

(No Model.)

J. F. McLAUGHLIN.
ARMATURE FOR ELECTRIC MOTORS OR GENERATORS.

No. 497,887.

Patented May 23, 1893

Fig. 1.

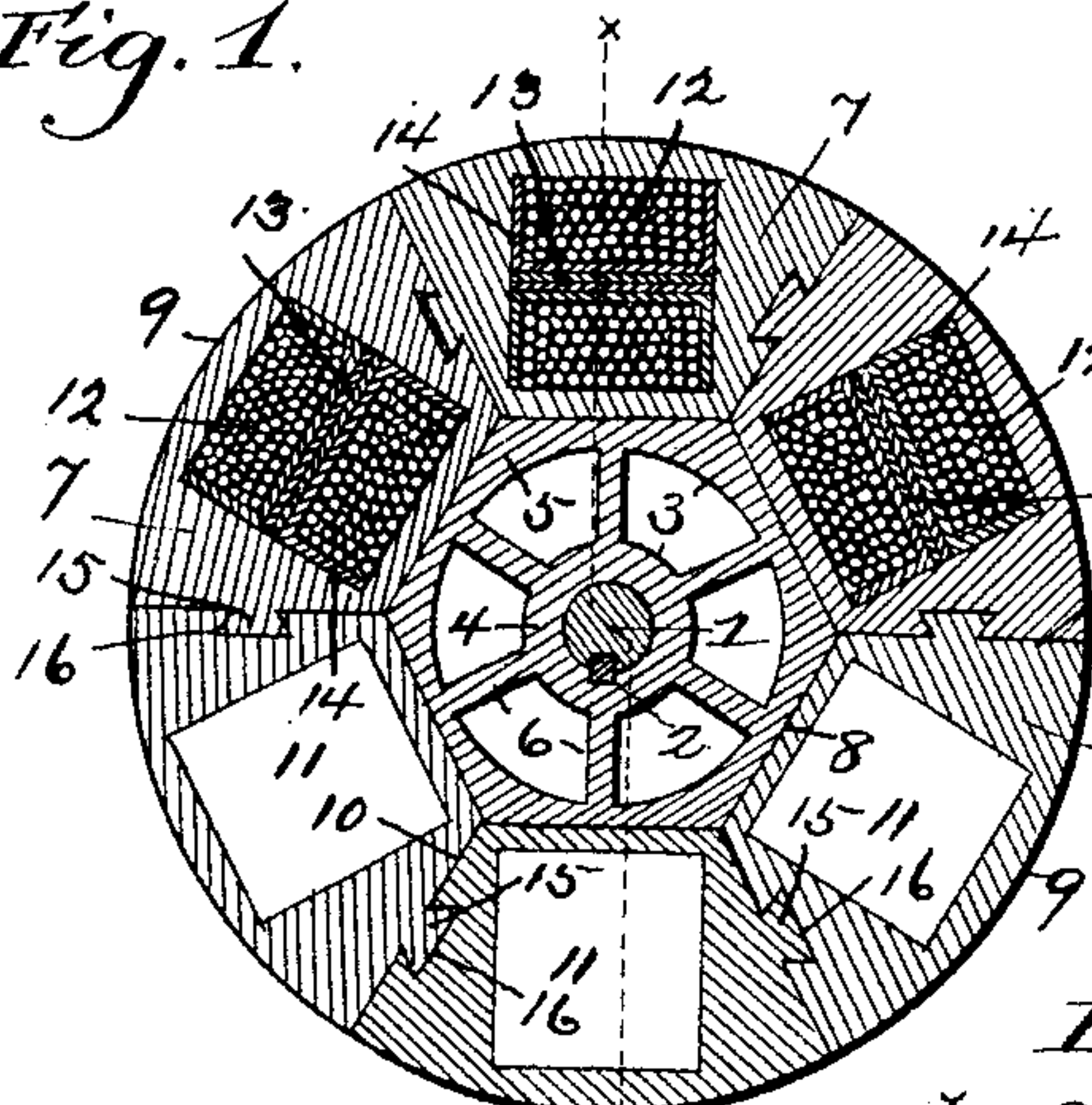


Fig. 3.

