Sept. 29, 1942. O. ZADNIK 2,297,521

COMMUTATOR

Filed May 16, 1941

Fig.1

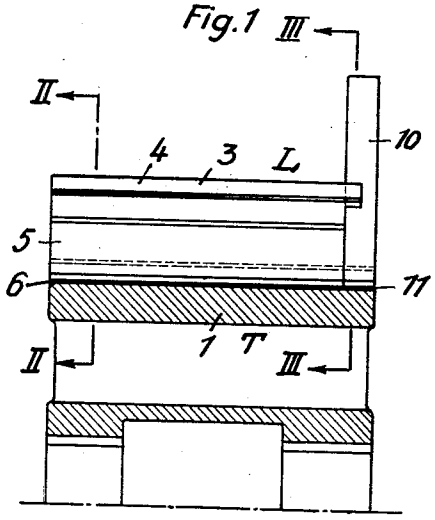


Fig.2

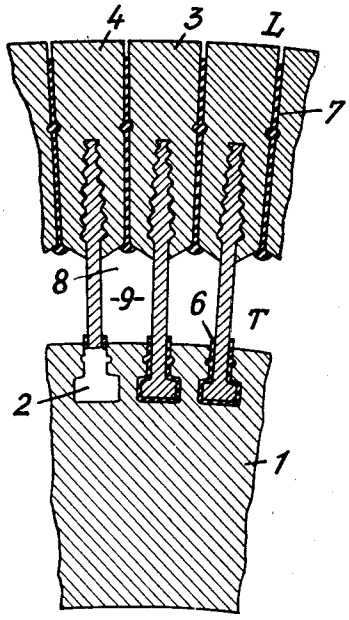
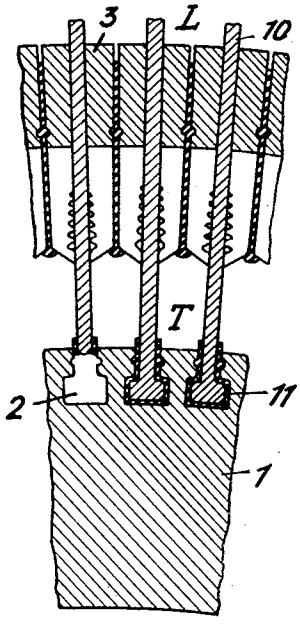


Fig.3



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COMMUTATOR

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10 Claims. (Cl. 171—321)

This invention relates to improvements in commutators.

An object of this invention is to provide a novel commutator construction of high rigidity but low weight.

Another object is to provide a commutator in which the individual bars are positively supported throughout their entire length.

Still another object of this invention is the provision of a commutator which can be simply and inexpensively manufactured.

An additional object of this invention is to provide a commutator having longitudinal cooling canals.

A further object of this invention is the provision of a commutator construction wherein the commutator bars are firmly anchored by a dovetail connection and insulated from one another and from their support by injected artificial resinous material.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed.

The invention has been illustrated in its preferred embodiment in the accompanying drawing, wherein:

Fig. 1 is a longitudinal view, partially in cross-section, of a commutator formed in accordance with this invention;

Fig. 2 is a partial transverse cross-section on an enlarged scale along the line II—II of Fig. 1; and

Fig. 3 is a partial transverse cross-section on an enlarged scale along the line III—III of Fig. 1.

As seen in Figs. 1 and 2, the commutator is built up upon a substantially cylindrical base member 1 provided with a plurality of longitudinally extending undercut grooves 2 spaced about its periphery. The individual commutator bars generally indicated at 3 consists preferably of two parts, a part 4 formed of material having a relatively high electrical conductivity, such as copper, on the contacting side L, and a part 5, preferably of a stronger metal such as steel, anchored in a suitable manner in the supporting side T of section 4. The inner ends of the steel part 5 are adapted to rest in the groove 2 of the cylindrical support 1, and these ends are also adapted to be formed T shaped to form a dovetail connection with the cylindrical support. Suitable insulation, preferably artificial resinous material such, for example, having a phenol-formaldehyde base is injected in the groove 2 about the T shaped end of the part 5, thus positively anchoring the commutator bars to their support, while providing suitable insulation. The individual bars 3 may be insulated from one another by the injection under pressure of similar artificial material which, at the same time, will act to interconnect the bars to form a strong unitary structure.

