Aug. 29, 1944. L. F. HEMPHILL 2,357,111

COMMUTATOR

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Fig. 1.

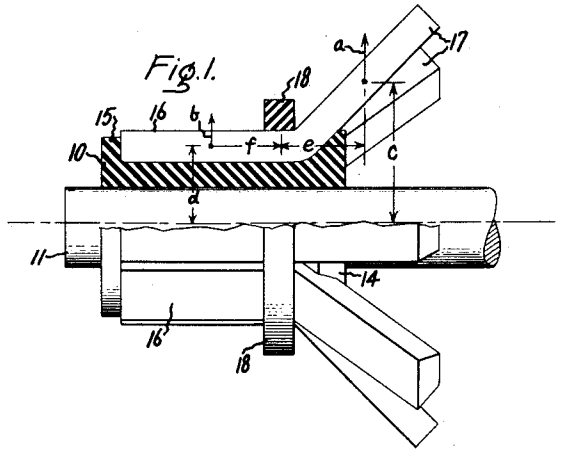
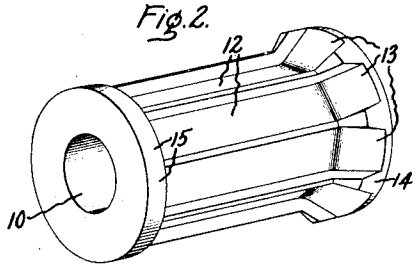


Fig. 2.



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COMMUTATOR

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Application December 5, 1942, Serial No. 467,959

3 Claims. (Cl. 171—321)

My invention relates to commutators for dynamo-electric machines.

An object of my invention is to provide improved and simplified commutator constructions.

Further objects and advantages of my invention will become apparent and my invention will be better understood from the following description referring to the accompanying drawing, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming part of this specification.

In the drawing, Fig. 1 is a side elevational view, partly broken away, illustrating an embodiment of my invention; and Fig. 2 is a perspective view of the insulating support shown in Fig. 1.

Referring to the drawing, I have shown an embodiment of my improved commutator wherein an insulating sleeve supporting element 10 is mounted on a shaft 11 and is formed with a plurality of axially extending grooves 12 which extend from adjacent the outer end of the sleeve 10 inwardly of the support and in an outer angularly extending surface 13 of an outwardly extending insulating shoulder element 14. The shoulder 14 is formed at an angle to the axially extending sleeve portion 10 and stops 15 are formed at the end of each of the slots 12 at the end of the insulating support opposite the shoulder 14. The commutator is formed of a plurality of segments of electrically conductive material which include axially extending brush seat portions 16 and angularly extending portions 17 which are arranged in the portions of the slots 12 in the sleeve 10 and the shoulder 14, respectively. A clamping ring 18 of insulating material is arranged over the commutator segments and is pressed over the axially extending portions thereof to a position adjacent the shoulder 14 and biases the segments into engagement with the insulating support for retaining the commutator in assembled relationship. With such a construction, centrifugal force will act on the angularly and axially extending portions of each commutator segment, as indicated by the arrows *a* and *b*, repsectively. Since the angular segment portion extends outwardly from the axial segment portion, the radius *c* at which centrifugal force acts on the angular portion is greater than the radius *d* for the axial portion. Therefore, if the weight of the angular portion is substantially the same or greater than the weight of the axial portion, the centrifugal force acting on the angular segment portion on rotation of the commutator will be greater than the centrifugal force acting on the respective segment axial portion. The two portions of each commutator bar may be formed of such a size that the weights thereof are substantially the same, but this is not essential. The radius *c* of the center of gravity or the hypothetical point of action of centrifugal force on the segment angular portion is substantially greater than the radius *d* of the center of gravity or point of action of centrifugal force on the segment axial portion, and, therefore, the centrifugal force *a* on the segment angular portion will tend to be greater than the centrifugal force *b* on the segment axial portion. A consideration of force moments due to centrifugal force on the segment portions indicates that a force moment acts on each of the segments 16 about the clamping ring 18 as a pivotal retaining ring. On rotation of the commutator, the segment angular portion 17 is acted on by the centrifugal force *a* acting through a moment arm *e* and the segment axial portion is acted on by the centrifugal force *b* acting through a moment arm *f*. This produces a centrifugal force moment *ae* for the segment angular portion and a centrifugal force moment *bf* for the segment axial portion. In order to assist in maintaining the axial segment portions firmly against the insulating supporting sleeve 10, the segment angular portions on one side of the retaining ring are constructed of such a size and arranged to extend at such an angle that the centrifugal force moment *ae* thereon about the clamping ring 18 is greater than the centrifugal force moment *bf* on the segment brush seat axial portion, thereby tending to rotate the segment about the ring 18 in a counterclockwise direction as viewed in Fig. 1. Thus, centrifugal force will tend to hold the commutator in assembled relationship rather than tending to cause it to fly apart.

While I have illustrated and described a particular embodiment of my invention, modifications thereof will occur to those skilled in the art. I desire it to be understood, therefore, that my invention is not to be limited to the particular arrangement disclosed, and I intend in the appended claims to cover all modifications which do not depart from the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A commutator including an insulating support, a plurality of commutator segments arranged on said support, and pivotal retaining means arranged intermediate the ends of said segments providing a brush seat portion and a portion on the other side of said retaining means

for securing said segments on said support, the weight and center of gravity of said other side segment portions being such relative to that of said brush seat segment portions that the moment of said other side portions about said securing means is greater than the moment of said brush seat portions thereabout.

2. A commutator including an insulating support having a shoulder thereon extending outwardly at an angle, a plurality of commutator segments having a portion of each extending axially on said support and a portion of each formed at an angle to said axially extending portion, and means for securing said segments on said support with said segment angular portions clamped against said shoulder, the weight and center of gravity of said segment angular portions being located such that the moment thereof about said securing means is greater than the moment of said axially extending segment portions thereabout.

3. A commutator including an insulating sleeve support having a shoulder thereon extending outwardly at an angle, a plurality of spaced apart grooves in said sleeve and shoulder, a plurality of commutator segments having a portion of each extending substantially axially in said sleeve grooves and a portion of each formed at an angle to said axially extending portion, and means including a clamping ring arranged over said segments adjacent said shoulder for securing said segments in said grooves on said supporting sleeve with said segment angular portions clamped against said grooves in said shoulder, the weight and center of gravity of said segment angular portions being such relative to the weight and center of gravity of said axially extending portions that the moment of said angularly extending portions about said clamping ring is greater than the moment of said axially extending segment portions thereabout on rotation of said commutator.

LAWRENCE F. HEMPHILL.