(No Model.) 2 Sheets—Sheet 1

J. F. McLAUGHLIN.

ARMATURE FOR ELECTRIC MOTORS OR GENERATORS.

No. 458,856. Patented Sept. 1, 1891.

Fig. 1

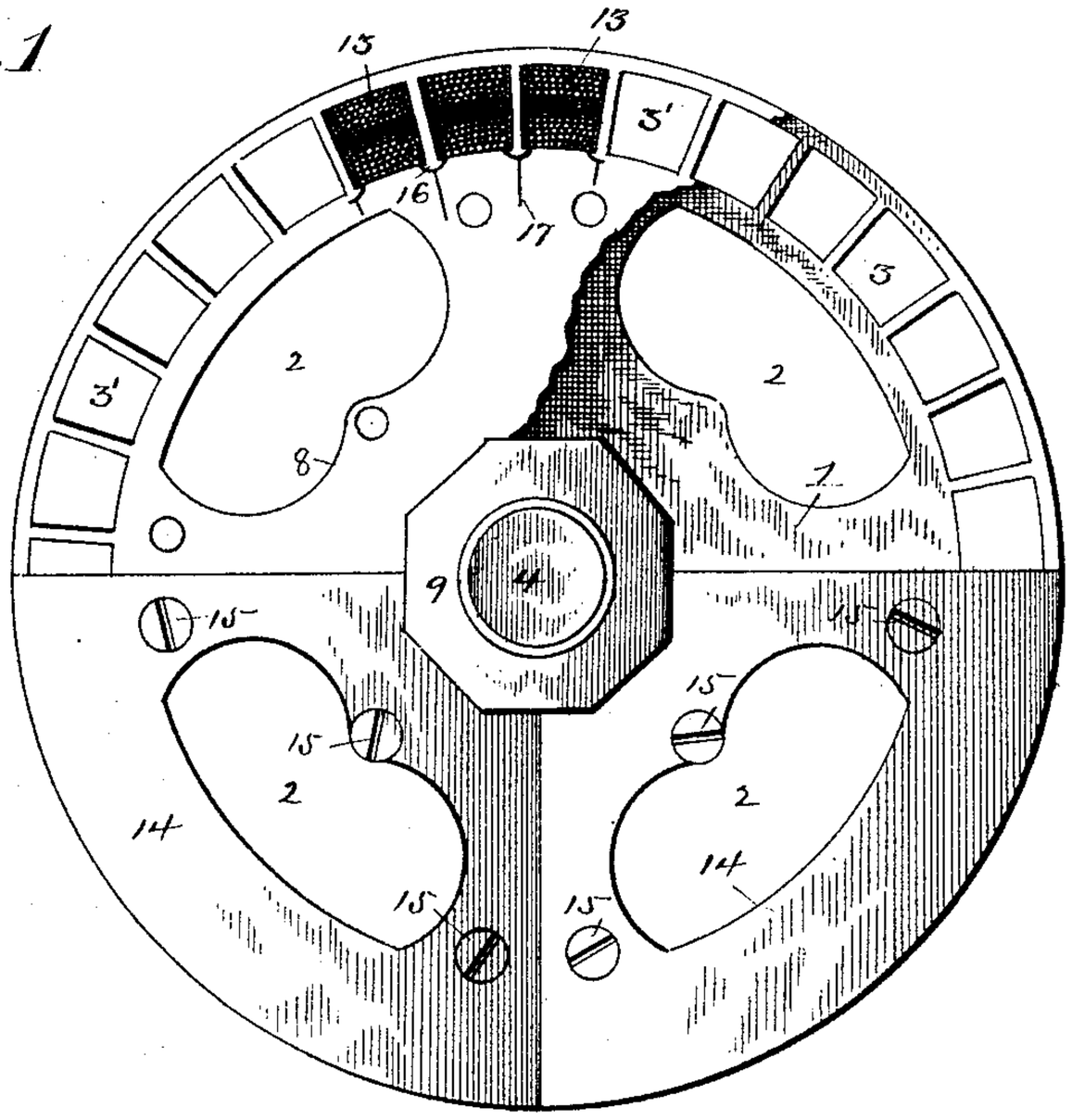
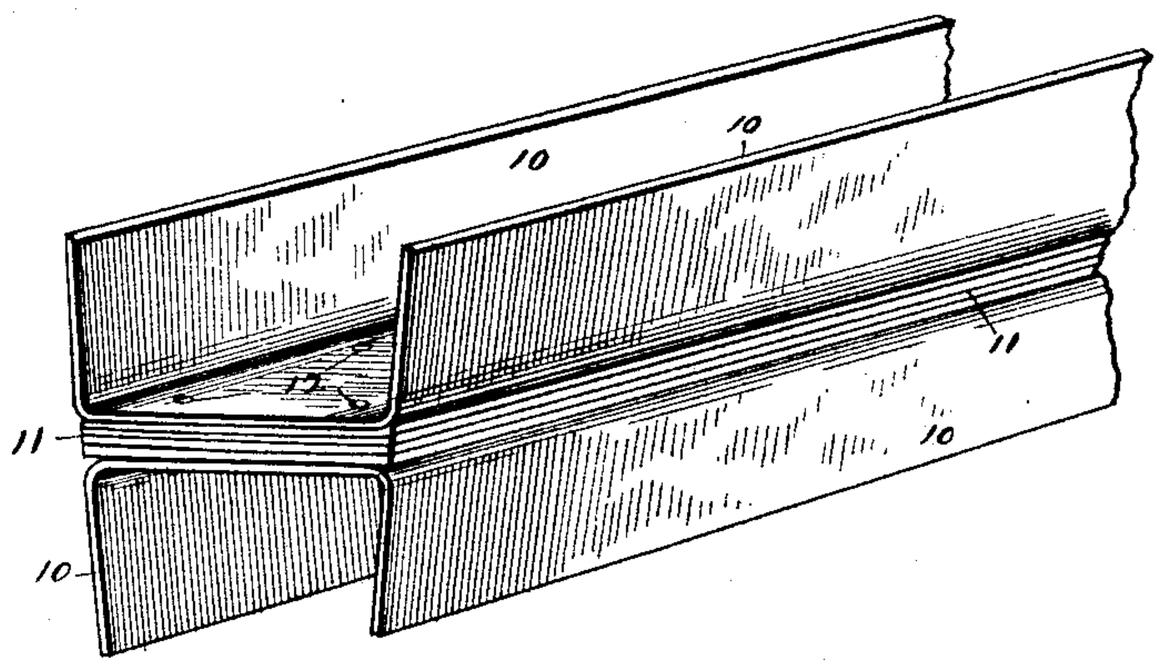


