

(No Model.)

W. H. ELKINS.
COMMUTATOR.

No. 479,793.

Patented Aug. 2, 1892.

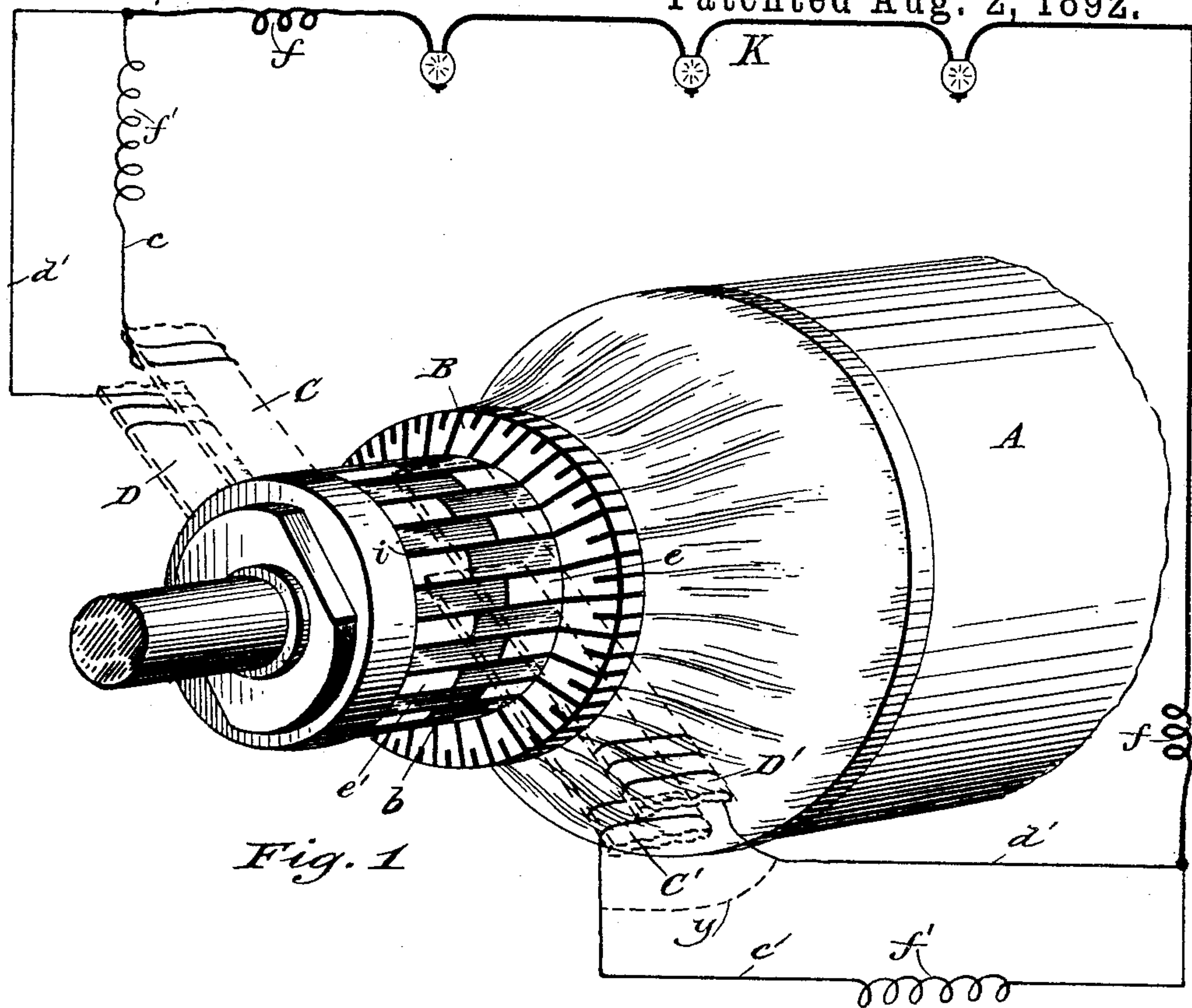


Fig. 1

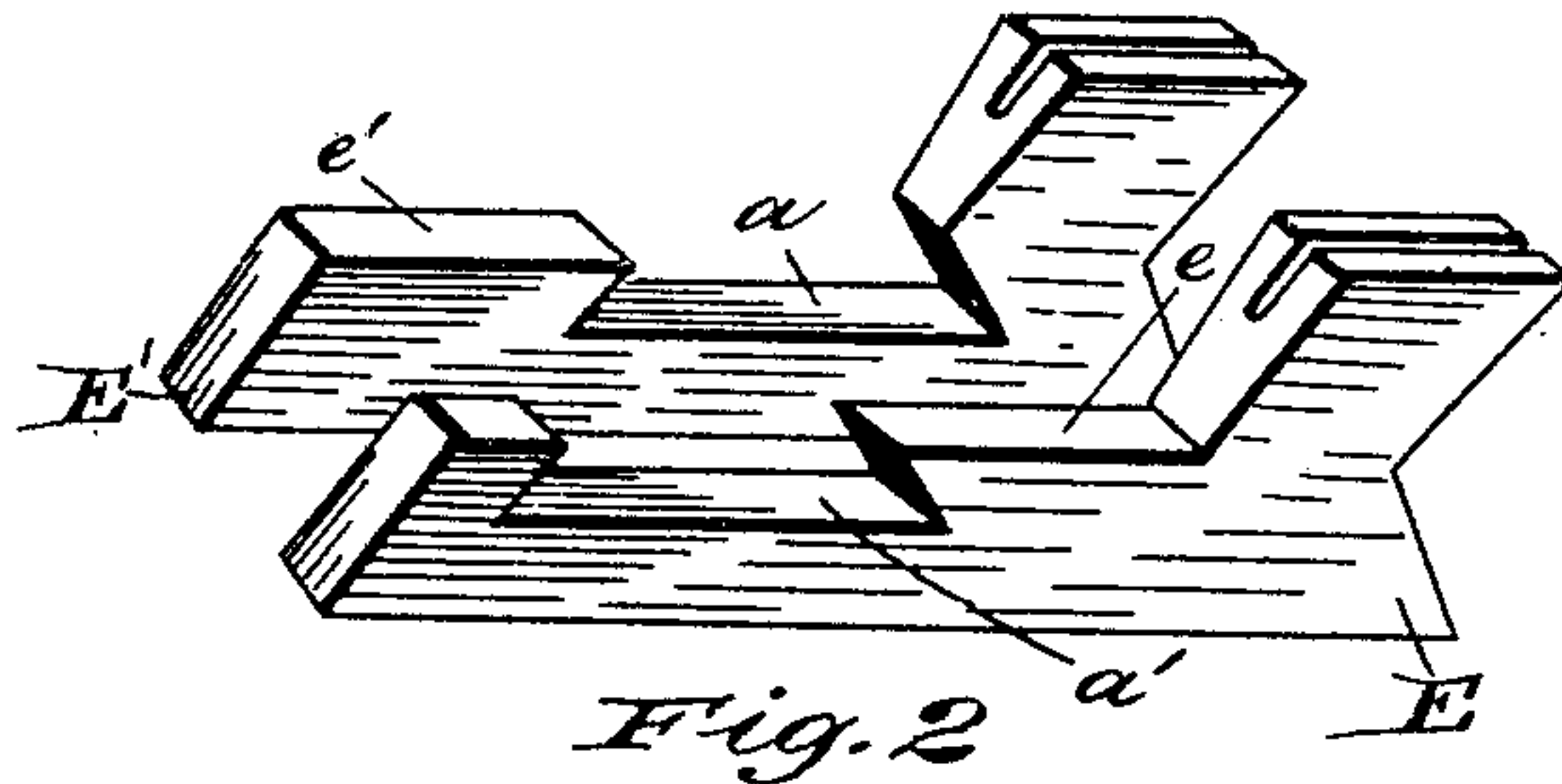


Fig. 2

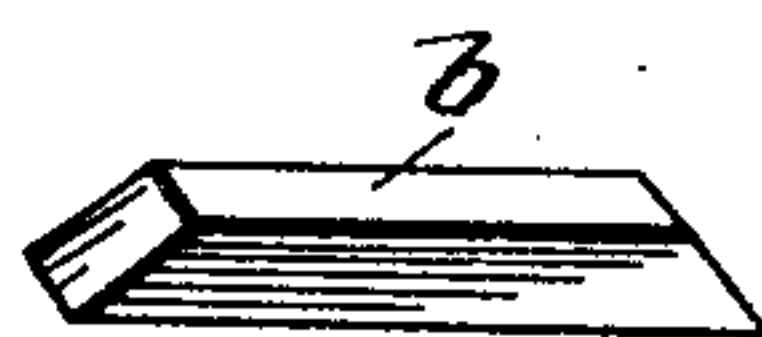


Fig. 3

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WILLIAM H. ELKINS, OF CAMBRIDGE, MASSACHUSETTS.

COMMUTATOR.

SPECIFICATION forming part of Letters Patent No. 479,793, dated August 2, 1892.

Application filed January 26, 1892. Serial No. 419,261. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HENRY ELKINS, a citizen of the United States, residing at Cambridge, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Commutators, of which the following is a specification.

This invention relates to improvements in commutators for dynamo-electric machines and motors; and its object is to prevent, to a large extent, the injurious sparking and arcing which usually takes place at the brushes and segments of such commutators.

My invention consists in a commutator having two series of contacts in different planes of rotation and engaging alternately with the commutator-brushes, so that a contact of a brush with a contact of one series is followed by a contact of said brush or one connected therewith with a contact of the other series. The two series of contacts are separated as far as necessary from one another to prevent the continuance of an arc between them.

The accompanying drawings show the preferred manner of carrying out my invention, Figure 1 being a perspective view of the commutator with connections shown diagrammatically, and Figs. 2 and 3 showing details.

While my invention may be carried out in several ways, the following is believed to be the simplest and most convenient.

