(No Model.)

G. A. WASHBURN.

ARMATURE FOR DYNAMOS, &c.

No. 422,863. Patented Mar. 4, 1890.

Fig 1

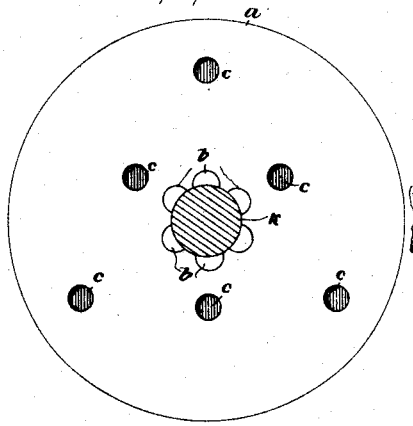

Fig 2

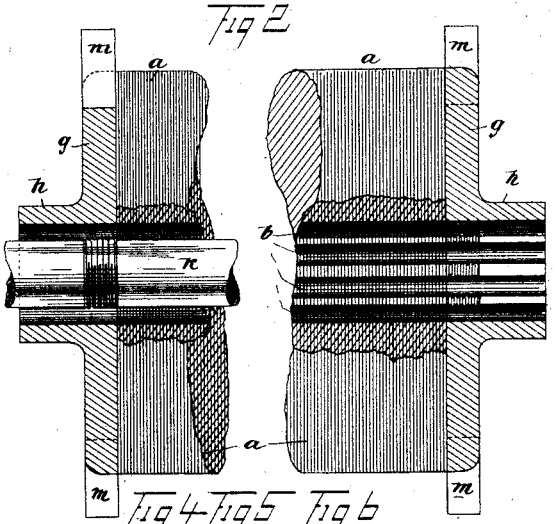

Fig 3

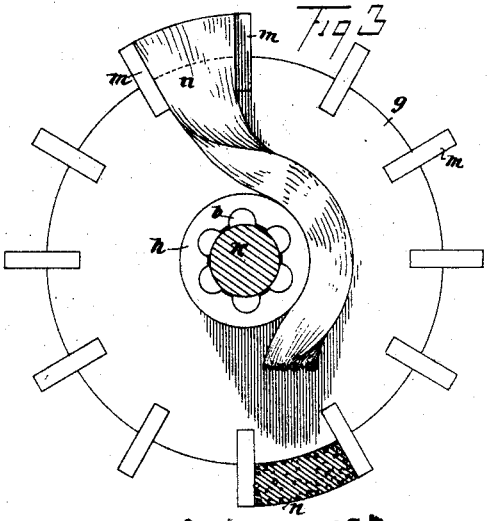

Fig 4 Fig 5 Fig 6

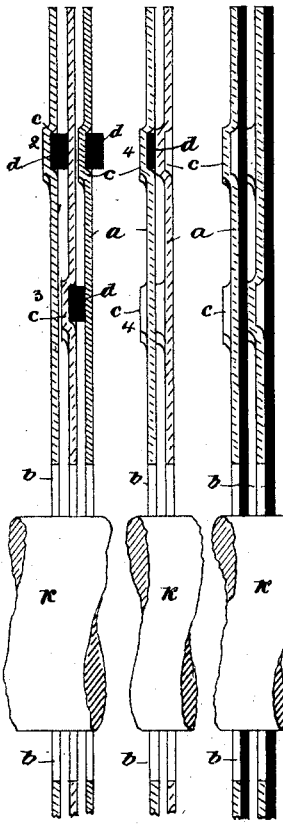

Fig. 7.

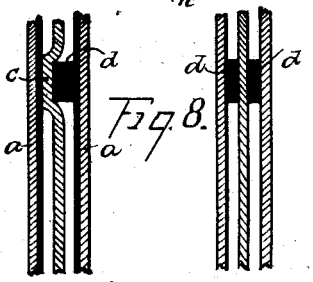

Fig. 8.

Witnesses.
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UNITED STATES PATENT OFFICE.

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ARMATURE FOR DYNAMOS, &c.

SPECIFICATION forming part of Letters Patent No. 422,863, dated March 4, 1890.

Application filed November 2, 1889. Serial No. 329,041. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. WASHBURN, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Armatures for Dynamos and Electric Motors; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in armatures for dynamos and electric motors; and the object of the invention is to provide an armature which will permit a much greater velocity or speed than is obtained in armatures as usually constructed without liability to heat or burn out; and to this end the invention consists in an armature-core formed of plates insulated, constructed, and wound substantially as shown and described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of the core plates or laminæ in position on the armature-shaft. Fig. 2 is a longitudinal sectional view of an armature constructed according to my invention with a part broken out at the center and the shaft broken off about midway. Fig. 3 is an outside view of one of the hubbed end flanges or disks between which the core is held, and showing the manner of wrapping the wire thereon to protect the draft-openings about the shaft. Figs. 4, 5, and 6 are enlarged sectional views of the plates, showing different arrangements and constructions of the insulating and separating features, as hereinafter more fully described. Fig. 7 shows plates with sockets and insulating-plugs and the projections forming the sockets properly insulated, adjoining plate otherwise resting against said projections. Fig. 8 is a sectional view of a series of perfectly flat plates with insulating-plugs placed between them.

I am aware that laminated armatures are not new, and I am also aware that such armatures have been constructed with a view to their ventilation, so as to keep down the heat and increase or improve their efficiency; but I am not aware that an armature has ever before been constructed or known which contained the distinctive features embodied in this invention.