Fig. 2.



Witnesses:
J. B. McGirr.
F. T. Chapman

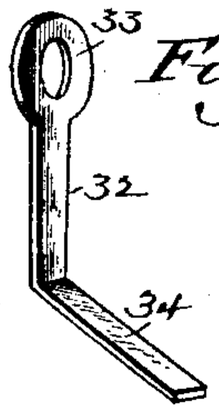


Fig. 6

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

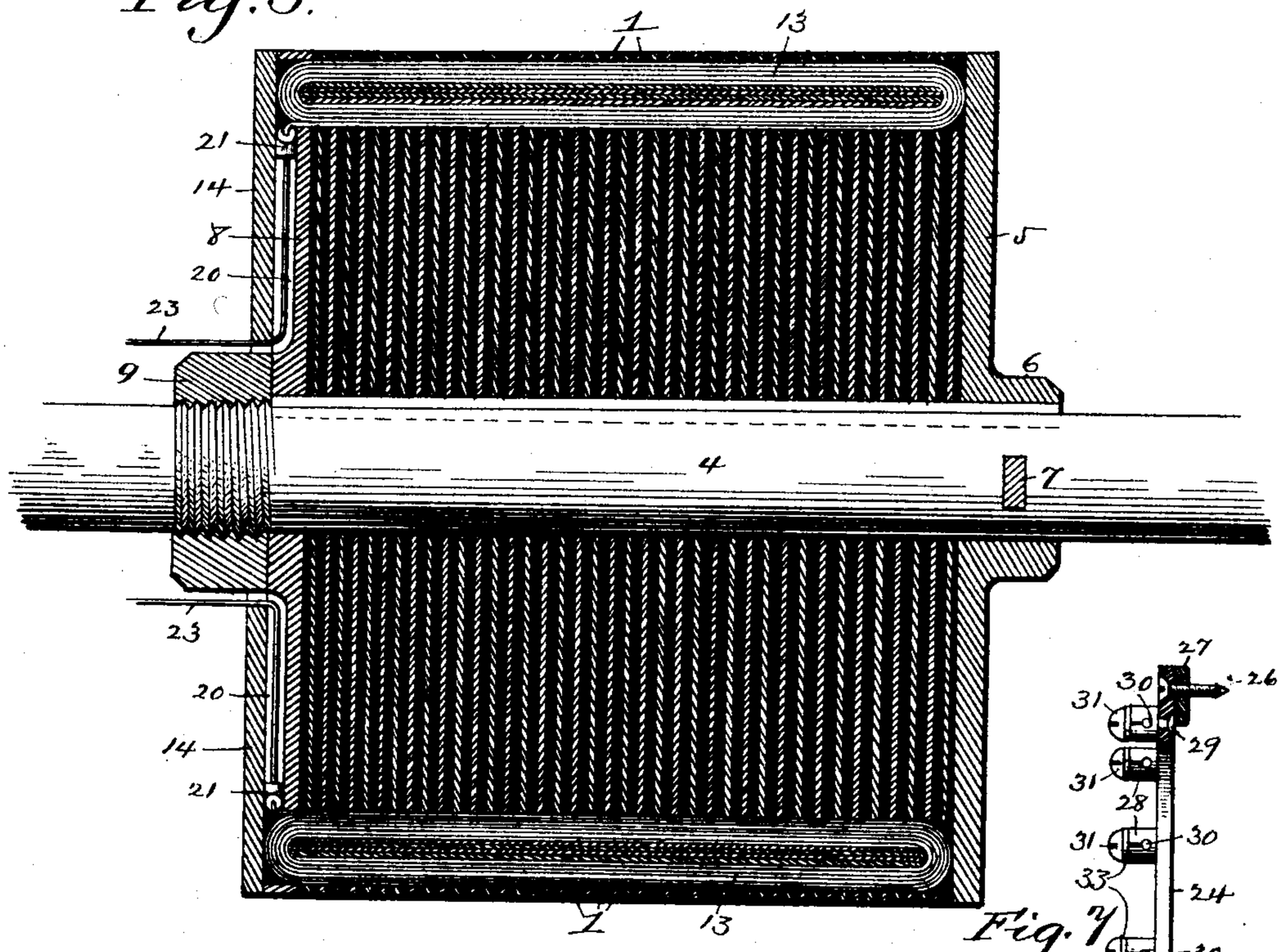

Fig. 7.

