N. S. KEITH.

Commutator for Magneto Electric Machines.

No. 229,255. Patented June 29, 1880.

FIG. 1.

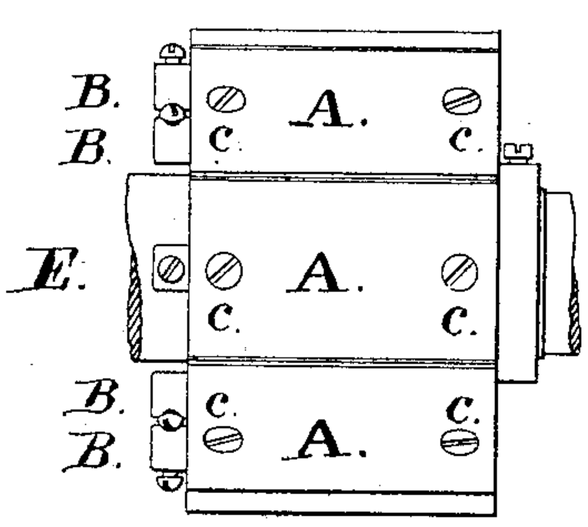



FIG. 2.

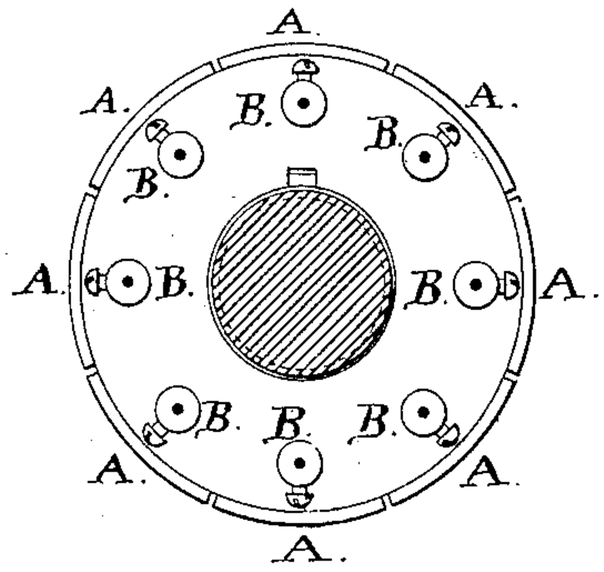



FIG. 3.

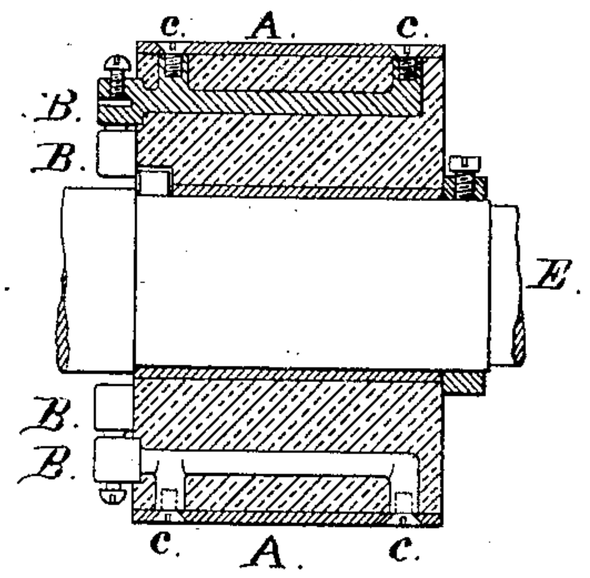



FIG. 4.

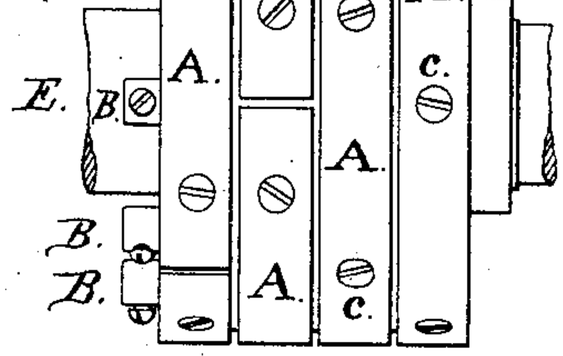



FIG. 5.

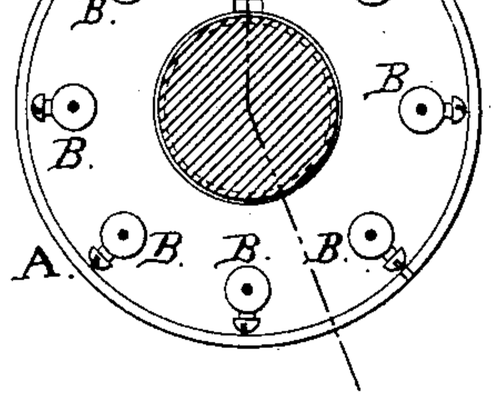



FIG. 6.

