

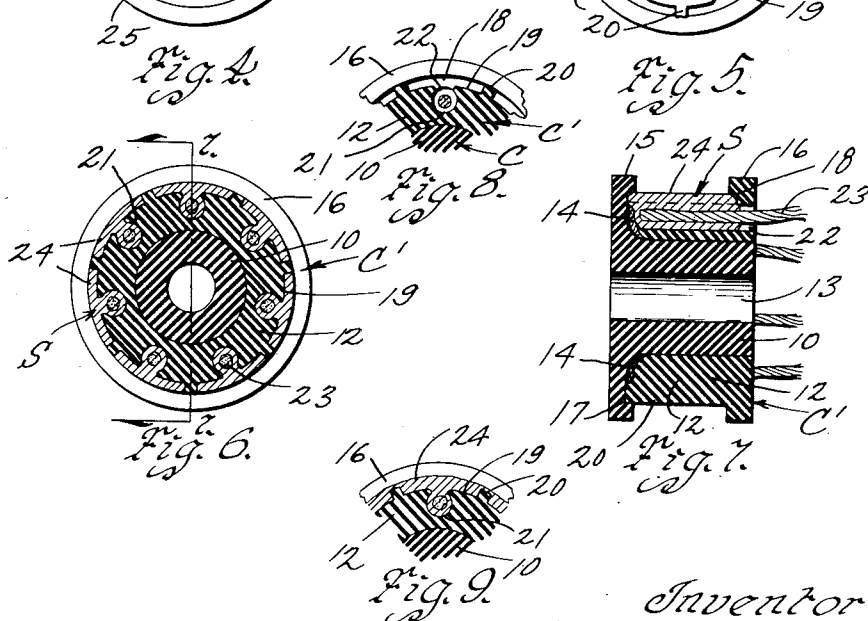
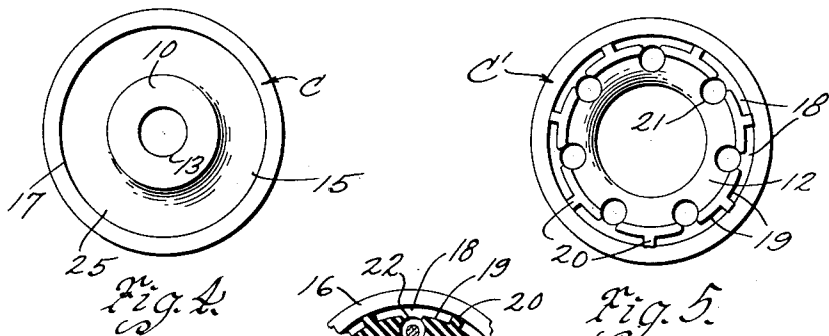
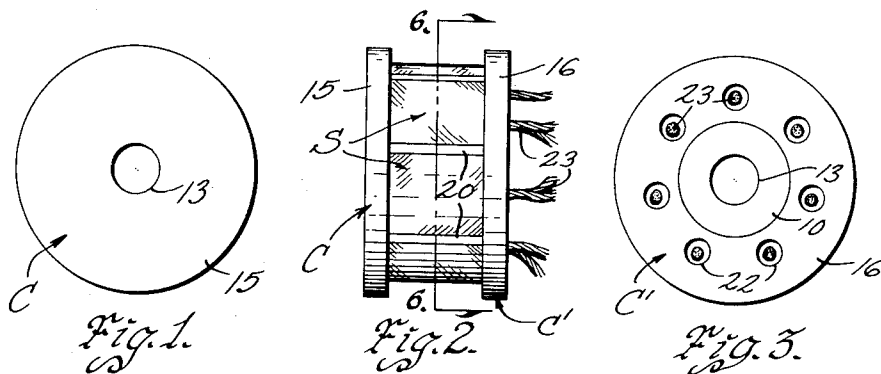
April 13, 1943.

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2,316,652

COMMUTATOR STRUCTURE AND METHOD OF FORMING THE SEGMENTS THEREOF

Filed March 23, 1942



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UNITED STATES PATENT OFFICE

2,316,652

COMMUTATOR STRUCTURE AND METHOD
OF FORMING THE SEGMENTS THEREOFGeorge L. Moeller, St. Louis, Mo., assignor to
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Application March 23, 1942, Serial No. 435,759

14 Claims. (Cl. 171-321)

My present invention has to do with a commutator structure wherein the core of the commutator may be molded of Bakelite or similar insulating material, and with a method of forming the commutator segments thereof.

One object of the invention is to provide a molded core with a novel type of commutator segment and a method of forming such segments which consists of spraying melted metal, such as copper or the like, into commutator segment seats formed in the insulating core and provided with grooves communicating with the seats in which the armature winding leads are positioned so that the sprayed metal, while in melted condition, flows around the leads and becomes bonded thereto.