A commutator B is built up and supported in the usual manner, except that in each segment E or E' is formed a notch a or a', as shown in Fig. 2, and these notches are filled with insulating material b. (Shown in Fig. 3 separately.) The notches a a' in adjacent segments are offset longitudinally of the commutator, but overlap, as indicated in Fig. 2, so that when the parts are assembled the unnotched metallic contact portions e e' of the segments form two series of contacts, one series of contact portions e being in one plane of rotation and the other series e' being in another plane of rotation. The contacts in the two planes alternate, as shown, around the commutator and are separated longitudinally by a space sufficient to prevent arcing. The usual insulation i is provided between these segments. The commutators being mounted on the shaft, connections are made from the segments E E' to the armature-coils in

the usual manner. Any usual or suitable form of commutator-brushes may be supplied to the commutator, and such brushes may be placed and connected in any suitable manner, so as to bring the contacts e e' of the two series into alternate connection with the circuit. I prefer to use an ordinary brush C C', extending along the commutator, so as to engage with both sets of contacts. Such brushes are preferably thick enough to bridge the insulation i, but are not necessarily so. The armature being rotated in a field of force either in generating or receiving a current through the brushes C C' the said brushes make contact with the two series of segments in alternate succession. The action is, in fact, the same as with an ordinary commutator, except that the point of contact on each segment is localized at a certain part, and, the succeeding segment being covered by insulation at the portions adjacent to such part, the point of contact is shifted along the commutator to the exposed part of said succeeding segment. Thus when the brush leaves a segment a wide insulation-gap is rapidly introduced between the parts, through which the discharge of the armature-coil tends to pass. Such discharge, whether resulting from the current flowing in a short-circuited armature-coil or from the line or main current itself, is liable with the ordinary commutator to set up an arc from segment to segment, which, especially with very high tension machines, may injure and even destroy the commutator. It will be seen that with my invention there is rapidly interposed in the path of this arc a disruptive or insulating space equal to the width of a segment or to the insulation distance separating successive contacts, and this arc is prevented from forming or is quickly disrupted.

My invention is of special advantage where the nature of the machine requires one or more brushes to be placed on the commutator at some distance from the neutral line, as a brush so placed is, as is well known, especially apt to cause destructive arcing.

In Fig. 1 the brushes C C' may be supposed to be placed on or about the neutral line, while the brushes D D' are placed at a distance of several segments therefrom. Said two sets of brushes are connected, respect-

ively, to branches c' and d' , which may be simply connected together, as shown by dotted line y , or may lead to separate parts of the circuit. For example, the connection d' may shunt a portion $f'f'$ of the field-magnet coil, ff being the main field-magnet coils. The external or work circuit is shown at K.

My invention applies to those dynamo-electric machines and electric motors wherein a coil-wound armature having a series of coils connected to a series of segments on the commutator is revolved in a magnetic field of force, as in such machines the tendency to arcing and flashing is of serious importance. It is especially applicable to the ordinary dynamo-electric machine or motor of the Gramme or Siemens type, wherein a continuous closed coil is wound around a drum or ring core and connections taken at successive points to successive insulated segments of a commutator. In such machines any departure of the brushes from the "non-sparking" point is usually accompanied by violent arcing and flashing. Such departure is often necessitated by the requirements of current-regulation or is occasioned by fluctuations in the working resistance.

It is obvious that any kind of brushes may be used in carrying out this invention and that instead of a single wide brush spanning both series of contacts I may employ two or more narrow brushes connected together in any suitable manner.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with an armature having a series of coils wound on a core and rotating in a field of force, of a commutator having insulated segments equal in number to the armature-coils and connected to said coils, the contact portions of alternate segments being in two different series in different planes of rotation, and a brush or brushes engaging with both said series of contacts.

2. The combination, with an armature having a series of coils wound on a core and rotating in a field of force, of a commutator hav-

ing two series of contacts in different planes of rotation and connected successively and alternately to said coils and a brush or brushes bearing on said contacts and making or breaking with contacts of the two series alternately.

3. The combination, with an armature having a series of coils, of a commutator having two series of insulated contacts connected successively and alternately to said coils and a brush or brushes engaging with contacts of the two series successively.

4. A rotary commutator having a number of individually-insulated segments and alternate segments having contact portions in different planes of rotation.

5. A rotary commutator having a number of individually-insulated segments, a portion of the top of each segment being covered with insulation, such insulation being offset in alternate segments, leaving two series of contact portions in different planes of rotation.

6. A rotary commutator having a number of individually-insulated segments, a portion of the top of each segment being covered with insulation, such insulated portions being offset and overlapping in alternate segments, leaving two series of contact portions in different planes of rotation, with an intermediate insulating-space.

7. The combination, with an armature having a series of coils, of two series of contacts connected successively and alternately to said coils and arranged alternately with their contact portions out of line with one another in the direction of rotation and a brush or brushes extending along the commutator and engaging with both series of contacts and making and breaking with contacts of the two series alternately.

In witness whereof I have hereunto set my hand this 16th day of January, 1892.

WILLIAM H. ELKINS.

Witnesses:

A. P. KNIGHT,
C. L. HAYNES.