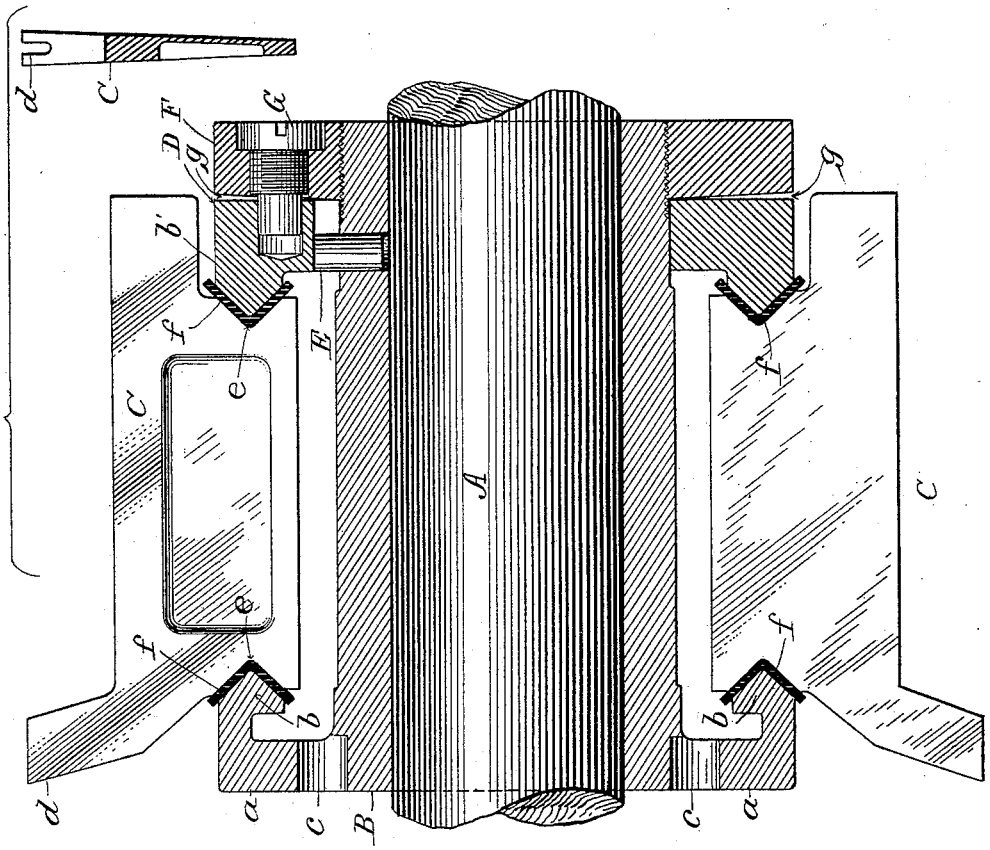
(No Model.)

A. J. SHAW.

COMMUTATOR CYLINDER.

No. 524,793. Patented Aug. 21, 1894.



WITNESSES

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ALTON J. SHAW, OF MUSKEGON, MICHIGAN.

COMMUTATOR-CYLINDER.

SPECIFICATION forming part of Letters Patent No. 524,793, dated August 21, 1894.

Application filed June 7, 1894. Serial No. 513,848. (No model.)

To all whom it may concern:

Be it known that I, ALTON J. SHAW, a citizen of the United States, residing at Muskegon, in the county of Muskegon and State of Michigan, have invented certain new and useful Improvements in Commutator-Cylinders, of which the following is a specification.

My invention relates to the construction of commutator cylinders of electric generators and motors, and consists essentially in providing the same with means to compensate for or take up the expansion and contraction of its bars.

The accompanying drawing represents my improved commutator cylinder in longitudinal section, and shows the construction which I have adopted in practice with very satisfactory results.

