No. 876,949. PATENTED JAN. 21, 1908.

M. DICKERSON.

ARMATURE BANDING.

APPLICATION FILED OCT. 10, 1905.

FIG. 1

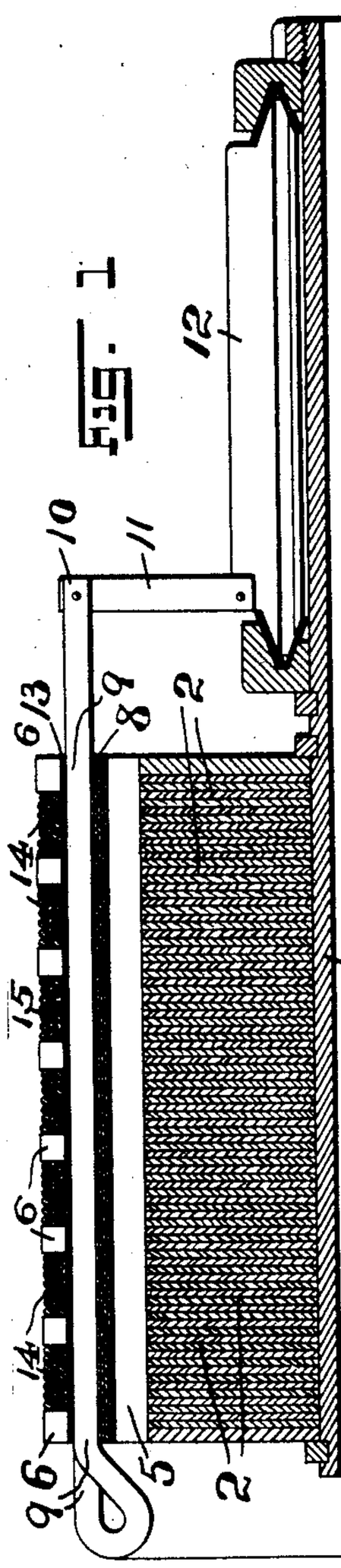

FIG. 2

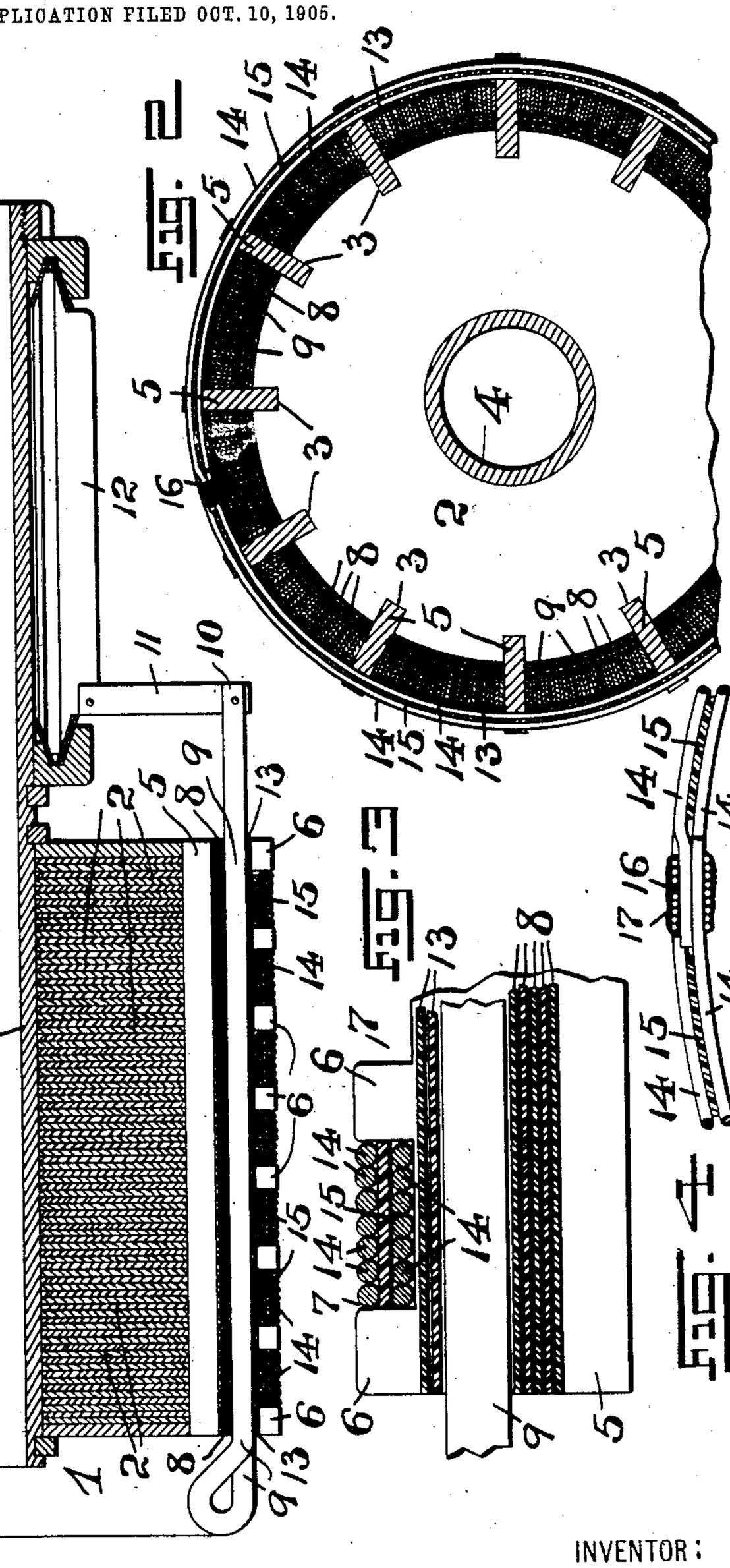

FIG. 3

FIG. 4

WITNESSES:

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ARMATURE-BANDING.

No. 876,949. Specification of Letters Patent. Patented Jan. 21, 1908.

Application filed October 10, 1905. Serial No. 282,137.

To all whom it may concern:

Be it known that I, MALCOLM DICKERSON, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Armature-Bandings; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

My present invention has reference to improvements in the "banding" of the armature of dynamo-electric machines; and, this invention has for its primary object to provide a novel arrangement and construction of "banding" for armatures, with the principal purpose of reducing to a minimum, the eddy or local currents ordinarily generated in the armature-band or bands of dynamo-electric machines, as at present ordinarily used with the armatures of such machines.

The "banding" for armatures of to-day, is what is usually termed "solid banding", that is, a "banding" which consists of a number of convolutions or windings of wire, which are clipped and soldered convolution to convolution, so as to practically produce a solid band. The principal objection to bands of this character is the heavy eddy or local currents which are generated therein, causing considerable loss of power which is given off in the form of heat, such loss in some cases being as high as 1 per cent. of the output of the machine. With a view of reducing such eddy or local currents to a minimum, I have provided a "banding" for the armature of a dynamo-electric machine, which is made from a continuous piece of wire, which is wound on in layers of convolutions or windings, usually two, one layer of convolutions in one direction forming the first layer, and another layer of convolutions in the opposite direction forming a second layer, the said layers of convolutions or windings being separated by means of intermediately arranged layers or separations of insulating material, and arranging the end of the upper or second layer of wire upon the beginning of the lower or first layer of wire, said ends being connected by a solder-joint, preferably by being wire-wound and soldered.

Other objects of this invention not at this time more particularly mentioned will be clearly understood from the following detailed description of the invention.

