April 13, 1943. G. L. MOELLER 2,316,651

COMMUTATOR STRUCTURE

Filed March 23, 1942

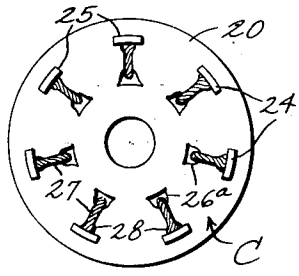


Fig. 1.

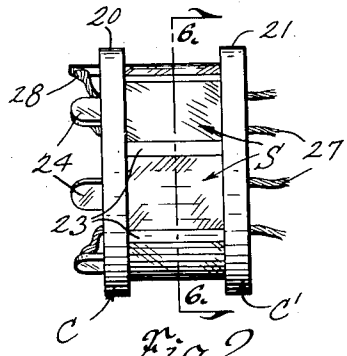


Fig. 2.

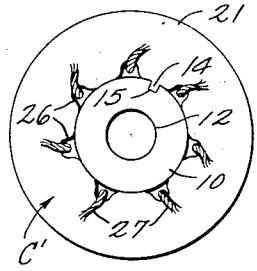


Fig. 3.

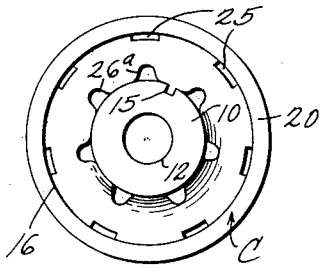


Fig. 4.

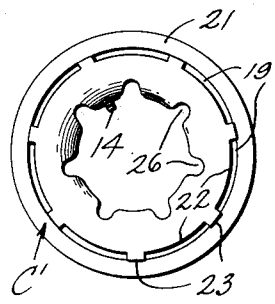


Fig. 5.

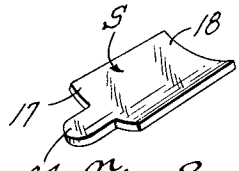


Fig. 8.

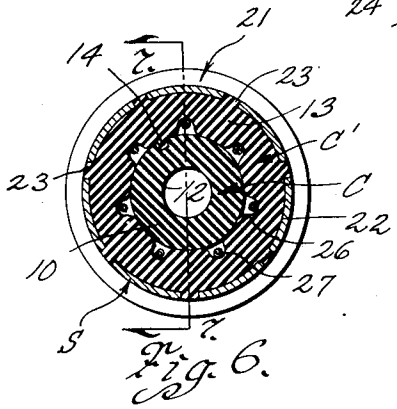


Fig. 6.

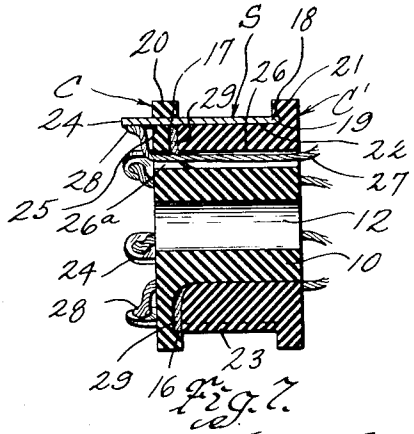


Fig. 7.

Inventor
George L. Moeller
by Bair & Freeman
Attorneys

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2,316,651

COMMUTATOR STRUCTURE

George L. Moeller, St. Louis, Mo., assignor to Knapp-Monarch Company, St. Louis, Mo., a corporation of Missouri

Application March 23, 1942, Serial No. 435,758

10 Claims. (Cl. 171—321)

My present invention relates to a commutator structure wherein the core for the commutator may be made of Bakelite or similar insulating material, the commutator segments being inserted with respect to the core and connected with the armature winding leads.

One object of the invention is to provide a commutator structure, the core of which may be inexpensively formed of molded Bakelite or the like, formed commutator segments being associated in such manner therewith that there is ample anchorage for the commutator segments against throwing out of place under the action of centrifugal force.

A further object is to provide the commutator core formed of two core elements of molded insulating material telescopically associated with each other and secured together as by cementing or the like, semi-circular commutator segments being insertable between the two core elements before they are assembled and effectively retained in position and in accurate alignment with the shaft on which the commutator structure is mounted after the core elements are cemented in assembled position.

A further object is to provide the core elements so designed as to have overhanging portions coacting with the ends of the commutator segments to confine them against throwing out of position by centrifugal force, the segments being so designed as to have extensions through the ends of the commutator to a position where armature winding leads may be readily soldered thereto.

