

No. 661,227.

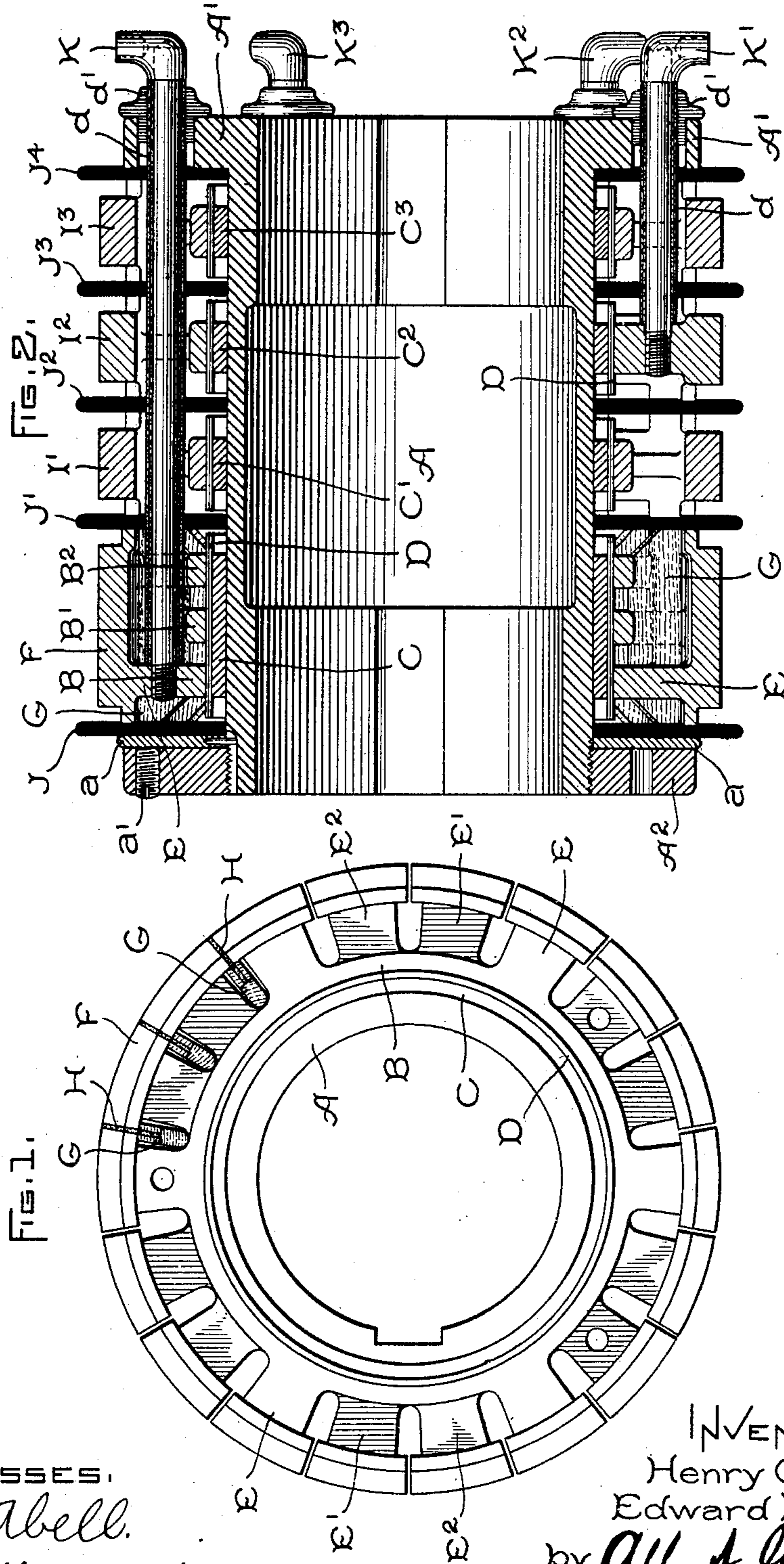
Patented Nov. 6, 1900.

H. G. REIST & E. L. AIKEN.
COMMUTATOR COLLECTOR.

(Application filed June 25, 1898.)

(No Model.)