Fig. 4

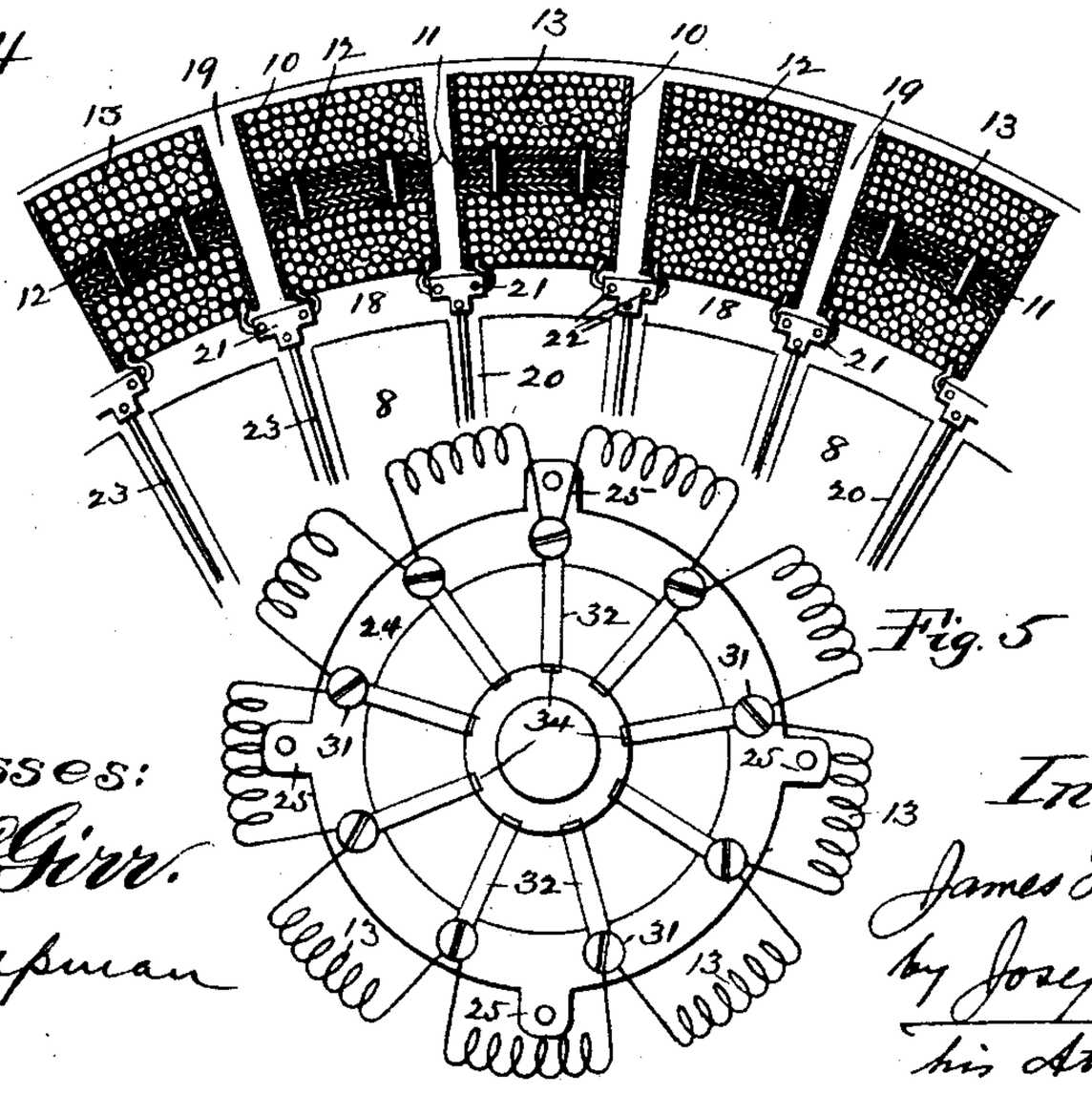

Fig. 5

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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. 458,856, dated September 1, 1891.

Application filed May 26, 1891. Serial No. 394,225. (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, of which the following is a specification.

My invention has reference to improvements in armatures for electric motors or generators, its object being to produce an electric motor or generator the armature-coils of which are each separately wound without requiring the handling of the armature as a whole, and these coils are so assembled and connected as to make it possible to remove any one of these coils for inspection or repair without dismantling the whole armature. It is consequently possible to replace a defective coil by another new coil, thus facilitating and cheapening the repair of armatures.

An additional feature of my invention is that the armature-coils are on all sides protected against mechanical injury, being embedded in the armature-body near the circumference thereof, and so close to that circumference that the inductive influence of the field-magnets is exerted upon the coils to best advantage. All this will more fully appear from the following detailed description, in which reference is made to the accompanying drawings, in which I have illustrated one general form which my invention may assume.