As here shown, the invention is employed in a drum-armature, but is not designed to be limited to any special style of armature.

The plates *a* composing the core are made of any suitable metal and are scalloped or cut out about the shaft-opening, as seen at *b*, so as to form a number of free air-passages, which extend the entire length of the core and out through the heads or hubbed flanges, as clearly seen in Figs. 2 and 3. The number of these openings *b* may be varied—say two or more, according to the construction and use of the armature—the object in any case being to have enough of said openings and of such size as to afford ample air circulation to keep the armature cool. Evidently in a high-speed machine of considerable size more room would be needed than in one of slower speed and less size. The judgment of a skilled electrician will determine this in any given case. Then, in order to carry out the idea of a free air circulation through the armature-core, I stamp up a bead or projection, as *c*, here and there on the face of the plate *a*—say as many as two or more to each plate—which beads or projections serve to separate the plates with respect to one another and furnish the air-space contemplated. Keeping in mind the prime purpose of a cool armature, it is desirable to have as little contact as practicable between the opposed plates, and this separation, so far as contact is concerned, is accomplished by employing as few of the beads *c* as will serve the purpose, thus leaving substantially the whole of both sides of each plate exposed to the air. This is the result in the construction shown, and the circulation is practically as free as if no contact at all between the plates existed. With this construction of plate two styles of insulation are shown and several different arrangements or dispositions of the beads *c* with respect to one another. Thus in Fig. 4 at 2 we see the beads of the plates on the same radius and opposite one another; but the intermediate plate exposes a flat surface to both the insulating-plug *d* at the left

and to the insulation which lies between the plate and the bead *c* at the right. Lower down at 3 the intermediate plate is sectioned in the line of its bead *c*, which is on the radius of the inner circle of beads, and a flat surface of both the outer plates comes opposite the bead and its insulating-plug.

In Fig. 5 at 4 the beads are shown as directly opposite in adjoining plates, and when this occurs a shorter plug *d* is required to separate the plates—say a thirty-second part of an inch. With the plugs no other insulation need be used.

In Fig. 6 I show an arrangement where the beads *c* are staggered or off the same radial lines, and plain flat insulation of any suitable kind is used alone and the plugs are dispensed with. This is shown by the full lines and sectional lines of the beads of the respective plates alternately on the two circles.

The heads or flanges *g* at the ends of the core and inclosing the same have hubs *h*, extending outward a sufficient distance to keep the windings off the shaft *k*, and have grooves *b* about the shaft matching those in the armature plates or laminæ *a*. Insulating pins or posts *m* are set in the periphery of the heads *g*, dividing off the spaces between the coils or wrappings *n*, which run longitudinally of the armature and overlap each other at the hubs *h*. These posts or pins *m* space the wires of the several coils not only on the heads, but intermediate of the heads, over which they are tightly stretched, so that an air-space occurs between each of the coils equal to the width of the posts *m*. Thus an open air-channel is provided through the passages *b*, the space between the plates, and the space between the coils of wires about the armature, which will keep down the temperature of the armature to a good working condition however great the tendency might otherwise be to heat owing to overloading, high speed, or excessive current turned on to do the work. It will be observed that by this construction of armature the plates are kept out of contact with one another substantially over their entire surface, the space occupied by the points or projections *c*, as compared with the whole surface of the plates, being very slight and immaterial. Of course the shape or form of the said points is immaterial, only they should not be of large contact-surface nor so numerous as to obstruct the space between the plates, thus affording a free circulation of air all over the surface of the plates. This insures as perfect ventilation and coolness of armature by exposure to circulating air as is possible to obtain by this principle of construction. If flat plates are used alternately, the projecting points *c* are the contact-points at one side and the plugs *d* the contact-points on the other. In that case suitable insulation is employed on one side of the flat plate for the points *c* to bear against. If flat plates throughout are used, the insulating-plugs *d* are adhered to the sides thereof.

Any suitable adhesive material may be employed to fasten the plugs *d* to the flat surface of the plates, and only enough of these plugs will be inserted between any two plates to properly distribute the lateral pressure on the plates, so that there will be as little obstruction as possible between the plates to ventilation, which this construction is designed to provide.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A disk or plate for a laminated armature, having separate sockets at intervals over its surface, said sockets being scattered over the surface of the plate and back from the edge thereof, substantially as described.

2. A flat disk or plate for an armature-core, provided with projections struck up at different points over its surface away from the edge and forming cavities or sockets on the opposite side of the plate where the projections occur, and a central opening in the plate for the shaft, having air-passages in its edge, substantially as described.

3. An armature-core consisting of a series of flat disks or plates having slight projections at one side and sockets with insulating material on the other, and air-passages extending along the axis of the core in open communication with the open space between the said plates, substantially as described.

4. An armature composed of a number of flat plates provided with scattering insulating projections on their surface by which the plates are separated, thus exposing substantially the whole surface of each plate upon both sides to free ventilation, air-passages axially through the armature opening into the space between said plates, and heads or flanges on the armature having the said air-passages extending therethrough, substantially as described.

5. An armature composed of plates provided with sockets in their sides and plugs of insulating material in said sockets, substantially as described.

6. An armature-plate having projecting points at one side and sockets on the opposite side provided with insulating-plugs, substantially as described.

Witness my hand to the foregoing specification this 28th day of October, 1889.

GEORGE A. WASHBURN.

Witnesses:
H. T. FISHER,
NELLIE L. MCLANE.