Still a further object is to provide the core elements so constructed as to receive the armature winding leads and effectively retain them in position against the action of centrifugal force without imposing their weight on the commutator segments.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my device whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawing. Although the invention is susceptible of a variety of embodiments, it is unnecessary to fully describe and illustrate more than one in order to give a full understanding of the invention both from its structural and functional standpoints. Accordingly, I have illustrated a preferred and desirable embodiment of the invention in the accompanying drawing, in which:

Figure 1 is an outer end elevation of a commutator structure embodying my invention and showing the armature winding leads associated therewith;

Figure 2 is a side elevation thereof;

Figure 3 is an inner end elevation thereof;

Figures 4 and 5 are end views of two core elements which are telescoped together to form the core of my commutator;

Figure 6 is a sectional view on the line 6—6 of Figure 2;

Figure 7 is a sectional view on the line 7—7 of Figure 6; and

Figure 8 is a perspective view of a commutator segment used in connection with the telescoping core elements.

On the accompanying drawing I have used the reference character C to indicate an outer core element, that is, the one on the outer end of the armature shaft, and C^1 the core element on the inner end of the armature shaft. The core elements C and C^1 are telescoped together, the outer core element C having a tubular portion 10 provided with a bore 12 to fit the armature shaft. The inner core element C^1 has a sleeve-like portion 13 telescoping over the tubular portion 10. The two are rotationally fixed with relation to each other by a key 14 formed on the inner core element C^1 fitting in a keyway 15 formed in the outer core element C. The core elements C and C^1 are formed of molded insulation, such as Bakelite or the like, the key 14 and the key-way 15, of course, being formed by molding them of the material of the core elements.

The core element C is provided with an annular shoulder 16 constituting an overhanging portion for one marginal end of a commutator segment. The commutator segment is shown at S, and the marginal end referred to is indicated at 17. There is a plurality of the commutator segments S, and each segment has its opposite marginal end (indicated at 18) received in a semi-circular groove 19 formed in the core element C^1. The core elements have the annular shoulder 16 and the groove 19 formed in flanges 20 and 21 formed at the ends of the tubular portion 10 and the sleeve portion 13 respectively. The grooves 19 also form overhanging portions for the marginal edges 18 of the segment S.

The sleeve-like portion 13 is provided with semi-circular seats 22, one for each segment S, and between the seats there are ribs 23 formed of the insulating material to separate the commutator segment edges and insulate them relative to each other, as in usual commutator construction practice.

Each segment S is provided with a reduced extension 24, which extends through a slot 25 in the flange 20 of the core element C so as to project beyond the outer face of the flange 20. The sleeve-like portion 13 is also provided with axially extending grooves 26 through which the commutator winding leads 27 extend from the inner face of the flange 21 (right side of Figure 7) past the outer face of the flange 20. The terminal ends of the leads 27, indicated at 28, are then soldered to the commutator segment extensions 24 to provide an electrical connection between the armature winding coils and the segments.

During the assembly of the commutator structure the segments S are each placed in its respective seat 22 of the core element C^1, and the core element C is then telescoped into position with the commutator segment extensions 24 passing through the slots 25. Before telescoping the core elements together, a plastic cement, indicated at 29, is inserted in the recess formed in the inner face of the flange 20 and outlined by the shoulder 16. Accordingly, when the core elements C and C^1 are fully telescoped together, the outer end of the sleeve portion 13 contacts with the cement, and a bond is thereby formed between the flange 20 and the end of the sleeve-like portion 13, so that the commutator core is held against subsequent disassembly. The commutator may then be mounted on the armature shaft with the bore 12 surrounding the shaft and secured thereto in any suitable manner, with the leads extending through the grooves 26 for subsequent connection at 28 with the commutator segments.

My commutator structure is designed for efficient retention of the commutator segments against any possibility of being thrown out of position with respect to the core. In connection with molded Bakelite commutator cores, this has been a problem, as the usual construction, having commutator bars cemented into grooves of the core, has been found unsatisfactory. With the grooves 19 forming over-hanging portions with respect to the ends 18 of the segments S, and the shoulder 16 similarly overhanging the ends 17 of the commutator segments, I have found that the throw-out of commutator segments is eliminated, and, at the same time, a relatively simple commutator assembly is provided.

Some changes may be made in the construction and arrangement of the parts of my device without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure, or use of mechanical equivalents, which may be reasonably included within their scope.

I claim as my invention:

1. In a commutator structure, a core comprising a pair of core elements of insulating material telescoped together and a plurality of semi-circular commutator segments, the outer core element having semi-circular seats for the commutator segments with insulation ribs between them, both of said core elements having portions overhanging said commutator segments to retain them against outward movement under the action of centrifugal force, one of said core elements having openings therethrough from said seats, said commutator segments having reduced extensions projecting through said openings, one of said core elements having grooves therein extending axially thereof between the telescoping surfaces of said core elements, and armature winding leads through said grooves and electrically connected with said commutator segment extensions.