2 Sheets—Sheet 1.



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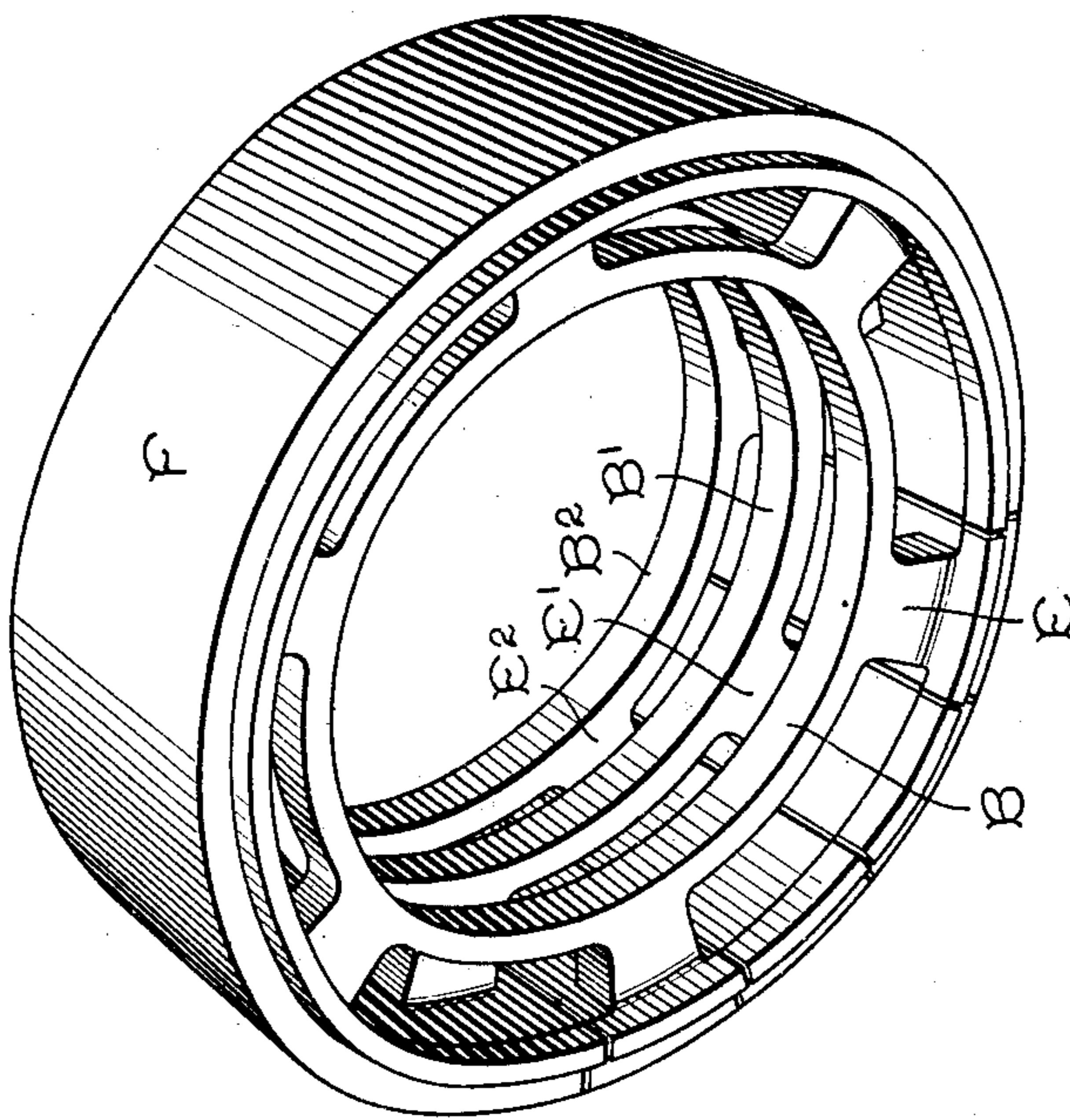
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FIG. 3.



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UNITED STATES PATENT OFFICE.

HENRY G. REIST AND EDWARD L. AIKEN, OF SCHENECTADY, NEW YORK,
ASSIGNORS TO THE GENERAL ELECTRIC COMPANY, OF NEW YORK.

COMMUTATOR-COLLECTOR.

SPECIFICATION forming part of Letters Patent No. 661,227, dated November 6, 1900.

Application filed June 25, 1898. Serial No. 684,520. (No model.)