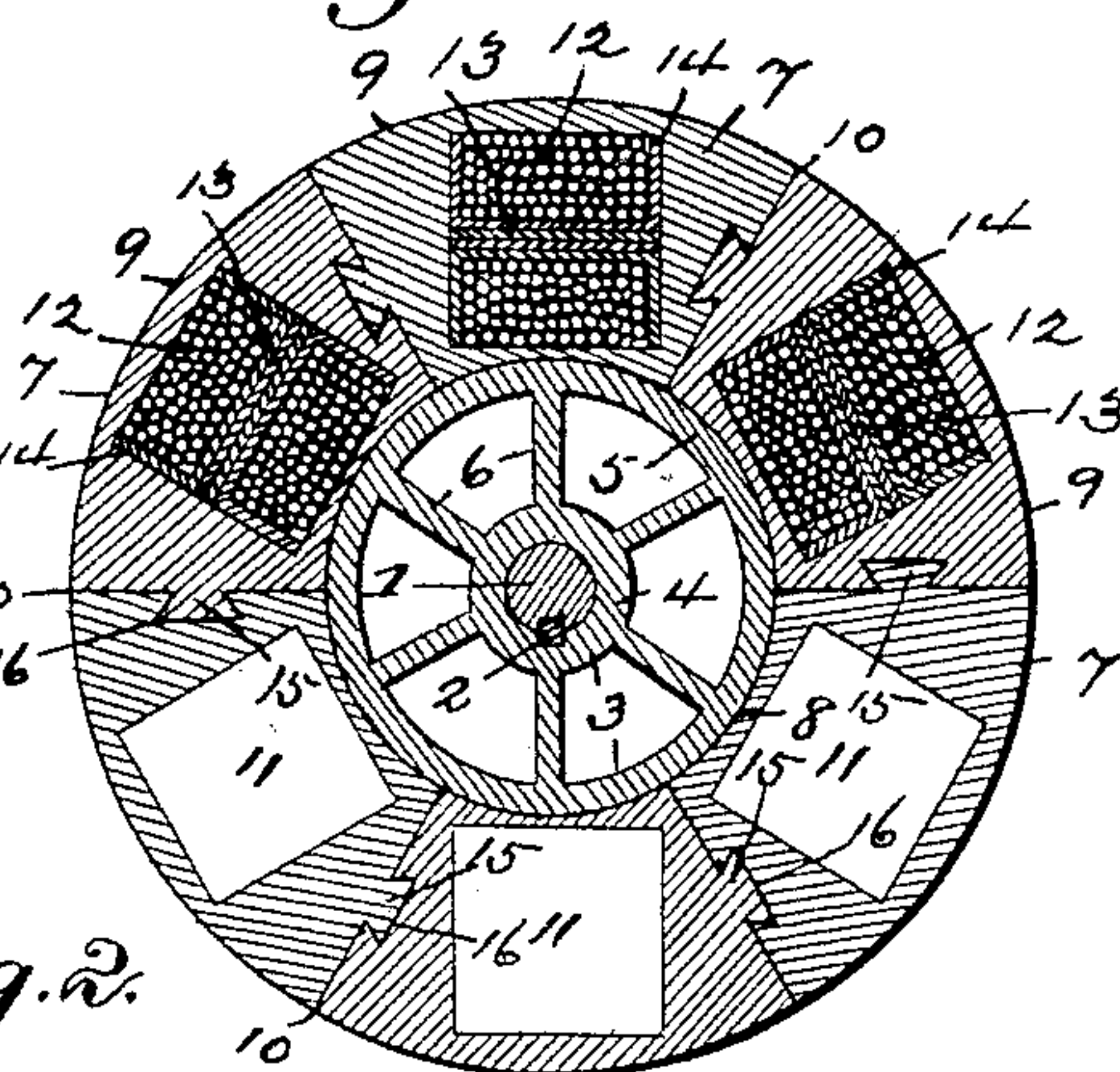


Fig. 2.

