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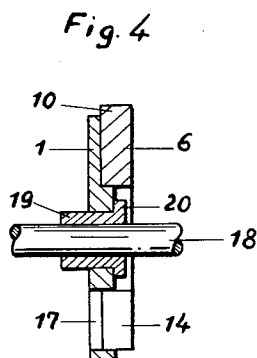
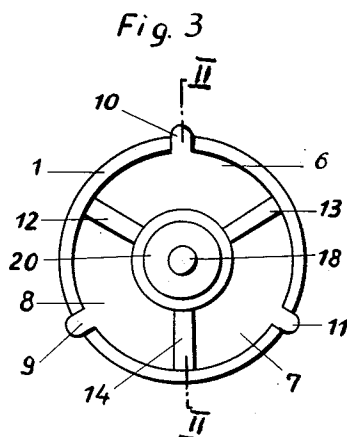
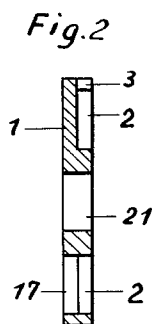
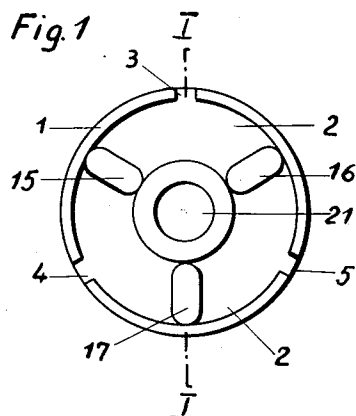
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DISC COMMUTATORS FOR FRACTIONAL HORSEPOWER MOTORS

Filed May 21, 1958

2 Sheets-Sheet 1



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Fig. 5

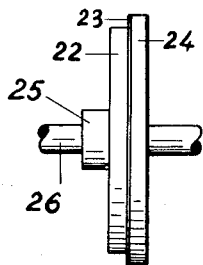


Fig. 6

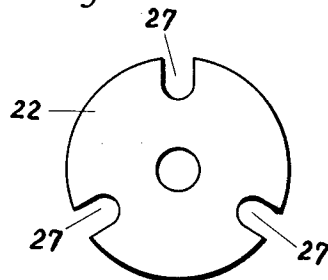


Fig. 8

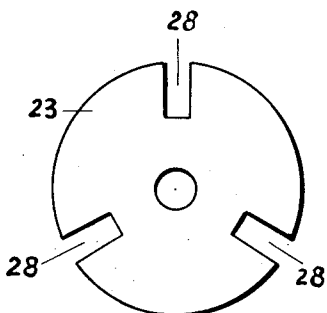
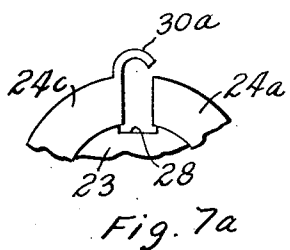
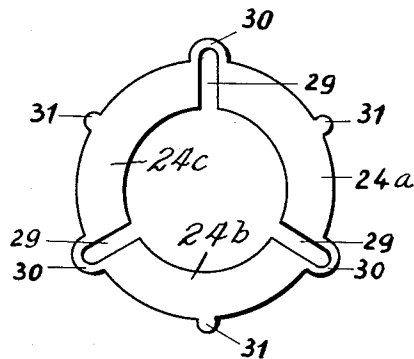


Fig. 7



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DISC COMMUTATORS FOR FRACTIONAL HORSEPOWER MOTORS

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8 Claims. (Cl. 310-237)

The invention relates to a disc commutator for fractional horsepower electric motors, especially toy motors, and is intended chiefly to create a commutator which is easy to adjust and which, as compared with the known disc commutators, effects an improvement in the commutation as the brushes pass from one commutator segment to another.

Up to the present it has been customary in the construction of fractional horsepower motors, especially in connection with toy motors, to fix the commutator segments on a carrier made from insulating synthetic material. Hard tissue or hard paper came chiefly into use as material for the carrier. The segments were fixed on the carrier by means of screws or rivets. Apart from the fact that mechanical connecting elements are necessary and the screwing or riveting of the commutator segments requires a relatively great amount of time, difficulties are encountered in accurately determining the position of the segments on the carrier. Moreover, the gaps between the neighbouring commutator segments can, in operation, become completely clogged or filled with carbon particles. As a result, current bridges form which can cause the complete destruction of the armature winding.