To all whom it may concern:

Be it known that we, HENRY G. REIST and EDWARD L. AIKEN, citizens of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Commutator-Collectors, (Case No. 720,) of which the following is a specification.

Our invention relates to commutator-collectors for alternating-current machines, especially to their mechanical features. It is particularly useful in polyphase dynamos; but the features of its construction could be applied with any type of machine, and in some respects it is applicable to ordinary commutators. In general its most useful application will be found in "rectifying-commutators," so called, such as those just briefly described.

It consists in general of an arbor upon which the collector-rings and commutator of an alternating-current machine are mounted in such a way that they may be readily removed and taken apart for repairs. In some of its features it resembles in general the construction described in the prior patent to Henry G. Reist, No. 533,084, dated January 29, 1895; but it is an improvement upon that in several particulars, which will be apparent from this description. Upon the arbor we mount a number of supporting-rings, which make a working fit with the said arbor, a separate ring for each of the collectors and one for the commutator. Between each collector-ring and the supporting-ring upon which it is mounted insulation is interposed, the collector-rings and the commutator being then shrunk onto the mounting-rings. Between each two adjacent collectors thus mounted on its ring and between one of these and the commutator may be placed insulating-septa, and suitable securing devices are provided by which the construction when assembled becomes a rigid whole. The commutator also embraces some peculiar features. It is by preference cast in a single piece having an external flange of the full width of the commutator-segments and internal rings connected (in alternation or "staggered" around the commutator) to the external flange by suitable spokes. It will be seen that in this construc-

tion by cutting a saw-kerf between each spoke the three rings will be separated. Where the construction is employed in a polyphase dynamo, there will of course be one ring for each phase to be commuted. Each ring will then support a series of segments interleaved between those carried by the other rings. We have shown a three-phase device, but are not limited in this regard.

The accompanying drawings show our construction.

Figure 1 is an end elevation of the commutator; Fig. 2, a section showing the arbor, collector-rings, and commutator secured in place; and Fig. 3, a perspective of the blank employed in the process of constructing the commutator.

In Fig. 1, A is the arbor. B is one of the internal rings of the commutator. C is a ring fitting the latter. D is suitable insulation between the ring C and the internal ring B. E represents the spokes connecting the commutator-ring B to the external flange F, which forms the working face of the commutator-segments. E' E² are spokes in different planes and staggered with respect to spoke E and connecting the flange F with the other interior rings B' B². (Shown in Fig. 2.) G G are blocks of wood which are driven in place between the spokes before the commutator-segments are sawed apart, and H H are strips of mica which are inserted through the spaces between the segments and into the kerfs in the wooden blocks after the segments have been separated.

The construction will be more clearly understood from Fig. 2, in which a completed device embodying our invention is shown in section. In this the internal rings B B' B² of the commutator are shown in section. These are all carried by the same supporting-ring C. Upon similar rings C' C² C³ are mounted the collector-rings I' I² I³, also formed with interior rings and spokes and having the insulating-septa J' J² J³ J⁴ between the different collectors. A suitable shoulder A' is provided at one end of the arbor, against which the septum J⁴ bears, and a retaining-ring A², screw-threaded, secures the parts in place, a washer α being interposed between the septum J and the ring A², and set-screws α' hold-

ing the ring from turning. Leads $K K' K^2 K^3$, protected by sleeves d , of insulating material, tap into the device at suitable points, and from these the cables of the machine are led
5 in the usual way.

The method of assembling the device is as follows: After the arbor A has been turned to the proper diameter and the thread cut upon its end the rings $C C' C^2 C^3$ are machined
10 to make a working fit with the arbor. These rings are then removed and insulation D, preferably of mica, built up on them to the desired thickness. The collector-rings $I' I^2 I^3$ are then machined and are shrunk on or other-
15 wise rigidly secured to the rings C over the insulation. The commutator is similarly made up. After this the flange is turned and the wooden wedges G are driven into place in the openings between the spokes $E E' E^2$.
20 The saw-kerfs are then made through the flange F and the wooden blocks or wedges, separating the flange of the commutator into three series of segments. In the commutator described in patent to Henry G. Reist, No.
25 533,084, it was necessary not only to separate the portions of the flange, but also to bore two alternating series of lateral holes in the radial web of the casting to electrically divide the structure. It is clear that it would be impos-
30 sible to bore holes in such a way in a third web located between two outer webs. With our present invention it is possible to construct a commutator having segments of great width and any desired number of series of spokes
35 or supports from a previously-machined and trued-up single-piece casting. Insulation H is then placed in the slots between the segments and a finishing cut is taken over the whole of it. The holes for the leads K may
40 be tapped either while the rings are separated or after they are assembled. The parts are then assembled upon the arbor and the ring A^2 is tightened over the washer a and held in place by the set-screws a' . The leads K are
45 then screwed in through the holes which are prepared for them, being held centrally by insulating - thimbles d' in addition to the sleeves d , of insulating material.