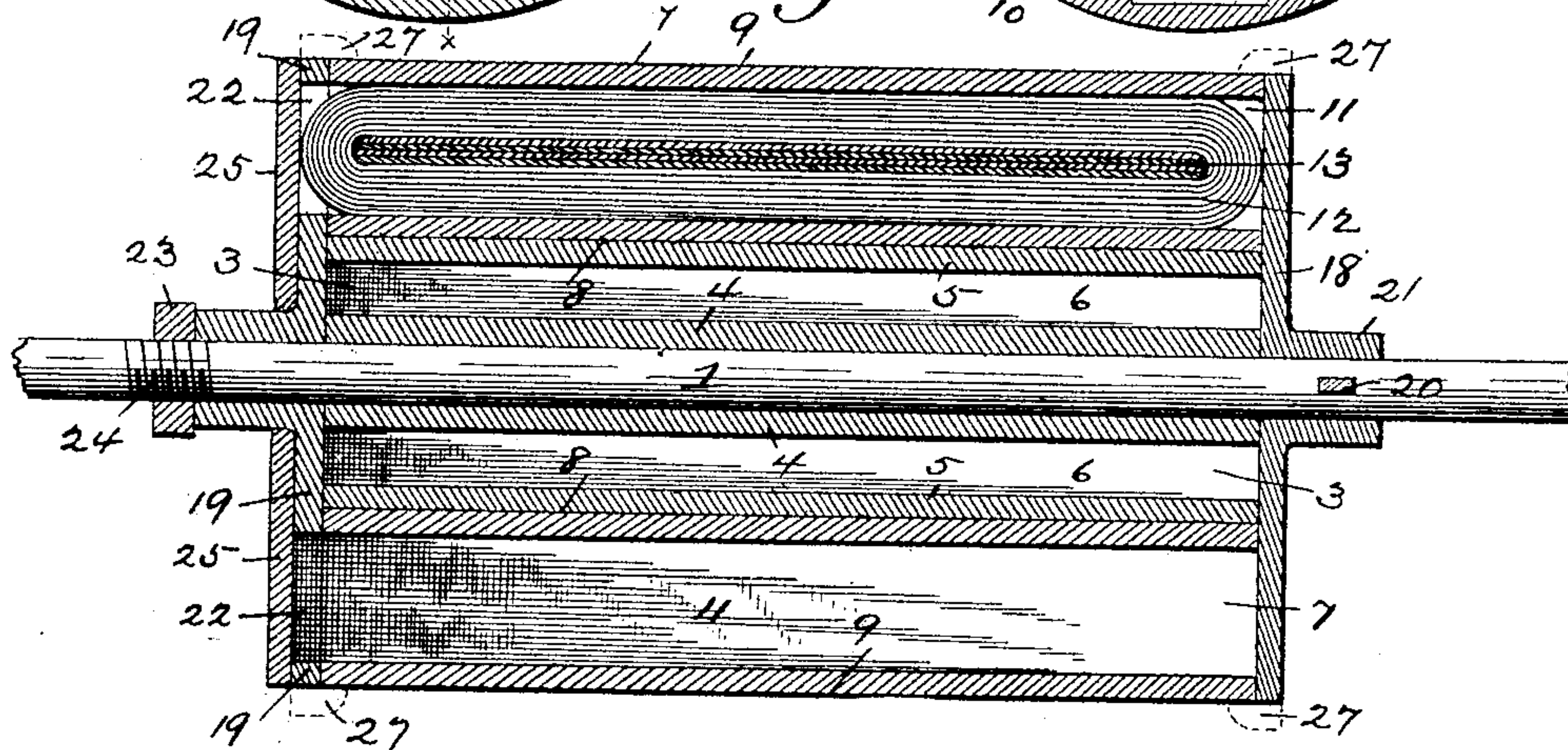


Fig. 5.