This objection is overcome by the invention which consists in that, in a commutator for fractional horsepower electric motors, especially toy motors, the commutator segments of which are fixed on the carrier, the fixation of these segments is effected by sticking or cementing. A thermo-setting adhesive, for example an ethoxyline resin, is preferably used for this purpose.

Furthermore, it is preferable to make the carrier from a clay, such as steatite. It is particularly advantageous to construct the disc commutator as a disc-shaped carrier with segment-shaped commutator elements and, according to another feature of the invention, to provide in one face of the carrier an annular groove in which the commutator segments are fitted.

In the case of disc commutators constructed in this manner, on the one hand, mechanical connecting means such as screws and rivets are avoided, and, on the other hand, the time required for fixing the segments on the carrier is considerably reduced.

To enable the commutator segments to be correctly fixed on the carrier, it is advantageous to allow the annular groove to extend into peripheral slots and, when affixing the segments, to fit them in these slots so as to determine and ensure that they are in the correct position.

In order to prevent as far as possible the gaps between the individual segments from becoming clogged, another feature of the invention consists in providing in the carrier through apertures at the point of transition of the commutator segments.

An extremely simple disc commutator is obtained when the carrier is provided with a hub which extends through a central hole and has a collar for connecting to the carrier.

A disc commutator which is particularly advantageous is obtained where the commutator segments are formed as an annular disc with radial incisions or slots determining the size of the segments in having connecting webs bridge-

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ing the gaps between the segments, the webs being removed after the annular disc has been stuck on the carrier.

Other advantages and features of the invention will be hereinafter explained with reference to the two forms of construction illustrated by way of example in the accompanying drawings, in which:

FIG. 1 is a front elevation showing a carrier of ceramic material;

FIG. 2 is a section through the carrier taken on line II-II of FIG. 1;

FIG. 3 is a front view of a finished commutator;

FIG. 4 is a section on line IV-IV of FIG. 3;

FIG. 5 shows a modified form of construction in side elevation;

FIG. 6 is a front elevation of the carrier of the commutator illustrated in FIG. 5;

FIG. 7 is a front elevation of the commutator ring disc of this construction, FIGURE 7a is a fragmentary view of the commutator disc of FIGURE 7 mounted on a carrier disc and having the bridging web interrupted, and

FIG. 8 shows in front elevation a disc serving as insulating bearing surface on the carrier of the commutator illustrated in FIG. 5.

A carrier 1 is composed of ceramic material, for example steatite. It is in the form of a disc and has on one of its faces an annular groove 2. This groove 2 extends into equally spaced peripheral slots 3, 4 and 5. Segment-shaped commutator elements 6, 7 and 8 can be introduced into this annular groove 2. These segments have lugs 9, 10 and 11 which, when the segments are inserted in the annular groove, fit in the slots 3, 4 and 5 and thus determine and ensure the correct relative positions of segments in relation to the carrier. As shown in FIGURE 3, the segments 6, 7 and 8 are limited in angular extent to provide radial gaps between adjacent segments, as shown at 12, 13 and 14. The segments 6, 7 and 8 are also held on the carrier 1 by means of a thermo-setting adhesive, such as an ethoxyline resin.

Through apertures 15, 16 and 17 are provided in the carrier 1 under the gaps 12, 13 and 14. These apertures enable any particles of dust or carbon which may enter the gaps 12, 13 and 14 to be flung out of the commutator by centrifugal force in time to prevent as far as possible the formation of current bridges between the individual segments.

For securing the commutator on the motor shaft 18 a hub is provided which consists of a cylindrical part 19 and a collar 20. The cylindrical part passes through a central bore 21 in the carrier 1 whereas the collar 20 serves for fixing the hub on the carrier in that it is stuck firmly thereon. The construction is otherwise such that the commutator segments 6, 7 and 8 project on their free side beyond the carrier including the hub collar in the direction of the longitudinal axis of the motor.