A further object is to provide a commutator structure which may be inexpensively formed by simple molded core elements telescoped together and thereafter provided with segments in the form of melted metal sprayed into commutator seats thereof, one of the core elements having insulation ribs to separate the segments, and the segments, after the spraying operation, being machined down substantially to the tops of these ribs.

Still a further object is to provide a method of forming commutator segments from melted and sprayed metal directly in position with respect to the core of the commutator as distinguished from separately formed segments, individually inserted in position in the seats of the core.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my device, and in the steps of a method for forming the commutator segments thereof 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, and the method of forming the commutator segments may be varied to some extent, it is unnecessary to fully describe and illustrate more than one embodiment of the structure and method in order to give a full understanding of the invention from its structural and functional standpoints. Accordingly, I have illustrated a preferred and desirable embodiment on the accompanying drawing wherein:

Figure 1 is an outer end view of a commutator structure embodying my invention;

Figure 2 is a side elevation thereof showing the armature winding leads associated therewith;

Figure 3 is an inner end elevation thereof;

Figures 4 and 5 are end elevations of the core elements of the commutator core elements before being telescoped together for final assembly;

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

Figures 8 and 9 are sectional views similar to the top portion of Figure 6, showing respectively steps in the method of forming commutator segments wherein Figure 8 shows an armature winding lead inserted in position and Figure 9 shows the commutator segments formed of melted metal sprayed into position prior to machining the outer surface of the segments down to the shape shown in Figure 6.

On the accompanying drawing I have used the reference characters C and C' to indicate respectively a pair of core elements formed of insulating material, such as Bakelite or the like, the element C being the one on the outer end of the armature shaft and the element C' being the one on the inner end thereof. The elements C and C' are provided respectively with a tubular portion 10 and a sleeve-like portion 12. The portions 10 and 12 are telescoped together during assembly, and the portion 10 has therethrough a bore 13 adapted to receive the armature shaft. The two core elements are retained in assembly with relation to each other by plastic cement, indicated at 14.

The core elements C and C' are provided with end flanges 15 and 16 respectively, the flange 15 having an annular shoulder 17 and the flange 16 having a plurality of grooves 18, one for each commutator segment S. The grooves 18 are relatively shallow and form continuations of commutator segment seats 19 formed in the outer surface of the sleeve-like portion 12, which seats are defined by ribs 20 of insulating material formed between them. Communicating with each seat 19 is a groove 21. Each groove 21 communicates at its inner end with an opening 22 forming a continuation of the groove and passing through the inner flange 16.

Armature winding leads 23 extend through the openings 22 and into the grooves 21. The commutator segments S are bonded with the armature winding leads 23 within the groove 21.

The segments S are formed after the core elements C and C' are cemented together, and the leads 23 are positioned in the grooves 21, as shown in Figure 8, while the commutator is on the armature shaft. The segments are formed

by melting a suitable metal, such as copper, and spraying it into the seats 19, as shown in Figure 9. The sprayed metal fills the grooves 21, surrounding the leads 23, and forms a perfect electrical bond therewith without the necessity of subsequently soldering the leads to the segments. A sufficient quantity of the sprayed metal is used to build it up to a rough cylinder as indicated by the outline 24 in Figure 9. It will be noted that the sprayed metal covers the insulating beads 20, and the next step in forming the commutator is to machine down the surface 24 until the ribs 20 appear. The segments 24 are thereupon electrically separated from each other by ribs, which ribs, at their ends, extend the depth of the grooves 18 and the depth of the recess 25 formed in the inner face of the flange 15 and outlined by the annular shoulder 17.

From the foregoing description it is obvious that I have provided a commutator structure which is inexpensive to manufacture from molded core elements that may be readily assembled with relation to each other, and the commutator segments are readily formed of sprayed metal, the spraying step of the method electrically bonding each commutator segment to its respective armature winding lead at the time the segment is formed without a subsequent soldering operation being necessary. The core of the commutator is so formed that a simple machining operation may be performed after the commutator segment forming operation to surface the segments to a true cylinder with respect to the armature shaft, and, at the same time, electrically separating the segments by machining down to the ribs 20.

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, one of said elements having semi-circular seats for commutator segments with insulating ribs between them, a groove at the bottom of each of said seats, an armature winding lead extending into each of said grooves, both of said core elements having portions overhanging the ends of said seats, openings through said portions of one of said core elements forming extensions of said grooves through which said armature winding leads extend from one end of the commutator structure, and commutator segments formed of metal melted and sprayed into said seats and grooves and bonded in the grooves with said armature winding leads, said commutator segments being machined down to substantially a level with said ribs of insulation and being retained against outward movement by centrifugal force due to their ends projecting under said overhanging portions.