With the various objects of my present invention in view, the said invention consists in the novel "banding" for armatures hereinafter more particularly set forth; and, furthermore, this invention consists in the various arrangements and combination of the devices and parts, as well as in the details of the construction of the same, all of which will be more fully described in the following specification, and then finally embodied in the clauses of the claim which are appended to and form an essential part of this specification.

The invention is clearly illustrated in the accompanying drawings, in which:—

Figure 1 is a longitudinal vertical section of an armature and commutator of a dynamo-electric machine, and a "banding" for the armature, said "banding" embodying the principles of my invention; and Fig. 2 is a transverse section of the armature and "banding". Fig. 3 is a longitudinal vertical section, on an enlarged scale, of a portion of an armature and the "banding"; and Fig. 4 is a view of the solder-joint and the connected ends of the wire employed for producing the "banding".

Similar characters of reference are employed in all of the said above described views, to indicate corresponding parts.

Referring now to the said drawings, the reference-character 1 indicates an armature of which 2 are the usual laminated disks or plates forming the core of the armature, and which are arranged upon a suitable sleeve 4, for mounting upon a shaft, not shown in the present drawings. The said assembled disks or plates are provided as will be seen more particularly from an inspection of Fig. 2 of the drawings, near their peripheral edges with radially disposed slots or channels 3, in each of which is arranged a longitudinally extending fiber driving horn 5. The upper and outer edge-portions of the said driving horns extend for some distance beyond the cylindrical surface of the core thus formed by the assembled disks or plates 2, each horn being provided with suitably disposed and

outwardly extending projections or extensions 6, so as to provide the said horns with suitable receiving spaces 7 in which the novel form of "banding" is arranged substantially as and for the purposes hereinafter more fully described.

Suitably arranged in the space between the respective horns 5 and upon the cylindrical surface of the assembled disks or plates 2 are several layers 8 of insulating material, usually five layers of the following material, viz:—press-board, oil muslin, mica cloth, oil muslin, and press-board. Conductors 9 composed of rectangular strips of metal, usually several and preferably of copper, extend longitudinally in the spaces between the respective horns 5. The said conductors are connected at their ends 10 by means of members 11 with the respective sections 12 of a commutator. Upon the upper edges of said conductors 9 are arranged other strips 13 of insulating material, usually a strip of flexible mica next the conductor and a strip of press-board upon said strip of mica.