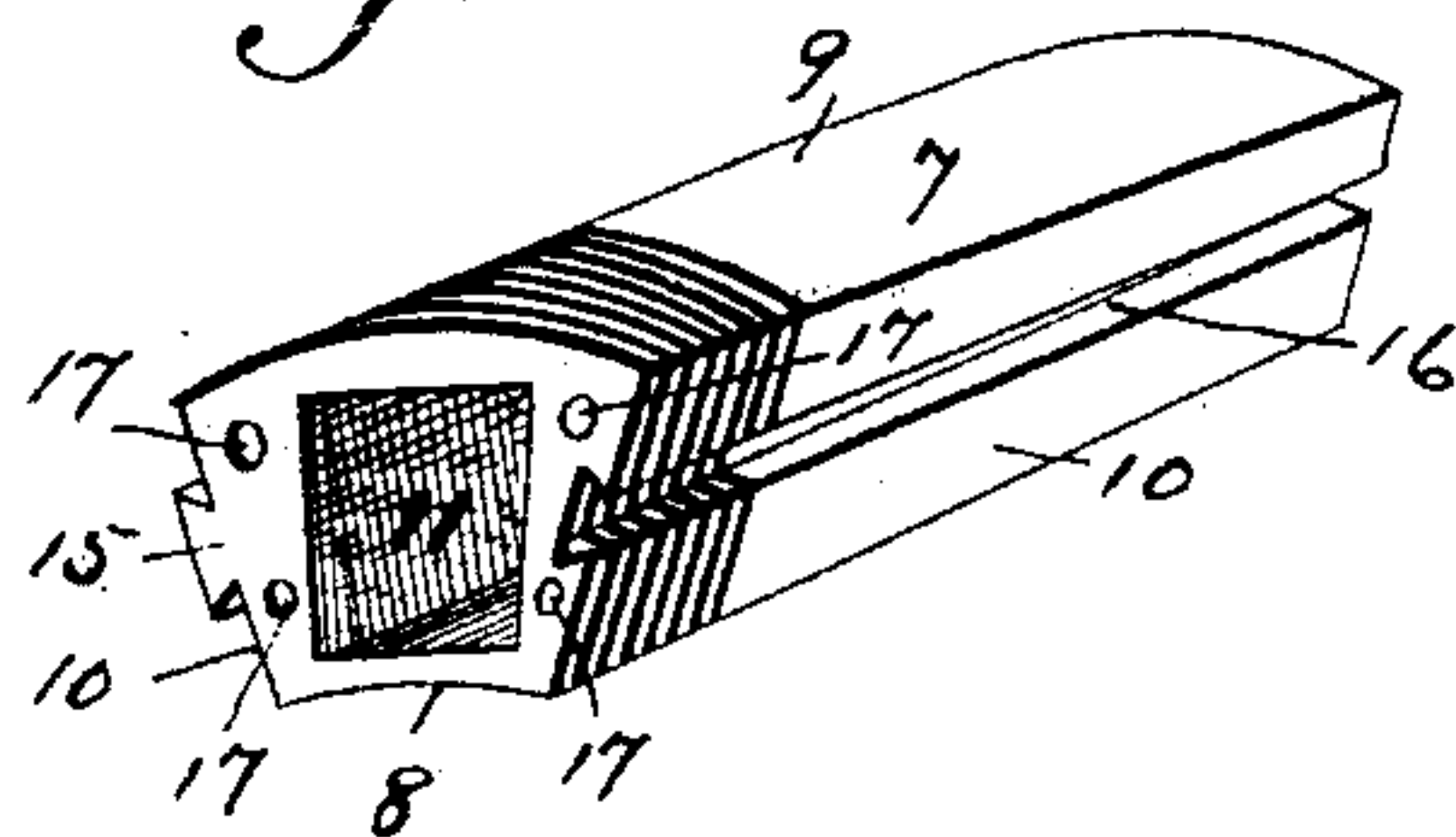
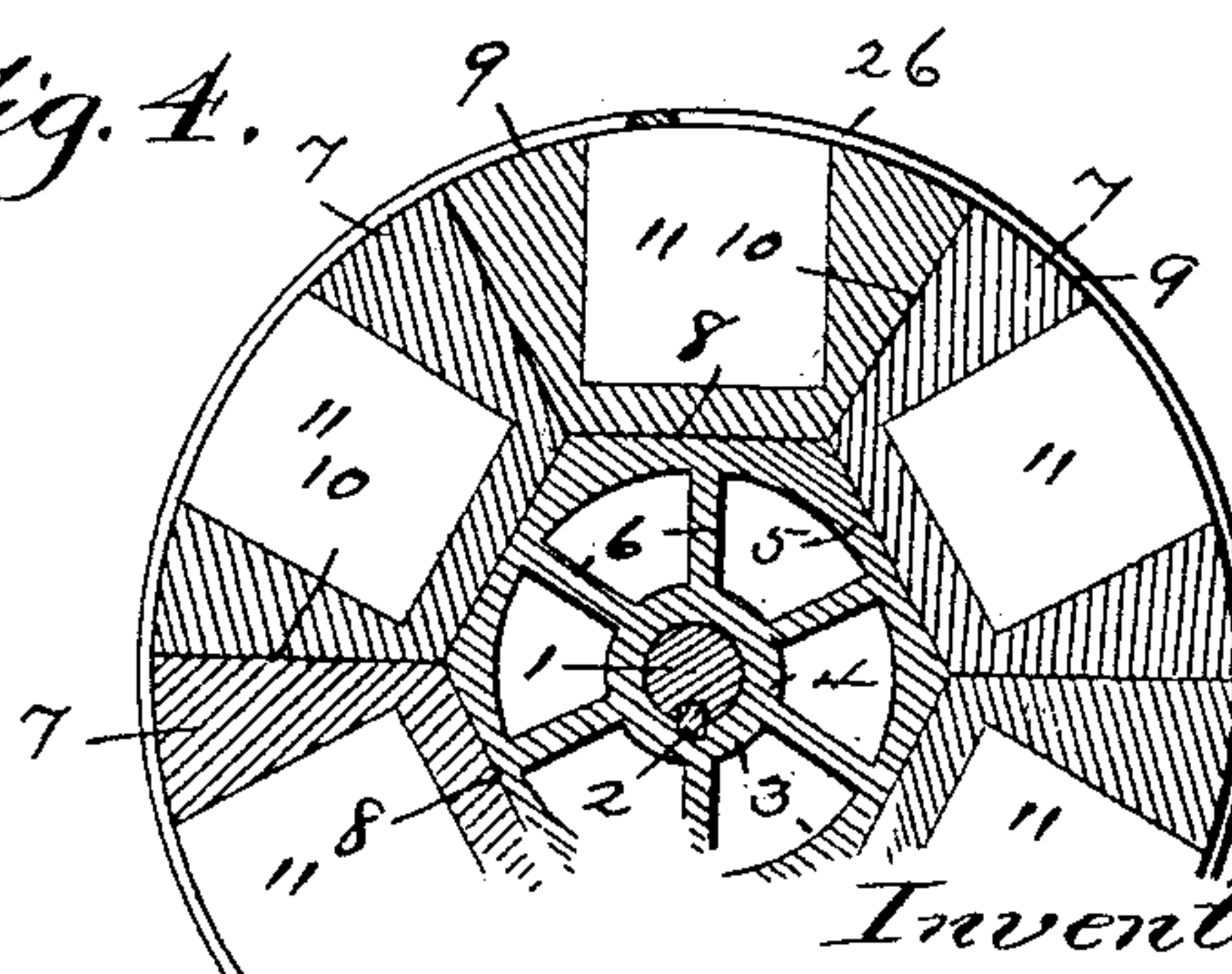