In the drawings, Figure 1 is an end view of my improved armature, partly in section and with portions removed. Fig. 2 is a perspective view of a portion of a skeleton core of an armature-coil section. Fig. 3 represents an axial section of the armature; Fig. 4, a section at right angles to the axle of a portion of the armature. Fig. 5 is an end view of the connections of the armature-coils with each other and with the commutator, the coils being shown in diagram. Fig 6 is a perspective view of a combined armature-coil, connector, and commutator-segment; and Fig. 7 is a central section of the construction shown in Fig. 5, with parts omitted for the sake of simplicity.

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

The body of the armature is composed of iron laminæ 1, which are circular disks cut from soft sheet-iron, with spaces 2 cut out near the center, both for the purpose of reducing the weight and for affording ventilating-channels for the armature. In addition thereto each lamina has a circular row of segmental perforations 3 3 near its outer edge. These perforations are small as compared with the size of each disk, and they therefore very nearly approach in shape a quadrilateral. Each iron disk 1 has a central perforation adapting it to be mounted upon the armature-shaft 4 and to be keyed thereto, as will appear farther on.

In building up the body of the armature I use a series of laminæ of insulating material—such as paper, hard rubber, vulvanized fiber, wood, or mica—shaped exactly like the iron disks and preferably cut by the same die. These laminæ of insulating material are indicated in Fig. 3 by the dark shading between the iron disks 1, and they are assembled upon the armature-shaft as follows: There is first keyed to that shaft a metallic head 5, which has the size of the iron disks, and is, in fact, itself a solid iron disk with a hub 6 formed in the center. This head is keyed to the shaft by a key 7, and the insulating laminæ alternating with the iron laminæ are then slipped upon the shaft in such position relative to each other that the perforations 2 and 3 of one lamina coincide with the like perforations in the other lamina, so that when the required number of laminæ is placed upon the shaft the perforations 2 and 3 will form channels extending parallel with each other and to the shaft, as will be readily understood. After the last insulating lamina there is placed upon the shaft a second metal head 8, constructed similar to the head 5, except that it is provided near its circumference with a series of segmental perforations 3′, corresponding in size and position to the like perforations in the metallic and insulating laminæ. This head 8 is forced down upon the armature-body thus formed by a nut 9, screwed upon the shaft 4.

The channels formed by the segmental or

nearly quadrangular perforations 3 3′ are designed to receive the armature-coils with their cores, and these coils and cores are constructed in the manner more particularly indicated in Figs. 2 and 4. For each coil there is a bobbin, built up of two trough-shaped pieces 10 of sheet-iron, the bottoms of which are riveted together and to a number of iron strips 11 by rivets 12 or in any other suitable manner. The bottoms of the two troughs, together with the interposed iron strips 11, constitute the cores proper of the armature-coils, which are wound upon these cores between the flanges, which are constituted by the side walls of the troughs.

Each coil 13 of insulated wire, together with the iron bobbin upon which it is wound, constitutes an element of my improved armature. The size of each bobbin is such that it will snugly fit into one of the channels formed by the perforations 3 3′, filling that channel from end to end—that is to say, from the inner face of the head 5 to the outer face of head 8.

In order to keep the armature-coils within their channel-housings, I apply upon the outer face of the head 8 sectoral coverings 14, which may be made of any material, but which are preferably made of iron. These coverings are screwed down upon the head 8 by screws 15, and if one of these sectors is removed the ends of a number of armature-coils are exposed, and then the coils may be withdrawn from their housings for inspection and repair or for exchange with others, if they should happen to be burned out or otherwise injured. It will be seen, however, that any other injury to the armature-coils than that caused by overheating is practically impossible.