The "banding" which embodies the principles of my present invention, and arranged in each receiving space 7 of the horns, consists, essentially, of a piece of wire 14, of any suitable size, which is wound laterally across the outer faces of the said outer insulating strips 13, in such a manner that a single lower set or series of convolutions or windings is produced, which fills in the lower part of the space 7, said set of convolutions or windings then having arranged thereon a band 15 of insulating material, as press-board or the like. The wire is then wound back upon itself upon said insulating band 15, to produce a single upper set or series of convolutions or windings, substantially as illustrated in the several figures of the drawings. Thus it will be evident that the end of said second and outer layer of convolutions becomes located directly above the beginning of the first winding of the said lower layer of convolutions, and the insulating band 15 being cut away at that point, the two end-portions of the said wire will be in close contact. A winding 16 of wire is then wound about these contacting end-portions and covered with a solder 17, as indicated in Fig. 4 of the drawings, thereby producing a wrapped solder-joint, by means of which the end-portions of the wire are solidly united, and a strong "banding" is produced which is of such a construction that the eddy or local currents usually generated in armature bands, when passing into and out of the magnetic fields of a dynamo-electric machine, are reduced to a minimum, and the loss of power which is given off in the form of heat is greatly reduced, if not entirely obviated.

The reasons why, by my novel banding, the eddy currents in the armature are reduced to a minimum, briefly are as follows: A conductor moving through a magnetic field produces electric currents at right angles to the direction of the rotation of said conductor. The currents vary with the strength of the magnetic field, and according to ohms law, the current varies as to the resistance of the conductor. Therefore, in case of the armature-banding wires, when not soldered, there is only a line contact between one wire and another, and consequently the electromotive force generated in each wire of the band produces a local current in that wire only, whereas, when the several wires constituting the band are soldered together, the several electromotive forces will be added together and will produce greater current strength, and of necessity more heat which has to be dissipated. Furthermore, the reaction of the magnetic field produced in the banding by the induced currents and the magnetic field poles of the generator, would call for more power. Thus, with the great reduction of the heat produced in the conductor, in this case the banding, the eddy currents in the armature will be reduced to a minimum.

Having thus described my invention, what I claim is:—

1. An armature-banding for dynamo-electric machines, comprising at least two series of wire-convolutions or windings wound in opposite directions, and an insulating material between the separate series of convolutions or windings, the end-portions of said series being non-insulated and in close connecting contact with each other, substantially as and for the purposes set forth.

2. An armature-banding for dynamo-electric machines, comprising at least two series of wire-convolutions or windings made from a continuous piece of wire, and an insulating material between the said series of convolutions or windings, the beginning and end of said wire being non-insulated arranged in close connecting contact with each other, and soldered, substantially as and for the purposes set forth.

3. An armature-banding for dynamo-electric machines, comprising at least two series of wire-convolutions or windings made from a continuous piece of wire, and an insulating material between the said series of convolutions or windings, the beginning and end of said wire being non-insulated arranged in close connecting contact with each other, a wire-wrap around said contacting ends, and a layer of solder around said joint, substantially as and for the purposes set forth.

4. In an armature for dynamo-electric machines, the combination, with a series of armature-disks and driving horns, said horns being provided with projections forming receiving spaces between them, of a wire-banding in said receiving spaces, each banding comprising at least two series of convolutions

or windings wound in opposite directions, and an insulating material between said series of convolutions or windings, the end-portions of said series being non-insulated and in close connecting contact with each other, substantially as and for the purposes set forth.

5. In an armature for dynamo-electric machines, the combination, with a series of armature-disks and driving horns, said horns being provided with projections forming receiving spaces between them, of a wire banding in said receiving spaces, each banding comprising at least two series of convolutions or windings, and an insulating material between said series of convolutions or windings, the beginning and end of said wire being non-insulated arranged in close connecting contact with each other, and soldered, substantially as and for the purposes set forth.

6. In an armature for dynamo-electric machines, the combination, with a series of armature-disks and driving horns, said horns being provided with projections forming receiving spaces between them, of a wire banding in said receiving spaces, each banding comprising at least two series of convolutions or windings, and an insulating material between said series of convolutions or windings, the beginning and end of said wire being non-insulated arranged in close connecting contact with each other, and a wire-wrap around said contacting ends, and a layer of solder around said joint, substantially as and for the purposes set forth.

In testimony, that I claim the invention set forth above I have hereunto set my hand this 7th day of October, 1905.

MALCOLM DICKERSON.

Witnesses:

FREDK. C. FRAENTZEL,

GEO. D. RICHARDS.