E. STROHACKER.

COMMUTATOR FOR ELECTRIC MOTORS.

APPLICATION FILED MAY 18, 1917.

1,289,014. Patented Dec. 24, 1918.

Fig. 1

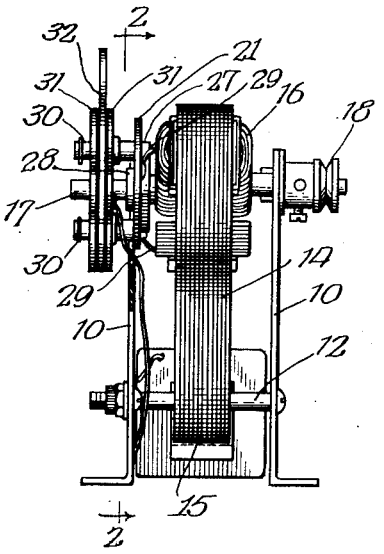


Fig. 2

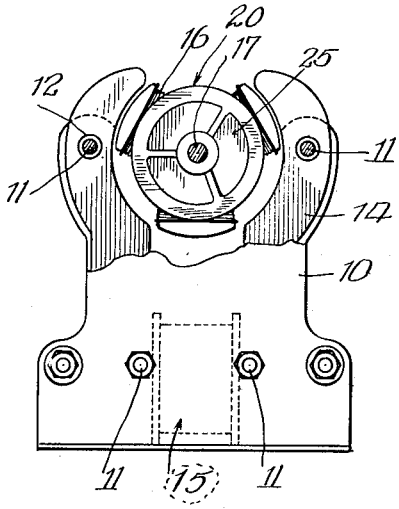


Fig. 3

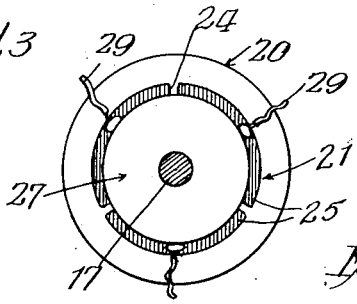


Fig. 4

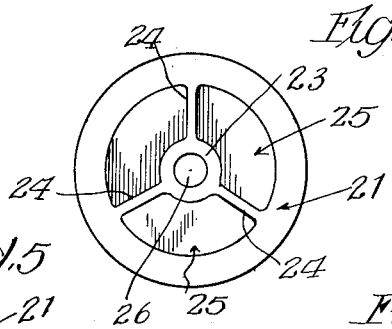


Fig. 5

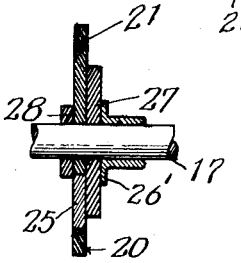


Fig. 7

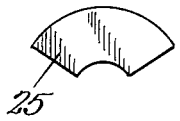
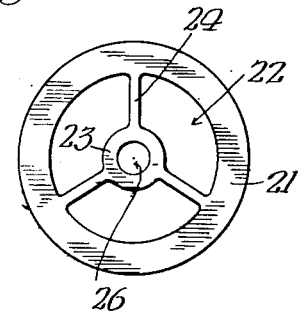


Fig. 6



Witness:
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UNITED STATES PATENT OFFICE.

EDWARD STROHACKER, OF FREEPORT, ILLINOIS, ASSIGNOR TO STRUCTO MANUFACTURING COMPANY, OF FREEPORT, ILLINOIS, A CORPORATION OF ILLINOIS.

COMMUTATOR FOR ELECTRIC MOTORS.

1,289,014. Specification of Letters Patent. Patented Dec. 24, 1918.

Application filed May 18, 1917. Serial No. 169,395.

To all whom it may concern:

Be it known that I, EDWARD STROHACKER, a citizen of the United States, and a resident of Freeport, in the county of Stephenson and State of Illinois, have invented certain new and useful Improvements in Commutators for Electric Motors; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in commutators for electric motors and refers more specifically to that type of commutator known as a disk commutator wherein the brushes contact with the commutator segments at the side face of the commutator.

The object of the invention is to simplify the construction of the commutator, to render it compact and to reduce the cost thereof by reducing the material of which the commutator is made and also by reducing the labor and time required to assemble the commutator.

A further object is to improve the brush contact face of the commutator so as to produce a smooth surface which travels against said brushes, and to improve the means for insulating the commutator segments from each other.

Other objects of the invention are to otherwise improve commutators for electric motors, and the invention consists in the combination and arrangement of parts shown in the drawings and described in the specification, and is pointed out in the appended claims.

The commutator herein shown as one illustrative embodiment of my invention comprises a disk or skeleton frame made of suitable insulating material and a plurality of commutator segments which are seated in openings formed in the disk and are arranged in the plane of the disk so as to be flush at their side faces with the sides of the disk, or at least at the brush engaging side thereof, said segments being separated and insulated from each other by narrow radial spacing members, preferably constituting parts of the skeleton disk, and being held in place in the disk by contact of the edge faces of the segments with the disk. The disk may be made from any suitable insulating sheet material by punching out the material from the spaces occupied by the segments, or said disk may be formed about segments properly spaced in relation one to the other by a molding operation with an insulating substance, such as bakelite, condensite or other suitable moldable insulating material. In each instance the segments, which are made of less radius than that of the disk, are embedded or inserted in the insulating material of the disk with their faces flush with the side faces of the disk and are spaced and insulated from each other by the material of the disk.