2. In a commutator structure, a core comprising a pair of core elements of insulating material telescoped together, one of said elements having spaced seats for commutator segments, a groove at the bottom of each of said seats, an armature winding lead extending into each of said grooves, both of said core elements having portions overhanging the ends of said seats, and commutator segments formed of melted metal sprayed into

said seats and grooves and bonded in the grooves with said armature winding leads.

3. A commutator structure comprising a pair of core elements telescoped together and having seats for commutator segments with separating ribs between them, a groove at the bottom of each of said seats, an armature winding lead extending into each of said grooves, said core elements having portions overhanging said seats, and commutator segments formed of metal melted into said seats and grooves and bonded in the grooves with said armature winding leads, said commutator segments being machined down to substantially a level with said separating ribs and being retained against outward movement by projecting under said overhanging portions.

4. A commutator structure comprising a core of insulating material having seats therein for commutator segments and having insulating ribs between said seats, a groove at the bottom of each of said seats, an armature winding lead extending into each of said grooves, said core having portions overhanging the ends of said seats, openings through said core forming extensions of said grooves through which said armature winding leads extend from one end of the commutator structure, and commutator segments formed of metal melted into said seats and grooves, said commutator segments being machined down to substantially a level with said ribs of insulation and being retained against outward movement by said overhanging portions.

5. In a commutator structure, a core of insulating material having arcuate seats for commutator segments, an armature winding lead extending into each of said seats, said core having portions overhanging said seats, and commutator segments formed of melted metal sprayed into said seats and bonded with said armature winding leads, said commutator segments being retained against outward movement by said overhanging portions.

6. In a commutator structure, a core having end flanges, said core being provided in its outer surface with arcuate seats for commutator segments and having separating ribs between the seats, armature winding leads extending into said seats, one of said flanges being provided with perforations through which said leads extend from the end of the commutator structure, said flanges overhanging said seats, and commutator segments formed of melted metal sprayed into said seats and bonded therein with said armature winding leads, said commutator segments being thereafter machined down to substantially the height of said separating ribs and retained against outward movement under the action of centrifugal force by said overhanging flanges.

7. 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 receiving said tubular portion, said core elements each having an end flange, the core element having said sleeve being provided in its outer surface with arcuate seats for commutator segments and with insulation ribs between the seats, a groove at the bottom of each seat, armature winding leads extending into said grooves, the flange of one of said core elements being provided with perforations through which said leads extend from one end of the commutator structure, said flanges overhanging said seats, and commutator segments formed of metal melted and sprayed into said seats and grooves and bonded in the grooves with said ar-

mature winding leads, said commutator segments being thereafter machined down to substantially the height of said insulation ribs and retained against outward movement under the action of centrifugal force by said flanges.

8. In a commutator structure, a core comprising a pair of core elements, one having a tubular portion and the other having a sleeve portion telescopically receiving said tubular portion, the core element having said sleeve being provided in its outer surface with spaced seats for commutator segments, armature winding leads extending into said seats, said core elements having portions overhanging said seats, and commutator segments formed of metal melted into said seats and bonded therein with said armature winding leads, said commutator segments being retained against outward movement under the action of centrifugal force by said overhanging portions.

9. 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 receiving said tubular portion, said core elements being cemented together and each having an end flange, said core being provided in its outer surface with spaced seats for commutator segments, a groove at the bottom of each seat, armature winding leads extending into said grooves, the flange of one of said core elements having perforations through which said leads extend from one end of the commutator structure, said flanges overhanging said seats, and commutator segments formed of metal melted and sprayed into said seats and grooves

and bonded with said armature winding leads, said commutator segments being machined down after the spraying operation and retained against outward movement under the action of centrifugal force by said flanges.

10. A method for forming commutator segments comprising the melting of metal and the spraying thereof into commutator seats of a commutator core and the bonding of said segments with armature winding leads projecting into said seats.

11. A method for forming commutator segments comprising the melting of metal and the spraying thereof into commutator seats of a commutator core.

12. A method for forming commutator segments comprising the melting of metal into commutator seats of a commutator core and around armature winding leads projecting into said seats to electrically connect the segments to the leads.

13. A method for forming commutator segments comprising the melting of metal into commutator seats of a commutator core, the bonding of said segments with armature winding leads projecting into said seats and the machining of said segments to a smooth cylindrical surface.

14. A method for forming commutator segments comprising the steps of melting metal and spraying it into commutator seats of a commutator core and subsequently machining said segments to smooth cylindrical shape.

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