T. ZIMMERMAN.

COMMUTATOR.

APPLICATION FILED APR. 17, 1914.

1,362,663. **Patented Dec. 21, 1920.**

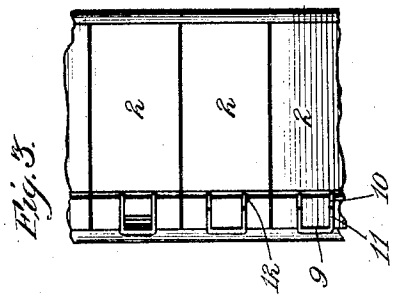


Fig. 3.

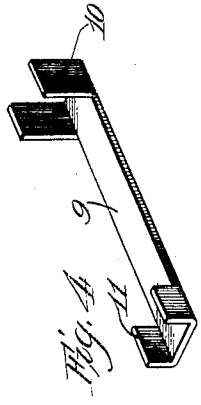


Fig. 4.

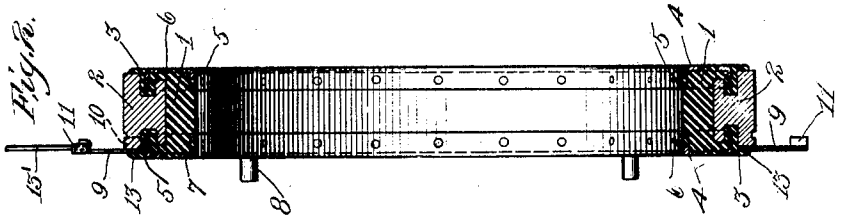


Fig. 2.

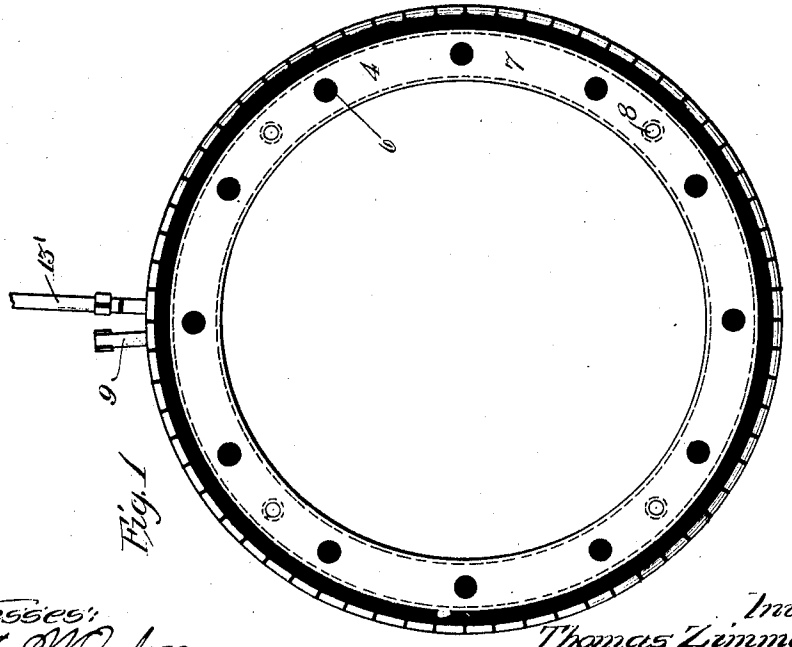


Fig. 1.

Witnesses:
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UNITED STATES PATENT OFFICE.

THOMAS ZIMMERMAN, OF NIAGARA FALLS, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO U. S. LIGHT & HEAT CORPORATION, OF NIAGARA FALLS, NEW YORK, A CORPORATION OF NEW YORK.

COMMUTATOR.

1,362,663. Specification of Letters Patent. Patented Dec. 21, 1920.

Application filed April 17, 1914. Serial No. 832,470.

To all whom it may concern:

Be it known that I, THOMAS ZIMMERMAN, a citizen of the United States, residing at Niagara Falls, in the county of Niagara and State of New York, have invented new and useful Improvements in Commutators, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

This invention relates to improvements in commutators.

It has been proposed heretofore to construct commutators in which the body portion has been formed of insulating material and the metallic commutator sections have been supported and held in place by projecting portions thereof embedded in the insulation, as shown for instance in the patent to Lundell, No. 459,368, issued September 8, 1891.

Such constructions while generally satisfactory for smaller commutators are not satisfactory in the larger sizes, because the insulating material known in the manufacture of commutators, such for instance as porcelain, vulcanite, wood, gutta-percha, sawdust mixed with glue, plaster of Paris, or Portland cement, is not of sufficient strength to hold in place the comparatively heavy mass of metal forming the periphery of the commutator. Consequently the sections of the constructions above referred to tend to work loose from the insulation or the entire commutator may break to pieces under the strain of service.

Applicant has discovered that by using a certain insulating material, hereinafter set forth, combined with certain mechanical devices in a novel way, that a large size of commutator may be produced, able to withstand very high speeds and temperatures.

An object of the present invention is to provide a commutator having a molded insulating body portion in which the commutator sections are under all conditions securely held in place.

Another object of the invention is to provide a commutator having a body portion formed of reinforced plastic material which has been molded and hardened, in which the commutator sections and reinforcing means may be embedded while the material is plastic and held firmly in place therein when the material is hardened.