If for any reason it becomes desirable to
50 take down the device, this can readily be done by reversing the process, when the parts may be repaired and reassembled.

What we claim as new, and desire to secure by Letters Patent of the United States, is—
55 1. The combination with a supporting-ring and a body of insulation formed thereon, of a plurality of commutator-rings shrunk on over the insulation.

2. The combination of an arbor, a number
60 of metal rings making working fits therewith, corresponding insulating-rings thereon, collecting devices mounted on the different rings, and means for securing the parts.

3. The combination of an arbor, a number
65 of metal rings making working fits therewith, insulation upon the rings, collecting devices shrunk on over the insulation, insulating-

septa between the collectors, and means for securing the parts in place.

4. An integral blank for the commutator of
70 a dynamo-electric machine, comprising a number of rings connected by staggered spokes to an external ring or flange.

5. The process of constructing a commuta-
75 tor, which consists in forming a blank having a number of internal rings connected by spokes with an external flange, mounting the rings upon an insulating-support, and then cutting the flange between each two spokes
80 so as to form commutator-segments.

6. The process of constructing a commuta-
tor, which consists in forming a blank hav-
ing a number of separated internal rings con-
85 nected by spokes with an external flange, shrinking the blank on an insulating sup-
porting-ring, and then cutting the flange be-
tween each two spokes so as to form commu-
tator-segments.

7. A commutator comprising a metallic
90 casting having a plurality of supporting-rings, each ring connected by a series of spokes which do not overlap the spokes of another ring, to a peripheral flange cast in one piece and having its face divided into separate seg-
95 ments by cuts between each two spokes of the total series of spokes.

8. A commutator for a three-phase elec-
trical machine, comprising a casting having
three supporting-rings, a series of spokes ex-
100 tending from each ring, no spoke in any series overlapping a spoke in another series, and a commutating-surface cast in one piece and divided by cuts across its face into a series of segments, to each of which a spoke is
105 connected.

9. A commutator comprising a casting hav-
ing several supporting-rings, a series of spokes
on each ring, each spoke in all the series oc-
cupying an unobstructed lateral space, a com-
110 mutating periphery cast in one piece and having as many transverse cuts therethrough as the total number of spokes, a spoke being connected between each two cuts to said pe-
riphery.

10. A commutator comprising a number of
115 supporting-rings, each ring being united integrally by a series of spokes, each of which spokes occupies a different radial position from any one of all the series, with a flange cast in one piece and divided by transverse
120 cuts into a series of commutating-segments which form a periphery of substantially uniform width of face.

11. A commutator comprising a number of
125 supporting-rings, spokes on each ring, and a flange cast in one piece and divided by transverse cuts into a series of contact-segments, each supported by a single spoke integral with its segment.

12. A commutator comprising a number of
130 concentric supporting-rings, integral spokes extending radially from the periphery of each ring, and a flange cast in one piece and divided by transverse cuts into a series of con-

tact-segments, each supported by a single spoke integral with its segment.

13. The combination with an arbor, of a plurality of metal rings mounted on said arbor and making a working fit therewith, insulation on said rings, collecting devices securely mounted over the insulation, insulating-septa between the collectors, and means for securing the parts.

14. A commutator comprising a cast blank having a number of separate supporting-rings integrally united by series of spokes with a peripheral flange cast in one piece, each spoke of which lies in an independent lateral position, incisions through the flange between each pair of spokes, and insulation in the incisions.

15. A commutator comprising a blank having a number of separate supporting-rings integrally united by series of spokes with a peripheral flange cast in one piece, each spoke of which lies in an independent radial position, supporting-blocks between each two spokes, incisions through the flange between each two spokes, and insulation in the incisions secured by the blocks.

