portions around which the core may be molded, the arrangement being such that after the molding operation, the disc may be slotted radially at circumferentially spaced points to provide a plurality of commutator segments accurately positioned with respect to the shaft for the commutator and electrically isolated from each other by a slotting operation which cuts through the washer-like element and into the core of insulating material.

A further object is to provide a commutator structure which may be manufactured by a method that insures alignment of the commutator segments due to their integral initial state, after which the steps for molding a core for the commutator and separating the segments by machining the slots between them completes the commutator and produces one which has many inherent advantages as will hereinafter appear.

With these and other objects in view my invention consists of the construction, arrangement and combination of the various parts of the commutator and in the steps of a method for forming the same whereby the objects contemplated are attained as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawings. Although the invention is susceptible of a variety of embodiments and as the method of forming the commutator may be varied to some extent, it is unnecessary to fully illustrate and describe more than one embodiment of the structure and one method of its fabrication in order to give a full understanding of the invention from its structural, functional and operational standpoints. Accordingly, I have illustrated a preferred and desired embodiment thereof on the accompanying drawings in which:

2

Figure 1 is a plan view of a disc showing the shape in which it is stamped out for producing my commutator structure.

Figure 2 is a similar view of the disc showing portions thereof displaced by a press or forming operation thereby conditioning the disc for molding a core to it.

Figures 3 and 4 are sectional views on the lines 3—3 and 4—4 of Figures 1 and 2 respectively.

Figure 5 is a view similar to Figure 3 with the core molded in position.

Figure 6 is a front view of the commutator with most of the slots cut in it, and

Figure 7 is a laid out sectional view on the line 7—7 of Figure 6 showing the coaction of the core with the disc and showing the radial slotting which results in separating portions of the disc into commutator segments.

On the accompanying drawings, I have used the reference character D to indicate a disc and C, a core. The disc D is washer-like in character and cut from flat copper sheet to the shape shown in Figure 1 with inward projections 10, and terminals 12 which project radially away from the periphery of the disc. The projections 10 are displaced and preferably bent to a hooked shape as shown in Figures 4 and 6 while the terminals 12 have displaced portions 12*a* as shown.

After the disc is cut and formed as just described, the core C is molded against the back face of the disc and embeds the displaced portions 10 and portions of the terminals 12, particularly the displaced portions 12*a* thereof and all but a small portion of the outer end to which rotor winding lead wires may subsequently be soldered. The core C is preferably molded with a shaft hole 14 therethrough and of course the mold is so arranged that the disc is accurately centered with relation to the shaft hole.

After the molding process has been completed, the disc D is radially slotted as indicated at 16, six of the slots being shown cut in Figure 6, and the seventh uncut but dotted.

In Figure 7, two of the slots are illustrated as being cut and the third one dotted at 16*a*. The cut, it will be noted, passes completely through the disc and may extend slightly into the core C in order to make sure that it is all the way through the disc itself to thereby electrically isolate the resulting commutator segments from each other.

I have provided a commutator structure which is inexpensive to manufacture particularly because the commutator segments may be formed initially in one piece of a sheet metal stamping and the core molded into an interlocking rela-

tionship therewith. The steps of the method are relatively few and simple, involving only one machining operation and that is the cutting of the slots 16. This operation isolates the segments electrically from each other and, at the same time, provides the desired "undercutting" of the commutator segments.

The segments are initially connected together for accuracy in position with relation to each other during the core forming step of the process. When the core has been molded and the slots 16 cut, each segment is anchored by its displaced portions 10, 12 and 12*a* as obvious from an inspection of Figure 5. The disc segments are relatively light in weight and are amply embedded in the insulating material which may be Bakelite or the like and I have found that they can attain extremely high speeds without "exploding."

Some changes may be made in the construction and arrangement in the parts of my commutator and the steps of my method may be varied within the scope of the appended claims without departing from the real spirit and purpose of my invention. I therefore intend to cover by my claims such modified forms of structure, and use of mechanical equivalents or equivalent methods which may be reasonably included within their scope.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a commutator structure, a washer-like disc having hook-like portions adjacent the center opening thereof and having at its periphery radially projecting terminals, provided with offset portions a core molded to surround said offset portions of said terminals and said hook-like portions and substantially flush with one face of the disc, said core having a shaft hole therethrough, and said disc and core being slotted radially between said hook-like portions and said terminals for providing electrically separated commutator disc segments.

2. A commutator structure comprising a plurality of triangular shaped disc segments having hook portions and terminals provided with offset portions, and a molded core of insulating material receiving said hook portions and said offset portions of said terminals with the outer ends of the terminals projecting from the periphery of the core.

3. A commutator structure comprising a plurality of circumferentially spaced segments having body portions provided with U-shaped portions which open radially outward, terminal strips at the outer ends of said body portions which are provided with terminal lugs offset from said body portion, and a core for said segments molded to surround said U-shaped portions and said terminals with the exception of said offset terminal lugs which are left free beyond the periphery of the core for soldering of rotor leads thereto.

GEORGE L. MOELLER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,757,393	Schmid	May 6, 1930