The lugs 9, 10 and 11 on the commutator segments may also serve as soldering lugs for connecting the beginnings and ends of the armature winding.

The disc commutator illustrated in FIGS. 5 to 8 comprises a carrier 22, a support or bearing surface 23 and commutator segments 24a, 24b and 24c. The carrier 22 is made from sheet metal and has a hub 25 produced by the cupping or drawing method and by means of which it is fixed on the motor shaft 26. The carrier 22 is provided with slots 27 at the points where the individual commutator segments terminate, which slots are wider than the relative distance or gaps between the individual commutator segments after they have been fitted on the carrier.

Slots are also provided in the disc 23 of insulating material and coincide with the slots 27 after the disc has been connected with the carrier and are designated by 28

on the drawing. The disc 23 is stuck or cemented onto the carrier 22. The slots 28 are narrower than the slots 27 but wider than the relative spacing or gaps between the commutator segments.

The commutator segments 24 are connected with the other constructional elements of the commutator by cementing. As shown in FIG. 7, they are formed by an annular disc with equally spaced radial slots or incisions 29, each slot being bridged by a web 30 which extends beyond the outer periphery of the commutator segments. After the disc 23 has been stuck on the carrier 22, the disc of FIGURE 7 is stuck on the disc 23. Its position is such that the incisions 29 coincide with the slots 27 and 28. The connecting webs 30 which still hold the ring disc together (FIG. 7) project beyond the periphery of the disc 23 after it has been stuck thereon. They are subsequently removed. Consequently both the individual commutator segments 24 and also the commutator slots 29 are positively determined in size and direction.

If the connecting webs 30 are severed only at one end they can be used as soldering lugs (see lug 30a in FIGURE 7a) so that separate soldering lugs 31, which would otherwise be necessary, can be dispensed with.

It is not necessary to construct the intermediate layer 23 as a separate disc if the adhesive used is itself used for forming the insulating layer or if an oxide layer is produced on the carrier and electrically insulates the commutator segments. For this purpose the carrier may be made from aluminum and its surface directed towards the segments may be provided with an oxide skin which can be produced by anodal oxidation.

We claim:

1. A disc commutator blank for fractional horsepower electric motors, especially toy motors, comprising a carrier body in the form of a circular disc, a plurality of commutator segments comprising an integral ring of conductive material adhesively secured to the disc, said ring having inner and outer peripheries and arcuately spaced radial slots extending from the inner periphery to a position adjacent the outer periphery and defining between them the arcuate size of the commutator segments, said ring also including web portions located outside of the outer periphery of the segment portions and bridging said slots, whereby separation of the webs bridging the slots at the outer periphery would provide spaced commutator segments,

2. A disc commutator blank in accordance with claim 1 in which the carrier disc is of insulating material.

3. A disc commutator blank in accordance with claim 1 in which the disc is of metal and an insulating layer is disposed between the disc and conductive ring.

4. A disc commutator in accordance with claim 7 in which the insulating layer is the adhesive for securing the commutator segments to the disc.

5. A disc commutator in accordance with claim 7 in which the carrier disc is of aluminum and the insulating layer is an anodic layer of aluminum oxide.

6. A method of making a disc commutator for fractional horsepower motors, especially toy motors, comprising the steps of adhesively securing to the face of a circular disc an integral ring of conductive material having equal arcuately spaced outer peripheral portions extending radially outward of the periphery of the disc and slots extending radially outward from the inner periphery of the ring beyond the periphery of the disc into the outwardly extending portions respectively, and severing one end of each such portion to form separated commutator segments and an integral soldering lug for each segment.

7. A laminated disc commutator for small electric motors comprising a carrier body formed of a disc of sheet metal having angularly spaced radial slots formed therein and having an insulating layer bonded to one face thereof, and sector-shaped commutator segments formed from sheet metal and being adhesively bonded to said insulating layer, said commutator segments being equally spaced about the axis of said carrier disc and having gaps between adjacent segments, which gaps coincide with the radial slots in said carrier body.

8. A disc commutator according to claim 7 wherein said carrier disc has a mounting hub formed integrally therewith from the central portion of the metallic disc.

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