May 5, 1925. 1,536,328

L. CARUSO

COMMUTATOR

Filed March 31 , 1923

Fig.1.

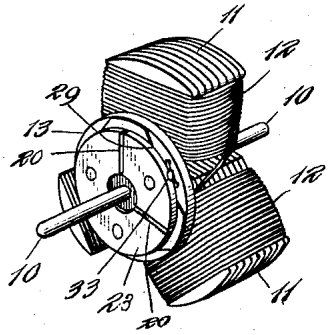


Fig.2.

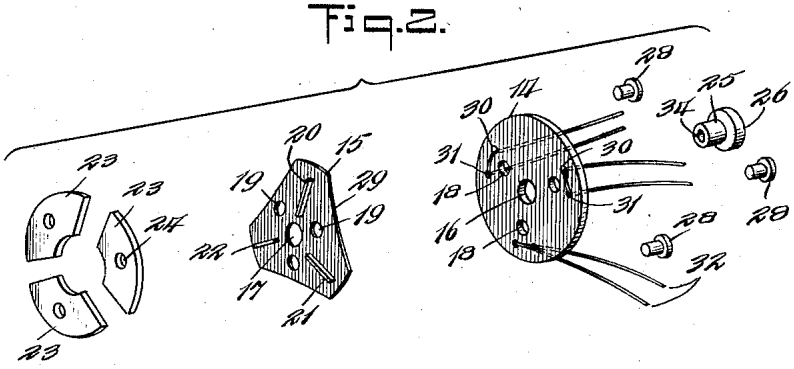


Fig.3.

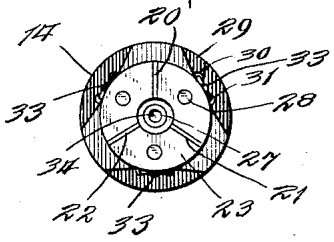
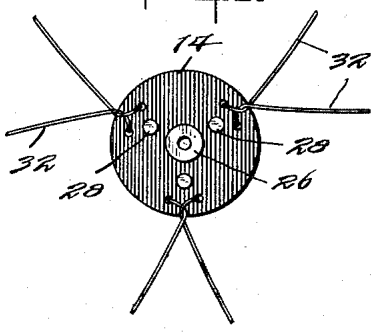


Fig.4.



INVENTOR

Louis Caruso,

BY

Jacob S. Liberman

ATTORNEYS

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UNITED STATES PATENT OFFICE.

LOUIS CARUSO, OF IRVINGTON, NEW JERSEY, ASSIGNOR TO THE LIONEL CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

COMMUTATOR.

Application filed March 31, 1923. Serial No. 628,973.

To all whom it may concern:

Be it known that I, LOUIS CARUSO, a citizen of the United States, and a resident of Irvington, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Commutators, of which the following is a specification.

This invention relates to commutators and is more particularly directed to a disk-type commutator suitable for use in small motors operating at comparatively low speeds, and a method of making the same.

There is a considerable demand for such motors for use as a toy or for an operating mechanism for toys, and the like. These motors are to be operated from a low potential circuit, usually dry batteries, or transformers and it is unnecessary for them to operate at high speed. One can therefore design a commutator for motors of this type without reinforcing it to take care of centrifugal force attained at high speed, and without insulating it for commercial lighting circuit potentials. Furthermore as these devices must be sold at a comparatively low price it is desirable to make them as cheaply as possible and yet have them give satisfactory service.

The principal object of the present invention is to provide a commutator—preferably of the disk type—which may be made at a low price and yet be serviceable.

Other objects of the invention are to provide an improved arrangement of insulating material, an improved arrangement of armature leads, an improved mounting for the commutator, and an improved method of manufacturing the commutator.

In the accompanying drawings there is shown, for purposes of illustration, one of the many possible embodiments in which the invention may take form. In these drawings:

Fig. 1 is a perspective view of a rotor with commutator mounted adjacent the armature.

Fig. 2 is an exploded view of the parts of the commutator.

Fig. 3 is a view of the exposed or working face of the commutator, and

Fig. 4 is a rear view of the commutator.

As shown in Figure 1, the rotor has a shaft 10, armature core 11, armature windings 12, and a commutator 13. The present invention relates to the latter, while the armature and armature coils may be of any standard type, those shown here being merely for purposes of illustration.

The supporting structure for the commutator segments, as herein shown, includes two disks 14 and 15, both of which are preferably made of insulating material. The disks 14 and 15 are each provided with central apertures 16 and 17 and with a plurality of regularly spaced rivet holes 18 and 19, the number of rivet holes depending upon the number of segments of the commutator. The insulating disk 15 is provided with a number of regularly spaced radial fins 20, 21 and 22 which extend from near the central hole 17 out toward the outer periphery of the disk. Commutator segments 23 are provided of a proper size to fit in the space between the fins, these segments having apertures 24 so located as to be in line with the apertures 18 and 19 in the insulating disks.