In the preferred form of construction illustrated in the drawing, the copper sections of the commutator bars are spaced from the support 1 as indicated at 8 to form longitudinally extending canals 9 which may serve to guide cooling air through the commutator and prevent overheating of the same. This type of construction which is, in effect, the same as cutting away part of the commutator bar, also reduces the weight and acts to unload the connection, particularly with respect to centrifugal forces. The commutator as a whole, is of course lighter in weight as compared to a solid construction, while sufficient strength and rigidity is assured by reason of the fact that each commutator bar is supported along its entire length and by reason of the dovetail anchored connection. The construction is such that an arching of the commutator segment under the action of centrifugal forces or because of expansion due to heating is positively prevented.

As seen in Fig. 3, the risers 10 are anchored in the support 1 in a similar manner to the commutator bar, the inner end of such risers being formed T shaped and inserted in the end of longitudinally extending grooves 2. Artificial insulating material 11 is again pressed into the groove about the end of the riser to simultaneously form a firm anchored construction and insulate the risers from the support. The riser may be connected to the corresponding commutator bar by any suitable means, such as soldering, and can be additionally supported if each bar is provided with a grooved extension into which the intermediate portion of the riser is inserted, as will be clearly apparent from Figs. 1 and 3.

In insulating the commutator extension 5 or the risers 10 from the support 1, the groove 2 may be first lined with strips of paper of fabric before the artificial material is injected, or, conversely, the members 5 or 10 at these points can be first covered with such paper or fabric.

The type of commutator described not only has the advantages of high rigidity, low weight, and the provision of cooling canals, but also lends itself to construction at a relatively low price. The individual bars can be cut from long bars in a

simple manner, while the assembly and finishing of the commutator is relatively simple.

It will be noted that the construction shown and described will serve admirably to accomplish the objects stated above. It is to be understood, however, that the construction disclosed above is intended merely as illustrative of the invention and not as limiting, as various modifications thereof may be made without departing from the invention as defined by a proper interpretation of the following claims.

I claim:

1. A commutator comprising, in combination, a substantially cylindrical support provided with a plurality of longitudinally extending, undercut grooves spaced about its periphery, commutator bars, means forming extensions from said commutator bar, respectively fitting in said grooves in a dovetail connection, and insulating material pressed in a ring-shaped member of molded artificial material, and a plurality of end connectors interconnected with the conductor bars and embedded in said ring-shaped member.

2. The combination according to claim 1, in which said insulation is artificial resinous material.

3. The combination according to claim 1, in which said extensions are of such depth that the commutator bars are radially spaced from the cylindrical support to form cooling channels therebetween.

4. The combination according to claim 1, in combination with risers having ends inserted at one end of said grooves and attached to corresponding commutator bars substantially intermediate their ends, said insulating material extending about the ends of said risers to insulate the same from and anchor the same in said cylindrical support.

5. The combination according to claim 1, in combination with risers having ends inserted at one end of said grooves in a dovetail connection, said commutator bars at said one end being each provided at their outer contacting surface with a groove adapted to receive and support said risers, said insulating material extending into the dovetail to insulate the ends of said risers from and anchor them in said cylindrical support.

6. The combination according to claim 1, in which said commutator bars are formed of a material having a relatively high electrical conductivity and said extensions are formed of steel and are anchored in the respective bars.

7. The combination according to claim 1, in which said extensions are longitudinally co-extensive with the commutator bars.

8. The commutator comprising, in combination, a substantially cylindrical support, a plurality of commutator bars, means for supporting said bars on said support comprising a plurality of relatively thin members respectively connecting each bar with said support, said members being spaced from one another to form longitudinal air-cooling canals extending beneath the commutator bars, and supporting each bar along its entire length, insulating means filling up the spaces between adjacent commutator bars, and insulating means between each connecting member and the support.

9. The combination according to claim 8, in which said commutator bars are formed of material having a higher electrical conductivity than said connecting members.

10. The combination according to claim 8, in which each connecting member is anchored in its respective commutator bar and in said support.

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