16. A commutator comprising a blank having a number of separate supporting-rings integrally united by series of spokes with a peripheral flange cast in one piece, each spoke of which lies in an independent radial position, supporting-blocks between each two spokes, incisions through the flange extending into each block, and insulation in the incisions between the flange-segments and held in the block incisions.

17. A cast commutator-blank consisting of a plurality of supporting-rings connected to a single exterior concentric ring by series of spokes, no two spokes of which share radial space.

18. In a commutator-collector, the combination with an arbor, of rings removably mounted thereon, insulation for said rings, and collecting and commutating devices securely mounted over said insulation.

19. In a commutator, the combination with an arbor, of rings thereon having a working fit therewith, insulation for said rings, collecting and commutating devices shrunk on over said insulation, and insulating-septa between the collecting and commutating devices.

20. The method of manufacture which consists in inserting supporting-blocks in the spaces between each pair of a radial series of spokes connecting a plurality of supporting-rings with a peripheral flange, making a series of radial incisions through the flange and into the supporting-blocks, and then inserting insulating-septa in the incisions, between the separated flange-segments, and into the supporting-blocks.

21. The method of manufacture, which consists in inserting supporting-blocks in the spaces between each pair of a radial series of spokes connecting a plurality of supporting-rings with a peripheral flange, making a se-

ries of radial incisions through the flange, each incision extending through the flange and into the separating-block, inserting insulating-septa in the incisions between the separate flange-segments and into the supporting-blocks, and then finishing off the peripheral surface.

22. The method of manufacturing commutators, which consists in mounting supporting-rings upon an arbor, covering the rings with insulating material, and then shrinking on contact-rings over the insulation.

23. The method of manufacturing commutators, which consists in mounting supporting-rings and insulating-septa alternately upon an arbor, then covering the rings with insulating material, and shrinking on contact-rings over the insulation.

24. A commutator having a peripheral flange cast in a single piece and integral with interior supports, which supports are organized into a plurality of electrically-separated parts, said flange having perforating incisions between each pair of radial supports, whereby the commutator, including the flange as well as the supports, is divided into a plurality of electrically-independent parts.

25. The combination with a plurality of interior members, of a series of integral supports extending radially in the same plane from each member, the supports on no member occupying the same radial position as those of another member, and a peripheral flange cast in one piece and integral with said supports and having a perforating incision between each pair of supports.

26. A commutator, which consists of an arbor, insulation mounted thereon, a plurality of rings mounted rigidly over the insulation, a plurality of series of spokes extending radially from the rings, no two series of spokes being in the same plane, no two spokes occupying like radial position, and a continuous flange on the ends of the spokes, from which transverse portions are removed between adjacent portions connected to spokes, whereby each ring, its spokes and the segments thus formed on the ends of the spokes are electrically separated from the other rings, spokes and segments.

27. A commutator, which comprises a plurality of rings having radial spokes, an exterior flange which is divided into electrically-separate segments by the removal of transverse sections of the metal of the flange between adjacent spokes, whereby successive segments are connected by the corresponding spokes to different rings.

28. A commutator, which comprises an exterior flange cast integral with radial spokes extending from a plurality of separated internal supporting-rings, transverse portions of the metal of the flange between adjacent spokes being removed to form separate commutator-segments.

29. A commutator, which comprises a plurality of rings, a plurality of radial supports

extending from each ring, each support on
one ring being located in a radial position to
one side of the nearest support on the next
ring, and a peripheral flange cast integral
5 with the supports and rings, said flange hav-
ing transverse sections removed, whereby
the successive segments thus formed are car-
ried successively by the radial supports ex-
tending from the successive rings.
10 30. In a commutator, the combination with
an arbor, of insulation covering the same, a
single-piece casting thereon provided with a
plurality of rings which are rigidly secured
over the insulation, with radial supports ex-

tending from each ring, and with a periph- 15
eral flange, said flange being divided into seg-
ments by the removal of transverse sections
of metal therefrom, at points between the
junctions of the radial supports with the
flange. 20

In witness whereof we have hereunto set
our hands this 17th day of June, 1898.

HENRY G. REIST.
EDWARD L. AIKEN.

Witnesses:

B. B. HULL,
C. L. HAYNES.