The terminals of the armature-coils must, of course, be connected with each other and with the commutator, and this may be done in any desired manner. I have indicated two practical means of making these connections; but I do not mean to be limited to these means, although they form a part of my invention. In Fig. 1 the armature-coils are represented as being connected with each other by wire loops 16 and with the commutator by branch wires 17; but this is only a diagrammatic representation, while in Figs. 3 and 4 a practical means is indicated. On the outer face of the head 8 there is formed an annular recess 18, which runs into the inner edges of the segmental perforations formed in said head and corresponding to the webs 19, which separate these perforations. There are also formed upon the outer face of the head 8 radial recesses 20, communicating with the annular recess 18. At the junctions of the annular recess 18 with the radial recesses 20 are placed the connectors 21, which are small T-shaped metal blocks provided with means for clamping a conductor to each of the three ends. These connectors may have an axial bore through the stem of the T into which the wires to be connected are passed, and are clamped therein by means of clamp-screws 22. Such connectors are well known in the art, and may be used with great advantage for connecting the terminals of adjacent armature-coils together and with the commutator. This is so well illustrated in Fig. 4 that further description seems to be unnecessary, it being understood that the wires 23, which are placed in the radial channels 20, are connected each with a segment of the commutator. The commutator itself is not shown in the drawings, since it may be of ordinary construction.

Another practical means for connecting the armature-coils together and with the commutator is indicated in Figs. 5, 6, and 7. There is a ring 24 of insulating material, which is provided with a number of lugs 25, and this ring is of such size that when placed upon the outer face of the head 8 the ends of the lugs will clear the inner edges of the segmental perforations 3′. This ring is secured to the head 8 by screws 26 passing through the lugs into the face of the head, and washers 27 are interposed between the lugs and the head 8, so as to leave a space between the ring 24 and the head, for a purpose which will presently appear. Upon the ring 24 are secured binding-posts 28, each corresponding to a junction of two adjacent armature-coil sections, and I have found it practicable to rivet these binding-posts to the ring 24, as indicated at 29 in Fig. 7. The washers 27 prevent contact of the rivet ends with the metallic head 8. There is a transverse hole 30 in each binding-post, and a binding-screw 31, passing axially into the post, clamps the wires which constitute the terminals of two adjacent armature-coil sections. Before this screw is inserted there is placed upon the upper end of the binding-post the angular copper piece 32, which is formed at one end with an eye 33 and at the other end with a commutator-segment 34. A single screw therefore connects the terminals of two adjacent armature-coil sections with a commutator-segment. It will be understood that when this construction is adopted the recesses 18 and 20 in the outer face of the head 8 are or may be omitted.

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

1. An armature for electric motors and generators, comprising a laminated iron body having a circular series of channels near its outer edge and an armature-coil section housed in each channel, substantially as described.

2. An armature for electric motors and generators, comprising a cylindrical laminated iron body mounted upon a rotary shaft and having a circular series of segmental channels near the periphery and parallel to the shaft and an armature-coil section housed in each channel, substantially as described.

3. An armature for electric motors and generators, comprising a laminated iron body with

a series of perforations or channels near its edge and a series of armature-coil sections, each comprising a laminated core carrying a coil of wire and housed in the perforations or channels of the body, substantially as described.

4. An armature for electric motors and generators, comprising a series of alternating iron and insulating disk laminæ having a series of perforations formed near their edge and constituting channels for the reception and housing of armature-coil sections, and heads at each end of the series of laminæ clamping the latter together, substantially as described.

5. An armature for electric motors or generators, comprising an iron body having a series of channels near its outer edge, armature-coil sections housed in the said channels, and a sectional face-plate covering one end of the armature-body for retaining the coil-sections within the channels, substantially as described.

6. In an armature for electric motors and generators, the combination of a series of coil-sections removably housed within a laminated iron body with couplings for connecting and disconnecting the terminals of adjacent coils with each other and with the commutator, substantially as described.

7. In an armature for electric motors and generators, the combination, with a series of removable coil-sections and couplings for connecting and disconnecting the terminals of adjacent coils with each other, of commutator-segments, each provided with an angular extension terminating in an eye for connection with the couplings of the coil-sections, 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:
H. F. REARDON,
MICHAEL G. PLUNKETT.