Fig. 4.



Witnesses:

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UNITED STATES PATENT OFFICE.

JAMES F. McLAUGHLIN, OF PHILADELPHIA, PENNSYLVANIA.

ARMATURE FOR ELECTRIC MOTORS OR GENERATORS.

SPECIFICATION forming part of Letters Patent No. 497,887, dated May 23, 1893.

Application filed December 17, 1891. Serial No. 415,391. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. McLAUGHLIN, a citizen of the United States, and a resident of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Armatures for Electric Motors or Generators, of which the following is a specification.

My invention has reference to improvements in armatures for electric motors and for dynamoelectric generators, and it consists, broadly speaking, in an armature body composed of segments, each provided with a channel or with a trough for the reception of an armature coil; the coil may be thus inserted and removed without dismantling the armature, and is protected against external injury by the walls of the channel, or by the walls of the trough and a wire wrappings surrounding the armature body, which thus converts the trough into channels closed on all sides. This armature is an improvement upon the armature previously invented by me and for which I have obtained Letters Patent No. 458,856, on September 1, 1891. In the said Letters Patent the armature is shown as composed of a cylindrical iron body, preferably laminated, with a number of channels formed near the periphery, each channel receiving an armature coil. In that construction the armature body is continuous circumferentially and if any injury happens to said body, the whole armature must be dismantled for inspection and repair; each coil must be moved, and if the injury to any part is serious, the whole body has to be discarded and a new one substituted in its place.

