

1,360,166.

Patented Nov. 23, 1920.

FIG. 1.

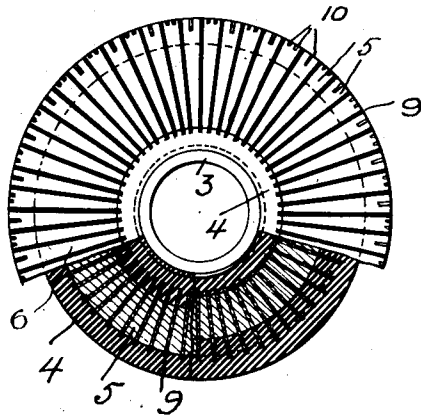


FIG. 2.

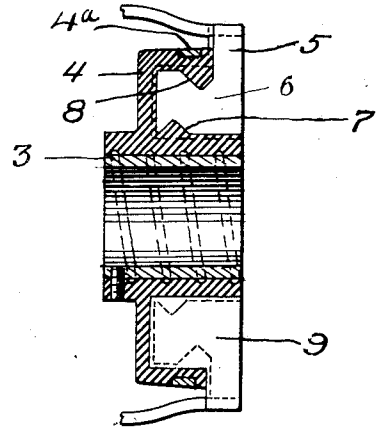


FIG. 3.

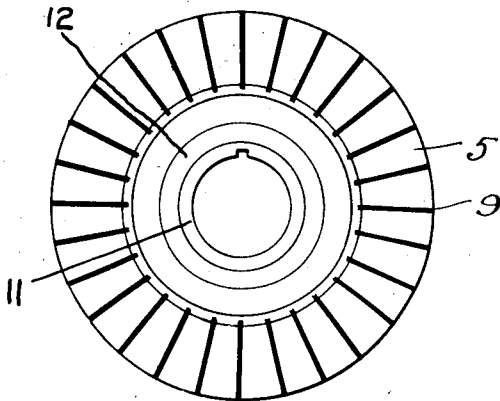


FIG. 4.

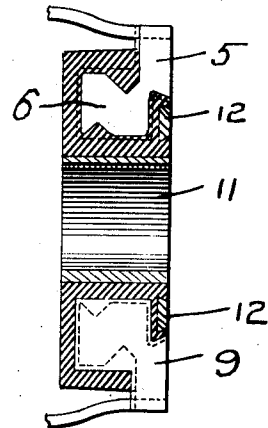


FIG. 5.

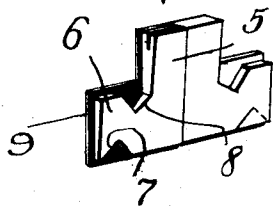
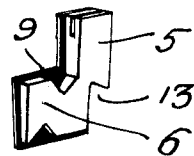


FIG. 6.



WITNESSES

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COMMUTATOR.

1,360,166.

Specification of Letters Patent.

Patented Nov. 23, 1920.

Application filed February 24, 1913. Serial No. 750,377.

To all whom it may concern:

Be it known that I, CHARLES C. ZENK, a citizen of the United States of America, residing at Westfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Commutators, of which the following is a specification, reference being had therein to the accompanying drawing.

10 This invention relates to commutators.

It is particularly applicable to a commutator wherein the commutator bars are held in place by molded insulating material solidified under heat and pressure.

15 Ordinarily, the molded material is formed from a plastic material, such as bakelite or other phenol condensation product, which will harden under heat and pressure.

20 The object of the invention is to reinforce the molded material in holding the bars against radial displacement and strengthen the commutator as a whole.

Other objects will appear from the disclosure hereinafter contained.

25 In accordance with this invention, means, in addition to the molded material, are provided to cooperate therewith to hold the bars in place and strengthen the commutator.

30 The views in the drawings are as follows: Figure 1 is an end view, partly in section, of one form of commutator;

Fig. 2 is a longitudinal section thereof;

35 Figs. 3 and 4, are, respectively, end and sectional views of a modified form of commutator;

Fig. 5 is a perspective of a bar such as may be used in the construction of the commutators shown in Fig. 1; and

40 Fig. 6 is a perspective of a bar such as may be used in the construction shown in Fig. 4.

Figs. 1 and 2 will first be described.