2. In a commutator structure, a core comprising a pair of core elements telescoped together and a plurality of semi-circular commutator segments, the core having semi-circular seats for said commutator segments and separating ribs between them, said core elements having portions overhanging said commutator segments to retain them against outward movement under the action of centrifugal force, and armature winding leads connected with said commutator segments.

3. In a commutator structure, a core comprising a pair of core elements of insulating material and a plurality of commutator segments, the core having spaced seats for said commutator segments and having portions overhanging said commutator segments to retain them against movement outward from the axis of rotation, said commutator segments having extensions projecting beyond the end of said core, and armature winding leads connected with said commutator segment extensions.

4. A commutator structure comprising a pair of core elements of insulating material telescoped together and a plurality of semi-circular commutator segments, the outer core element having seats for the commutator segments and having separating ribs between the adjacent edges of the segments, said core elements having portions overhanging the end of said commutator segments to retain them against outward movement, said commutator segments having extensions projecting beyond said overhanging portions, and armature winding leads through said core elements and connected with said commutator segment extensions.

5. In a commutator structure, a core comprising a pair of core elements and a plurality of semi-circular commutator segments, one of said core elements having spaced semi-circular seats for the commutator segments with insulation ribs between them, both of said core elements having portions overhanging the ends of said commutator segments to retain them against movement away from the axis of rotation under the action of centrifugal force, one of said core elements having openings therethrough from said seats, said commutator segments having extensions projecting through said openings, and armature winding leads connected with said commutator segment extensions.

6. A commutator structure comprising a pair of core elements of insulating material having sleeve portions telescoped together and a plurality of semi-circular commutator segments, the outer core element having semi-circular seats in its sleeve portion for the commutator segments, both of said core elements having portions overhanging the commutator segments and one of the core elements having openings therethrough from said seats, said commutator segments having extensions projecting through said openings, one of said core elements having grooves therein extending axially thereof between said sleeve portions, and armature winding leads through said grooves and connected with said extensions.

7. A commutator structure comprising a pair of core elements having sleeve portions telescopically associated, said core elements being cemented together and having end flanges, a plurality of semi-circular commutator segments between said flanges, the sleeve portion of one of said core elements having semi-circular seats in its outer surface for said commutator segments with insulat-

ing ribs between the segments, said flanges constituting overhanging portions with respect to the ends of said commutator segments to retain them against outward movement under the action of centrifugal force, said sleeve portions being keyed together, one of said flanges having openings therethrough from said seats, said commutator segments having extensions projecting through said openings, one of said core elements having grooves extending axially thereof between the telescoping surfaces of said core elements, and armature winding leads through said grooves and electrically connected with said commutator segment extensions.

8. In a commutator structure, a core comprising a pair of core elements of insulating material, one having a tubular portion and the other having a sleeve portion telescopically receiving said tubular portion, said core elements being cemented together and having end flanges, a plurality of commutator segments between said flanges, said sleeve portion having seats in its outer surface for said commutator segments and having insulating ribs between said seats, said flanges constituting overhanging portions with respect to the ends of said commutator segments to retain them against outward movement from the axis of rotation of said commutator structure, said tubular portion and said sleeve portion being keyed together, one of said flanges having openings therethrough from said seats, said commutator segments having extensions through said openings, and armature winding leads electrically connected with said commutator segment extensions.

9. In a commutator structure, a core comprising a pair of core elements, one having a sleeve portion telescopically receiving the other one, a plurality of commutator segments, said sleeve portion having seats therein for said commutator segments, said core elements having overhanging portions to retain said segments against outward movement under the action of centrifugal force caused by rotation of said commutator structure, said core elements being keyed together, one of said core elements having openings therethrough from its commutator segment seats, said commutator segments having extensions projecting through said openings, and armature winding leads through said core elements between the telescoping surfaces thereof and electrically connected with said commutator segment extensions.

10. A commutator structure comprising a pair of core elements of insulating material, one having a tubular portion and the other having a sleeve portion telescopically receiving said tubular portion, said core elements having end flanges, a plurality of commutator segments between said flanges, said flanges constituting overhanging portions with respect to the ends of said commutator segments to retain them against outward movement from the axis of rotation, grooves extending axially between the telescoping surfaces of said tubular portion and said sleeve portion, and armature winding leads through said grooves and electrically connected with said commutator segment extensions.

GEORGE L. MOELLER.