A hollow rivet 25, preferably provided with a comparatively large head 26, is passed through the holes 16 and 17 and riveted over on to the disk 15 as shown at 27 in Fig. 3. This rivet serves to hold the insulating parts together and also as a mounting for the commutator on the shaft 10. A plurality of smaller rivets 28 is also provided these rivets being of the proper size to pass through holes 18, 19 and 24. The rivets are passed through these holes, the heads of the rivets abutting the rear face of the disk 14, while the small ends of the rivets are riveted over on to the faces of the segments 24. After these riveting operations have been carried out the contact surfaces of the commutator segments and exposed rivets may be turned down and polished so that proper contact may be made with the brushes.

As here shown the insulating disk 15 is of the same outside diameter as the disk 14 and is shown as having cut-away portions 29 which extend a short distance underneath the outer edges of the commutator segments, more clearly shown in Fig. 1. The disk 14 is provided with a plurality of pairs of holes 30 and 31 each pair of holes being ad-

jacent one of the rivet holes 18. These holes are so located that they are very close to the outer edge of the corresponding commutator segment so that armature leads may be readily connected to the commutator. These leads may conveniently be in the form of a short piece 32 of enameled copper wire looped through each pair of holes as shown. This piece of wire passes adjacent the commutator segment and may be fastened to it by scraping the enamel off the wire and applying a drop of solder 33 as shown in Fig. 1. The ends of the loop of wire provides the two leads for connecting each commutator segment with the armature coils so that the armature circuit may be properly completed after the commutator has been mounted on the rotor shaft. This mounting may be easily carried out by having the hole 34 in the hollow rivet 26 of a proper size so that a pressed fit may be obtained by forcing the commutator over the shaft 10. As it is desirable to properly locate the commutator relative to the armature, for example, to provide room for making the connections, and for an insulating sheet to insulate the rivets 28 from the armature, the rivet 25 is provided with a comparatively large head 26 which acts as a spacer to position the commutator.

The commutator which has now been described is one which has been found to be susceptible of quantity production at low cost, and one which operates in an entirely satisfactory manner on the type of motor for which it is designed. Furthermore, it is easy to assemble the commutator and other parts of the rotor and then make the connections, which may be accomplished by merely soldering the leads together. The insulating support may be made up of a single piece of insulating material instead of two pieces as described, and the disk 15 may, if desired, be of the same diameter as the outside of the commutator segments.

I claim:

1. A commutator comprising a flat insulating disk having radial fins on one face and an aperture between each of the fins, commutator segments, and rivets passing through the segments and apertures to fasten the segments against the face of the disk with their ends engaging the fins, the fins preventing the twisting of the commutator segments on the rivets.

2. In a commutator, a supporting disk having a plurality of holes therein for rivets for the commutator segments, and a pair of holes adjacent each rivet hole whereby a pair of leads may be introduced for each commutator segment.

3. In a commutator, an insulating disk having a plurality of integral radial fins on one face.

4. In a commutator, an insulating disk having a plurality of integral radial fins on one face and rivet holes intermediate the fins.

5. A commutator having a supporting disk, an insulating disk having a plurality of integral radial fins on one side, commutator segments, and rivets, each rivet passing through a commutator segment and both disks to fasten the commutator segment to the outside face of the insulating disk with the ends of the segments engaging the fins.

6. In a commutator, a disk-shaped insulating support, and commutator segments carried on one face of the support, the support extending beyond the commutator segment, the extending portion of the support being provided with a pair of holes adjacent each commutator segment for the purpose of permitting the ready attachment of the respective armature lead.

7. In a commutator, a disk-shaped insulating support, commutator segments carried on one face of the support, the support extending beyond the commutator segments, the extending portion of the support being provided with a pair of holes adjacent each commutator segment, and a wire looped through the holes of each pair and soldered to the commutator segment.

8. A commutator having a supporting disk, an insulating disk, a hollow rivet passing through both disks to fasten them tightly together, and commutator segments carried on the exposed surface of the insulating disk, the hollow rivet forming a bushing for mounting the commutator on a shaft.

9. In a commutator a disk-shaped insulating support, a hollow rivet passing through the center of the support, said rivet having a projecting head, whereby the support may be spaced along a shaft passing through the hollow rivet.

10. A commutator having a disk-shaped insulating support, commutator segments carried on one face thereof, and a hollow rivet passing through the center of the support, said rivet having a head projecting from the opposite face of the support to space it along a shaft passing through the hollow rivet.

11. In a commutator an insulating member, commutator segments mounted on one side thereof, there being a pair of apertures in the member adjacent each commutator segment, and a wire threaded through the holes and connected with the commutator segments, the free ends of the wire constituting armature leads.

12. In a commutator, a disk-like insulating support one face of which is provided with radial fins, commutator segments intermediate the fins, rivets each of which pass through the support and one commutator segment, there being holes in the support adjacent each commutator segment, and armature leads passing through the holes, each

lead being soldered to a commutator segment.

13. The method of making a commutator which comprises riveting commutator segments alongside one face of an insulating disk-like support with the outer edge of the segments adjacent holes in the support passing armature leads through the holes in the support to bring the leads close to the segments, and soldering them to their respective commutator segments.

Signed at Irvington in the county of Essex and State of New Jersey this 25th day of March, 1923.

LOUIS CARUSO.