In my present invention where the body of the armature is made up of segmental sections, an injury to any one section only requires a renewal of that portion and not of the whole armature body.

In my former construction the portion of the armature body which received the coil was integral with the spider which connected the body with the armature shaft, while with my present construction the spider is made separate from the armature body and may be altogether dispensed with, since the segments may be and are preferably made interlocking and self sustaining.

The advantages of this construction are

numerous, as will be readily understood. When each segment is made of a solid piece, the weight of the material which it becomes necessary to manipulate in the building up of the armature is comparatively small; these segments are cast much easier and more perfect than the whole body of the armature would. When each segment of the armature body is built up of laminae, these laminae are so small that they can be stamped out from scraps of sheet iron, which would otherwise be wasted, and more especially is this true of smaller armatures, the segmental laminae of which may be stamped out from the rectangular pieces which are cut out in the formation of the channels or troughs of the larger armatures. But in each case, whether the segments are made of solid pieces, or are laminated, each segment with its coil seated in the channel or trough, forms a unit of the armature, which is exchangeable with every other like unit, thereby giving great comfort both in the manufacture and in the overhauling and repair, which from time to time becomes necessary.

In the accompanying drawings which form a part of this specification I have illustrated my improvements as follows:

Figure 1, is a cross section of one form of armature, constructed in accordance with my invention. Fig. 2, is a longitudinal section on the line $x-x$ of Fig. 1. Figs. 3 and 4, are cross-sections similar to that shown in Fig. 1, but differing therefrom in details of construction; and Fig. 5, is a perspective of one of the armature-body segments.

Like numerals of reference designate like parts throughout all the drawings.

Upon the armature shaft 1, there is secured by a key 2, a spider 3, composed of a hub 4, through which the shaft 1, extends, an outer portion or shell 5, and arms or wings 6, connecting the hub and shell and formed integral with the same. The spider is, in effect, a cylinder, with its outer surface either polygonal as shown in Figs. 1 and 4, or cylindrical, as in Fig. 3, and it serves as a core or support for segmental sections 7, which latter, together with the said core, constitute the armature body. The sections 7, are each of the same length as the core with their inner faces 8, either flat to fit the faces of the po-

lygonal surface of the core shown in Figs. 1 and 4, or curved to fit the cylindrical face of the core shown in Fig. 3. The outer faces 9, of the sections 7, form arcs of a circle, the diameter of which corresponds to that of the completed armature body, and the sides 10 are radial, as shown, so that when the several sections are assembled around the core, the parts will all be in close magnetic contact.

Each segmental section 7, is formed with a channel 11, extending longitudinally through it, and this channel is shaped to receive an armature coil 12, similar in construction to those shown and described in my aforesaid Letters Patent; by preference, however, the channels 11, are made rectangular, as shown. The wire of each coil is wound upon a bobbin 13, preferably of soft sheet iron, the flanges 14, of which are in magnetic contact with the side walls of the channels 11, when the coil is inserted therein.

One side wall 10, of each section 7, has formed on it a central longitudinal, dove-tail tongue 15, and the other side wall 10, is provided with a central, longitudinal, dove-tail groove 16, the tongues and grooves of the several sections being matched to fit one within the other when the said sections are assembled around the core 3, the tongue of one section being slipped lengthwise into the groove of the adjacent section.

The dovetail tongues and grooves, it will be seen, form interlocking connections between the sections 7, thus effectually holding them against the action of centrifugal force when the armature is rotated, and the sections may either be assembled around the core 3, or the latter may be inserted afterward.

The core 3, and sections 7, may be solid or laminated, and in Fig. 5, I have shown one of the sections 7, laminated for a portion of its length. It will be understood, however, that the section will be constructed either entirely of laminæ or will be formed in one piece.