In the drawings is illustrated one particular embodiment of my improved commutator and its application to a motor. The motor herein shown is a small type of motor which is more particularly adapted for operating toys, talking machine mechanisms, sewing machines and other like uses where small horse power output is required; although my improvements may be adapted to motors of larger capacity.

As shown in the drawings:—

Figure 1 is an edge elevation, partly broken away, of a motor equipped with my improved commutator.

Fig. 2 is a partial side elevation and a partial section of the motor, the section being taken on line 2—2 of Fig. 1.

Fig. 3 is an inner face view of the commutator.

Fig. 4 is an outer face view thereof.

Fig. 5 is an axial section of the commutator.

Fig. 6 is a side view of the skeleton insulating disk.

Fig. 7 is a side view of one of the commutator segments.

The frame of the motor comprises upright side members 10, 10 which are connected by tie rods 11, 11 and spaced by spacing sleeves 12 which coöperate with nuts on the ends of the bolts to rigidly connect the side members.

14 designates the laminated field magnet and 15 the field coil. 16 designates as a whole the armature, herein shown as a three pole armature, which rotates between the field poles with the armature shaft 17 that is rotatively mounted in suitable bearings in the side members 10 of the frame and is provided with a driving pulley 18. 20 des-

ignates as a whole the commutator. It comprises, as herein shown, a skeleton disk 21, separately shown in Fig. 6, and which may be assumed to be cut or stamped from a sheet of suitable insulating material. In stamping the disk parts are cut therefrom to produce angularly spaced and symmetrically arranged openings 22, disposed exteriorly to and centrally of an annulus 23 constituting a hub, and connected by narrow radial spacing members 24 to the outer part or rim.

25, 25 designate the commutator segments, one of which is separately shown in Fig. 7. They are shaped to correspond to the openings 22 of the disk, and when said disk is cut or stamped out from a sheet of insulating material, said segments are made of slightly larger dimensions than the openings. They are adapted to be pressed into said openings and have engagement only at their edge faces with opposing edges on the disk. The relatively larger segments are pressed into the disk openings to fixedly hold the segments in place. The said segments are herein shown as made of the same thickness of the disk so that their faces are flush with the side faces of the disk.

The radial members 24 of the disk constitute means to separate and insulate the segments from each other. An advantage of the construction described is that the air gaps between the segments are filled flush with the faces of the copper segments with an insulating material, so that the face of the commutator on which the brushes travel, by reason of the relative rotation of the commutator and brushes, is smooth and continuous. The space between the segments being thus filled with an insulating medium prevents metal particles from accumulating in the air gap between the segments, which would tend to short circuit the segments on each other. The disk is provided with a central opening 26 through which the armature shaft extends, and the disk is fitted tightly over the armature shaft against a suitable shoulder 26′.

Arranged at the inner and at the outer sides of the disk are smaller insulating disks 27, 28, respectively, the disk 28 being smaller than the inner disk 27, and the latter disk being formed on a radius slightly smaller than that of the segments. The said inner larger disk is pressed upwardly against the shoulder of the shaft and the outer, smaller disk 28 fits tightly on said armature shaft. Said disks 27, 28 increase the bearing area of the commutator on the shaft so as to provide a strong and rigid connection between the shaft and commutator. The presence of said inner and outer disks also serves the further function of assisting to support the segments in the event such segments should become slightly loosened.

The disks are connected to their respective armature windings by wires 29 which are soldered or otherwise connected to the inner faces of the segments near their margins and radially exterior to the disk 27, as herein shown.

30, 30 designate brushes which extend through and fit closely in parallel insulating plates 31, 31 arranged at the commutator side of the motor, and said plates are fixed to the motor frame by the upper tie bolts or rods 11. The said insulating plates 31 constitute a mounting for a reversing switch 32, which is rotatably mounted on the armature shaft. The details of said reversing switch are shown in my pending application for U. S. Letters Patent, Serial No. 169,394, filed of even date herewith and need not be further described herein.

I claim as my invention,—

1. A commutator for electric motors comprising a disk of insulating material and commutator segments embedded therein in the plane of the disk and spaced by material which is flush with the faces of said segments, and insulating disks applied to the inner and outer faces of said commutator and radially overlapping said segments.

2. A commutator for electric motors comprising a skeleton body comprising an exterior ring portion, an interior annulus or hub and radial members connecting said hub and ring portion and commutator segments seated in the openings between said radial portions and flush on their brush contact faces with the faces of said radial portions.

3. A commutator for electric motors comprising a skeleton body comprising an exterior ring portion, an interior annulus or hub and radial members connecting said hub and ring portion and commutator segments seated in the open spaces between said radial portions and fixed in place by engagement of their edge faces with the edge faces of said radial portions, said ring and said annulus.

In testimony whereof I claim the foregoing as my invention, I hereunto append my signature in the presence of two witnesses at Freeport, Illinois, this 14 day of May. 1917.

EDWARD STROHACKER.

Witnesses:
C. E. Thompson,
A. G. Trembly.