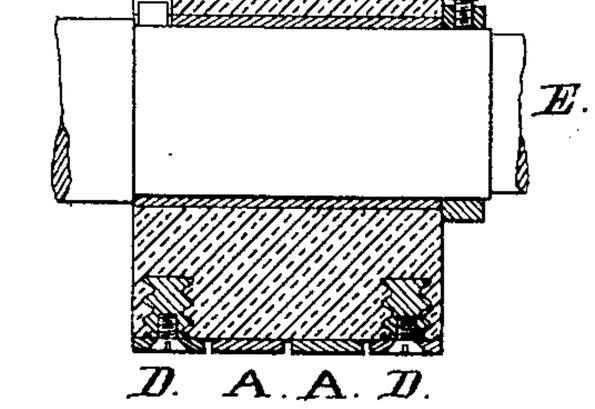
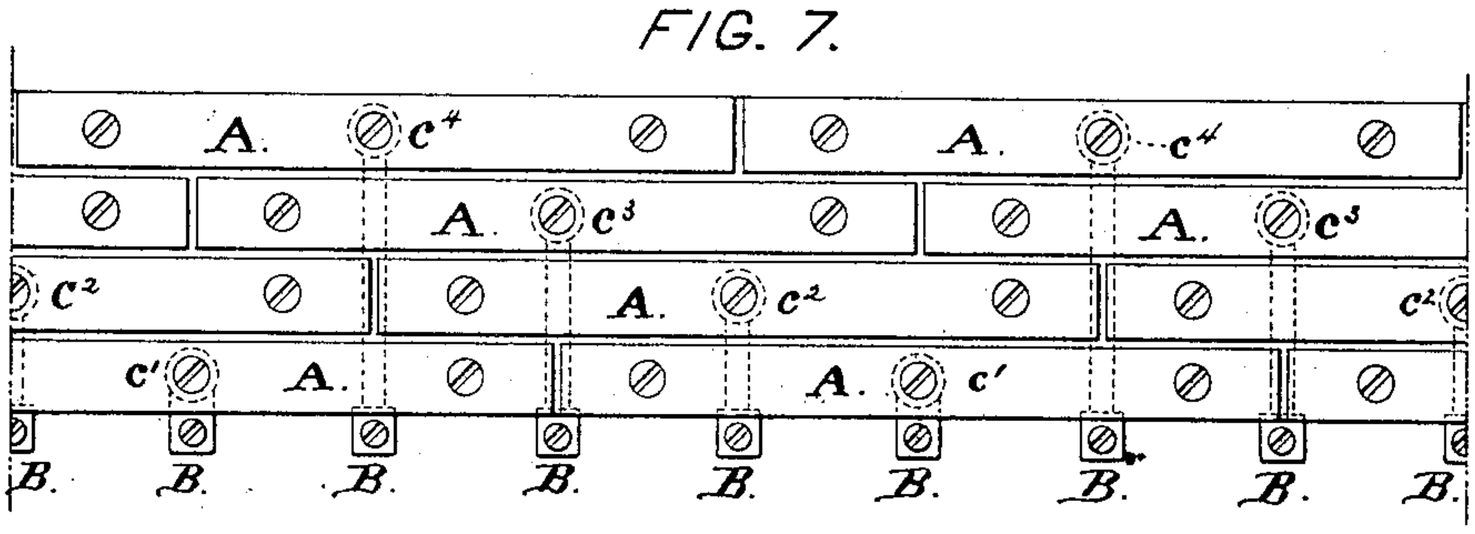



FIG. 7.

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# UNITED STATES PATENT OFFICE.

NATHANIEL S. KEITH, OF NEW YORK, N. Y., ASSIGNOR TO THE FULLER ELECTRICAL COMPANY, OF SAME PLACE.

## COMMUTATOR FOR MAGNETO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 229,255, dated June 29, 1880.

Application filed March 1, 1880. (Model.)

*To all whom it may concern:*

Be it known that I, NATHANIEL S. KEITH, of the city of New York, in the county and State of New York, have invented a new and useful Method of Constructing a Commutator for Electrical Machines, of which the following is a specification.