In the practical use of electric generators and motors it has been found that however nicely made and however accurately turned and mounted, commutator cylinders speedily get out of true or become more or less eccentric and irregular, thereby causing a rapid wear of bars and brushes, and an irregular and unsatisfactory action of the machine, with considerable sparking. I have ascertained that the difficulty is occasioned, in many instances at least, by the varying length of the commutator bars under different conditions. Thus when the machine is at rest and the cylinder is cool, the bars are of normal length; but when the machine is in operation, the friction engendered by the pressure of the brushes upon the rapidly rotating cylinder, causes the bars to elongate, the extent of elongation depending upon the speed and pressure, the current, and the proportions of the parts. Of course the trouble is greater where the carrying capacity of the commutator is proportionately small, or is in any degree inadequate; but owing to the high coefficient of expansion of copper the heat due to friction alone is sufficient to effect material elongation. As commutator cylinders are ordinarily constructed, there is no provision for taking up or compensating for this elongation, the heads of the cylinder being rigid and unyielding, and hence the bars buckle or bend radially, that being the only direction in which they can go. To overcome this defect I so construct the head or heads of the commutator cylinder that the bars may expand longitudinally without buckling or bending, and without any material radial variation. This construction is illustrated in the accompanying drawing, wherein—

A indicates the shaft or arbor of a generator, motor, or other electric machine employing a commutator, and B indicates a sleeve keyed or otherwise secured thereon and provided with a head or collar *a* which projects inward over the body of the sleeve, or is channeled, preferably on its inner face to produce an overhanging flange *b*, as plainly shown in the drawing. By thus channeling the head *a*, I lessen the rigidity of the web or portion connecting the overhanging flange *b* with the body of the sleeve, and adapt it to yield or spring under sufficient pressure. To further lessen the rigidity of the head *a* and permit a circulation of air between the sleeve and the commutator bars, a series of openings *c* may be drilled or otherwise formed in the head *a*, as shown.

In practice it is found expedient to form the sleeve B of a fine grade of cast iron, which possesses a very considerable amount of elasticity or resilience, ample for the purpose here indicated. Other materials may be used, however.

C indicates the commutator bars, which are preferably made of copper, though other metals or alloys may be used. These bars are sector shaped in cross section, so that when grouped in a circular series with proper insulating material between them, they shall form a solid and compact drum or cylinder, as is usual; and a suitable slotted tang or ear *d* is provided on each bar to receive the wires from the armature. Each bar C is provided at both ends with a notch *e*, advisably of V-shape, as shown.

D indicates an annular collar, adapted to fit snugly upon the sleeve B, and having an overhanging flange *b'*, in all essential respects like the flange *b* of head *a* of the sleeve B. As shown, each flange has its outer or projecting edge beveled to V-shape, or to such shape as shall correspond with the notches *e*

of the bars C. The collar D is slotted to slide over a key E by which it is held against rotation upon or independently of the sleeve B, and it is followed and held firmly in place by a nut F screwed upon the sleeve B as shown.

Before assembling the parts, insulating strips *f*, preferably of mica or micanite, are placed upon the beveled faces of the flanges *b*, *b'*, so that the bars C may not make electrical contact with said flanges, or with the sleeve B, and of course similar insulation separates the bars. The parts being properly proportioned, it follows that as the collar D is forced to place by the nut F, the bars C will be drawn firmly and closely together, thereby clamping and holding the insulation against escape, a result further insured by the notching of the insulating strips to receive the flanges *b*, *b'*.

It will be seen that if the collar D were solidly backed up by the nut F, there would be no yielding action at that end of the cylinder, hence I turn off the face of one or both of said parts to produce a slight bevel, as shown at *g*, so that there is bearing only at or near the circumference of the sleeve. In this way I afford space for the necessary spring or play of collar D, and divide the movement between the collars *a* and D.

To prevent the nut F from unscrewing or working back, I pass a screw G through the nut and into the collar D, as shown.

It is preferred, but is not essential, to provide the yielding supports at both ends of bars C.

Having thus described my invention, what I claim is—

1. In a commutator cylinder, the combination of a sleeve B provided with a fixed collar *a*, a sliding collar D, pin or key E to prevent rotation of collar D upon the sleeve B, nut F, screwed upon sleeve B and bearing against collar D, bars C extending from collar *a* to collar D, and insulating material interposed between the bars, and between the collars and bars, all substantially as described and shown.

2. In combination with sleeve B provided with a collar, a loose collar D fitting upon said sleeve, conducting bars C extending between said collars, and a nut F outside the collar D,—the nut and collar being arranged to bear against each other only at their inner portions or near the sleeve.

3. In a commutator, the combination with the conducting bars, of collars at the ends of said bars, one or both of said collars being formed of resilient material and adapted to yield under the pressure due to longitudinal expansion of the bars.

In witness whereof I hereunto set my hand in the presence of two witnesses.

ALTON J. SHAW.

Witnesses:
F. W. BABCOCK,
T. C. AKIN.