These and other objects may be attained by the embodiment of the invention herein described and illustrated in the accompanying drawing, in which—

Figure 1 is an elevation of a commutator;

Fig. 2 is a section taken on the diameter of the commutator;

Fig. 3 is a face view of a portion of the commutator;

Fig. 4 is a perspective of an improved commutator terminal.

The body of the commutator is formed of plastic insulating material 1 in which the commutator sections 2 of brass, or other suitable material, are embedded. This insulating material preferably consists of bakelite, condensite, or similar material which has the property of hardening under the action of heat and pressure, and which when hardened possesses considerable strength.

The metallic sections of any desired thickness are preferably H-shaped as illustrated in Fig. 2, whereby a notch 3 is provided on each end of the sections.

In order to reinforce the insulating material and to hold the commutator sections securely in place, a pair of channeled rings 4 are provided which are embedded in the insulating material and have one of their flanges 5 extending into the notches in the sections.

In forming the commutator one of the rings 4 is placed on a suitable base, the commutator sections are supported in their proper positions and are surrounded with sufficient bakelite or other material so that when fully compressed a commutator of sufficient thickness will be formed. The other ring 4 is placed in the plunger of a press which is brought down over the first ring and compresses the plastic material into all the spaces between the rings and sections. When bakelite, or similar material, is used sufficient pressure and heat are applied simultaneously to cause the insulation to thoroughly harden.

In order to anchor the rings securely in place they may be provided with openings 6 in the flanges 5 and bottoms 7 of the channels. The insulating material when forced into these openings and hardened will securely anchor the rings in place so that they will not work loose in service.

Pins 8 may be riveted in place in one of

the rings 4 to position the commutator with respect to the armature.

Fig. 4 illustrates an improved commutator terminal which is adapted to be used with the improved commutator. The terminal consists of a thin strip 9 of conducting material provided with up-turned lugs 10 at one end and up-turned lugs 11 at the other end. One end of the commutator sections may be slotted as illustrated at 12, Fig. 3, to receive the longer terminal lugs 10. To assist in holding these terminals in place in the commutator sections, a flange 13 may be formed in molding the insulating material which extends over the end of the strip 9, as illustrated in Fig. 2. The shorter lugs 11 of the terminal may be bent over to secure a conductor end 13′ as illustrated.

By means of the improved construction, commutators of large size and adapted for comparatively high speed may be constructed of molded material without danger of the sections becoming loosened, or the commutator flying to pieces in service. The rings 4 serve to distribute the strain so that all portions are under substantially equal stress. The flanges of the rings which project into the notches in the commutator sections serve to hold the sections securely in place and relieve the adjacent portions of the bakelite of most of the strain. At the same time the insulating and other properties of the bakelite are fully utilized.

It is to be understood that the embodiment herein described is merely for the purpose of illustration and that various modifications in the construction and arrangement of parts may be made without departing from the invention which is defined in the appended claims.

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

1. A commutator having a body of molded insulating material, notched metallic commutator sections embedded in said material and held in place thereby, and reinforcing members each having a portion extending into the notches in said sections and an opposite portion embracing said insulating material in a position parallel to the axis of rotation of said commutator.

2. A commutator having a molded insulating body of a material of the nature of bakelite, notched commutator sections embedded therein, and channeled reinforcing members also embedded in said material and having portions extending into the notches in said sections.

3. A commutator having a molded insulating body of a material of the nature of bakelite, commutator sections embedded therein, and retaining members embedded in said body and holding said commutator sections in place, said retaining members being provided with holes through which said insulating material extends in a position to resist lateral movement of said members.

4. A commutator having a molded insulating body of a material of the nature of bakelite, commutator sections embedded therein, and retaining members embedded in said body and holding said commutator sections in place, said members having anchoring means to hold them in place.

5. A commutator having a molded insulating body of a material of the nature of bakelite, H-shaped commutator sections embedded therein, and channeled retaining rings having a flange extending into the notches in said commutator sections and having a flange embracing a portion of said insulating body.

6. A commutator having a molded insulating body of a material of the nature of bakelite, H-shaped commutator sections embedded therein, and channeled retaining rings having a flange extending into the notches in said commutator sections and having a flange embracing a portion of said insulating body, said rings being provided with anchoring means for holding the rings in place.

7. A commutator having a body of bakelite, commutator sections embedded therein, and retaining means interlocking said sections and said bakelite body, said means being provided with holes radial of said commutator, portions of the bakelite body extending through said holes.

8. A commutator having a flanged insulating body portion, metallic commutator sections embedded therein, and terminals in electrical contact with said sections and held in place by the flanged part of said insulating body portion.

9. A commutator having a molded body portion, commutator sections held therein, each section being provided with a slotted end, and terminals having lugs extending into said slots, said molded body portion having a flange molded around said terminals to hold the same in place.

10. A commutator having a body of bakelite, commutator sections embedded therein, and annular retaining means of U-shaped cross-section interlocking said sections and said bakelite body, said means being provided with holes extending therethrough radially of said commutator, with portions of said bakelite body extending through said holes.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

THOS. ZIMMERMAN.

Witnesses:
C. A. MUDGE,
H. A. HARVEY.