45 A metallic sleeve 3 forms a support for a body of insulating material 4 which insulates and holds in position circumferentially arranged conducting bars 5. These bars are of wedge-shaped cross-section and have their active or commutating faces at substantially right angles to the axis of rotation of the commutator. Such commutators are ordinarily designated "radial commutators." The outer surface of the sleeve, in order to provide a better grip for the body 4, may be spirally ribbed, knurled,

grooved or otherwise roughened. The inner ends of the bars have laterally-extending projections 6, which are embedded in the body of insulating material and have their upper and lower edges provided with notches 7 and 8. The side of these notches interlock with the body 4 and assist in preventing lateral and vertical displacements of the bars.

The bars are separated and insulated from each other by strips of mica 9.

To receive the terminals of the armature windings, the bars may be provided with one or more longitudinal grooves 10, as clearly indicated in Fig. 1.

To strengthen the commutator and assist in holding the bars in place, a ring 4^a is embedded in the body about the extensions 6. This ring aids in resisting the centrifugal forces produced by rotation and cooperates with the body and bars to give the commutator increased durability and strength.

The material composing the body 4 is one which, although ordinarily plastic, hardens under the action of heat and pressure and will not again soften or become weakened upon subsequent rises in temperature. Resinous condensation products possess this property, the most widely known 85 being a phenolic condensation product known commercially as "Bakelite."

90 Figs. 3 and 4 show a modified construction wherein a conducting collector ring is provided in addition to the commutator bars.

The conducting bars 5 have their notched projections 6 embedded in and held by insulating material as before. The body of insulating material and the bars are supported on a metallic sleeve 11. A collector ring 12 is embedded in the front face of the commutator. The sides of the ring are dovetailed, as clearly shown in Fig. 4, so that the body of insulating material can more easily hold the ring in place. In order to provide space for the ring and the material in which it is embedded, part of the front face of the commutator bars and the strips of insulation therebetween are cut away, as shown at 13 in Fig. 6.

Fig. 5 shows a type of bar suitable for producing two radial commutators at the same time. The two similarly notched projections 6 of this type of bar are both embedded 110

in bodies of the insulating material. The structure thus formed by these bars may be cut in two as indicated in Fig. 5, and two radial commutators are produced.

5 What I claim is:

1. A commutator comprising metal commutator bars, a body of heat-hardened resinous condensation product holding said bars in place, and means cooperating with said
10 body to assist in holding the bars in place.

2. A commutator having conducting bars held in place by a body of phenol condensation product, and means cooperating with said bars and body to assist in holding the
15 bars in place and strengthen the commutator.

3. A commutator comprising metal commutator bars having projections embedded in a body of heat-hardened resinous condensation product, and means cooperating with the body and projections to assist in holding the bars in place and strengthen the commu-
20 tator.

4. A commutator having conducting bars held in place by a body of heat-hardened resinous condensation product, and a reinforcing ring cooperating with said body to assist in holding the bars in place and strengthen the commutator.

5. A commutator having conducting bars held in place by a body of bakelite and reinforcing means cooperating with said bars and said body to strengthen the commutator and assist in holding the bars in place.

6. A commutator having circumferentially arranged commutator bars each provided with a ledge extending axially, a plastic material, solidified under heat and pressure, holding said bars in place and overlapping said ledges, means overlying said ledge radially and embedded in said material to resist centrifugal action upon said bars and mate-
35 rial and strengthen the commutator as a whole.

7. A commutator comprising circumferen- 45 tially arranged conducting bars having their active faces at substantial right angles to the axis of rotation and held in place by a body of phenol condensation product, and a reinforcing member cooperating with the body 50 and bars to assist in holding the bars in place.

8. A commutator for electric motors comprising a skeleton body comprising an exterior ring portion, an interior annulus or 55 hub and radial members connecting said hub and ring portion and commutator segments seated in the openings between said radial portions and flush on their brush contact faces with the faces of said radial portions. 60

9. A commutator for electric motors comprising a skeleton body comprising an exterior ring portion, an interior annulus or hub and radial members connecting said hub and ring portion and commutator segments 65 seated in the open spaces between said radial portions and fixed in place by engagement of their edge faces with the edge faces of said radial portions, said ring and said annulus.

10. A commutator having circumferen- 70 tially arranged bars each provided with a ledge extending axially, plastic material, solidified under heat and pressure, holding said bars in place and overlapping said ledge, and a ring surrounding said ledges 75 radially and embedded in said material to resist centrifugal action upon said bars and material and strengthen the commutator.

In testimony whereof I affix my signature in the presence of two witnesses.

CHARLES C. ZENK.

Witnesses:

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CHARLES MCGREGOR.