My invention relates to improvements in the construction of commutators for electrical machines, and the substitution, in part, of Portland cement or other self-hardening cementing material in place of metal, the object being to produce a cheap, durable, and efficient commutator having the sectional plates properly insulated from each other, while the electrical connection between them and the electric generator or motor is maintained. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view of a commutator on its shaft, constructed with outside sectional plates extending longitudinally, each plate attached by two screws, which form an electrical connection between the sectional plate and its binding-post or electrical connection. Fig. 2 is an end view of the same. Fig. 3 is a longitudinal section of the same, showing the connections between the binding-post and the sectional plate. Fig. 4 is a perspective view of a commutator on the shaft, constructed with outside sectional plates extending in parallel lines around the circumference of the commutator, the center screw of each plate forming an electrical connection with its binding-post, and the end screws being insulated, but holding the plates firmly by means of anchor-nuts embedded in cement. Fig. 5 is an end view of the same device. Fig. 6 is a longitudinal sectional view, showing the connection between the sectional plates and their binding-posts, and the ends of the plates firmly attached to the anchor-nuts. Fig. 7 is an extended plan view of the circumference of the commutator, showing the arrangement of parts and their connections.

Similar letters refer to similar parts throughout the several views.

The sectional plates A A are made of brass or other proper metal, and so arranged around the circumference of the commutator as not to come in contact with each other.

From the middle of each plate, on the inner side, is projected a metallic rod, as seen at C in Fig. 6, extending part way toward the circumference of the shaft, on which the commutator is to revolve when it makes a right angle, and, running parallel with the axis of the commutator, projects beyond the end thereof and terminates in a binding-post or connection for the electrical conductor, as seen at B B in Figs. 2, 5, and 6.

As the ends of the sectional plates must be kept firmly in their proper position, an anchor-nut is arranged under each extremity of each plate, and the plates, both at the middle, where connections are made, and at the ends, which are insulated, are firmly fixed to these attachments by means of metallic screws properly fitted and adjusted.

The arrangement of the anchor-nuts is shown in Fig. 6 at D D.

The plates and their binding-posts are so arranged that the plate nearest the end of the commutator, where the binding-posts are located, makes connection with its binding-post at the edge of the surface of the commutator, as seen at Fig. 7, C′, while the plate next in position makes connection with its binding-post by the metallic rod passing by the first plate insulated by the cement, as seen at Fig. 7 at $C^2$, and the plate third in position makes connection with its binding-post by the metallic rod passing by the first and second plates insulated by the cement, as seen in Fig. 7 at $C^3$, and the plate fourth in position makes connection with its binding-post by the metallic rod passing by the first, second, and third plates insulated by the cement, as seen in Fig. 7 at $C^4$.

I do not claim as my invention the order or relative position of the sectional plates with regard to each other, nor their graduated or alternate connection with the machine, but make this description of the parts to show the great difficulty in insulating the various connections by the old methods in use.

In my improved commutator the metallic frame-work is first constructed by attaching the metallic connections and anchor-nuts to the inside of a pattern-cylinder of the proper

size with screws in such manner as to give each connection and anchor-nut its proper position in the commutator. The whole is then placed in a mold having a center core to provide for the passage of the shaft. The mold is then filled with a cement of the proper kind and consistence, which hardens around the metallic connections and between the cylinder on the outside and the center core on the inside, forming a solid body for the commutator, which preserves all the connections and insulations without the exercise of further mechanical skill. The commutator is then taken from the mold, the outside pattern-cylinder removed, after the cement has sufficiently hardened, by disengaging the screws, and the sectional plates adjusted and fastened by replacing the screws, and the commutator is complete and ready for use.

The inside may be constructed with a metallic lining or sleeve to fit around the shaft; or the cement may be brought down to the surface of the shaft without any lining or sleeve.

I generally use Portland cement mixed with sharp sand in the proportion of three parts cement to one part of sand; but the cement may be mixed with plaster-of-paris, or with soluble glass and sand, or other suitable plastic material may be used—such as simple plaster-of-paris or india-rubber in a plastic state, as prepared for vulcanization—which will fill all the interstices and harden into a solid non-conducting body.

This kind of a commutator is found in practice to work equally as well as a commutator made wholly of metal, and is much lighter and more convenient to handle, and can be constructed at much less cost, and if any of the connections become severed can be repaired with less trouble and expense, and the insulations are always perfect.

Having thus described my device and the method of its construction, what I claim as new, and desire to secure by Letters Patent, is—

1. The method of constructing commutators for electric machines, which consists in first arranging the metallic connecting and anchoring parts in proper relative position in a mold or form, and then filling the space between the parts with a suitable non-conducting plastic material or cement which will harden and retain the parts in position, substantially as herein specified.

2. As a new article of manufacture, a commutator for electric machines, having its metallic connecting and anchoring parts held in position by a non-conducting cement hardened about the parts, substantially as herein specified.

N. S. KEITH.

Witnesses:
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