When the sections are made of laminæ, bolts or rivets 17, of non-magnetic material will be employed to secure the laminæ together.

The core 3, and interlocked section 7, are confined on the shaft 1, against longitudinal movement thereon, by means of heads or end plates 18, 19, similar to those described in my aforesaid Letters Patent. The head 18, is a disk of the same diameter as the assembled sections 7, and is held against movement on the shaft by a pin or key 20, passing through the shaft and through a hub 21, formed on said disk or head; this head 18, closes one end of each of the channels 11, in the section 7. The other head 19, is similar to the head 18, except that it is provided with perforations 22, similar in shape to and matching the corresponding ends of the channels 11, while, the said head is capable of longitudinal move-

ment on the shaft 1, and is forced toward the other head by a clamp nut 23, on a screw-threaded portion 24, of the shaft, thereby clamping the several parts of the armature body firmly together.

The armature coils 12, may be inserted into the channels 11, through the perforations 22, in the head 19, after the armature body has been assembled as described, but it will be understood that they may be inserted in the channels 11, before the sections are connected together. The armature coils are confined within the channels by the head 18, which closes one end of the latter and by a plate or plates 25 applied to the head 19, so as to cover the perforations 22, in the same manner as shown and described in my aforesaid Letters Patent.

In constructing an armature in accordance with the present invention, it is not absolutely necessary that the sections 7, be locked together by the dove-tailed tongues and grooves, but the side walls 10 of the sections may present plane surfaces without projections, as shown in Fig. 4, and the channels 11 may be simple troughs opening into the periphery of the armature and formed into channels by an additional wall composed of an exterior layer 26, of bare or insulated iron wire wrapped around the assembled sections thereby confining them closely to the core 3, protecting the armature coil against mechanical injury and constituting a magnetic shield for the same. However, the sections 7, may be formed with channels, as in Figs 1 and 3, and with unbroken radial sides 10, as in Fig. 4, in which case the heads 18, 19 will be each formed with a peripheral annular flange 27, projecting therefrom at right angles to the said head as indicated by dotted lines Fig. 2. In this last described construction the heads 18, are of somewhat greater diameter than the main portion of the armature body, so that when the heads are forced one toward the other by the nut 23, the flanges 27 will engage over the ends of the sections 7, and thereby hold them in firm contact with each other and with the core 3.

It will be understood that the terminals of the coils will be connected with a suitable commutator, but this is not shown in the drawings, for the sake of simplicity of illustration, and because this forms no part of my present invention, and is moreover well understood by those skilled in the art.

Having now fully described my invention, I claim and desire to secure by Letters Patent—

1. An armature for electric motors and generators composed of a circular series of iron sections each formed with a longitudinal channel, and armature coils housed in said channels, substantially as described.

2. An armature for electric motors and generators, composed of a circular series of iron sections each formed with a longitudinal channel, armature coils housed in said chan-

nels, and a core or spider around which the sections are assembled, substantially as described.

3. An armature for electric motors and generators, composed of a circular series of iron sections each formed with a longitudinal channel, means, substantially as described for holding the sections against the action of centrifugal force, and plates or heads for clamping the sections against longitudinal movement, and armature coils fitted to said channels, substantially as described.

4. An armature for electric motors and generators, composed of a core or spider, segmental sections assembled around said core, and formed with longitudinal channels, end plates or heads provided with flanges engaging over the ends of said sections, and armature coils housed in the channels in the sections, substantially as described.

5. An armature for electric motors and generators, composed of a core or spider having a polygonal outer surface, segmental sections formed with longitudinal channels, and fitted

to the core, and armature coils housed in the said channels, substantially as described.

6. An armature for electric motors and generators, composed of a core or spider having a polygonal outer surface, segmental sections formed with longitudinal channels and fitted to the core, and plates or heads with flanges engaging over the ends of the sections, and armature coils housed in the channels in the sections, substantially as described.

7. In a built-up armature for electric motors and generators, a circular series of iron sections, each section being formed with a longitudinal seat for a removable armature coil, in combination with such coil, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES F. McLAUGHLIN.

Witnesses:

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J. R. RICHARDS.