(No Model.)

C. PARHAM.

VENTILATING DEVICE FOR COMMUTATORS OF DYNAMO ELECTRIC MACHINES.

No. 332,427. Patented Dec. 15, 1885.

Fig. 1.

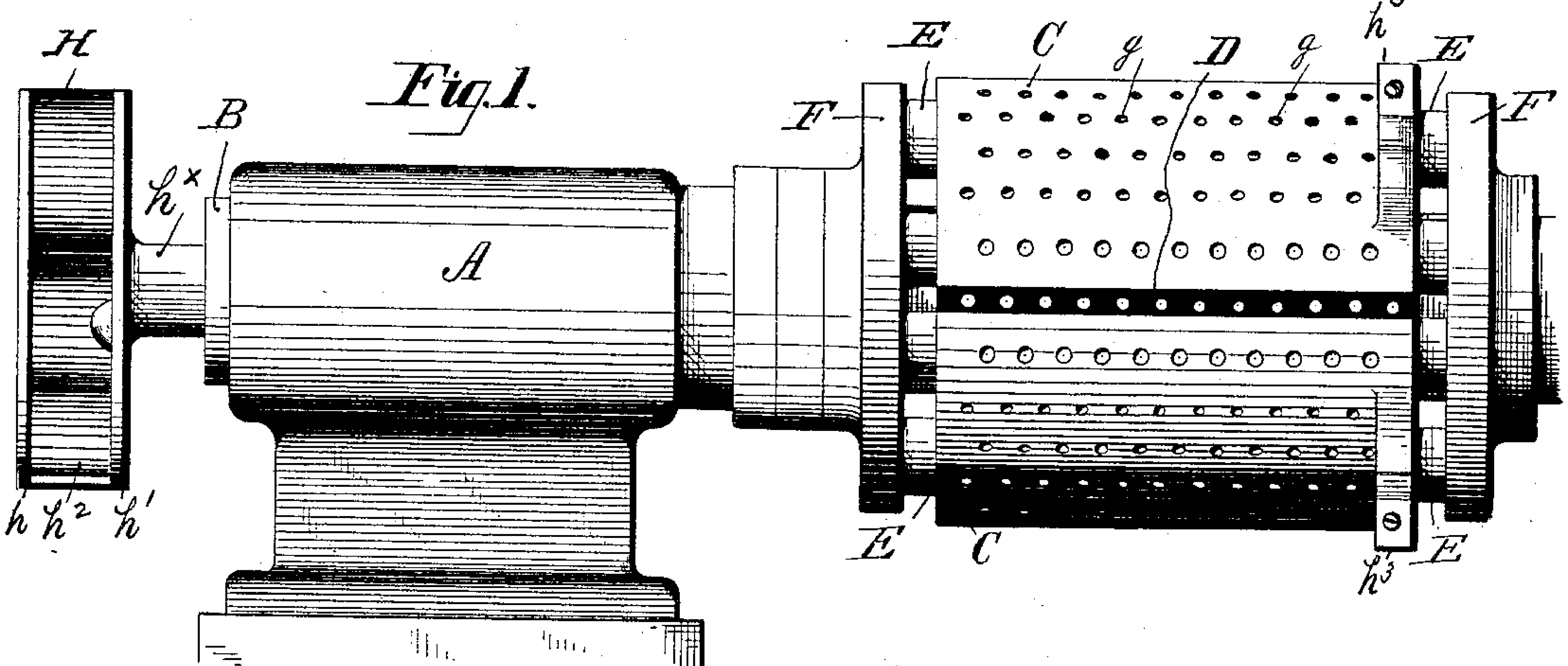


Fig. 2.

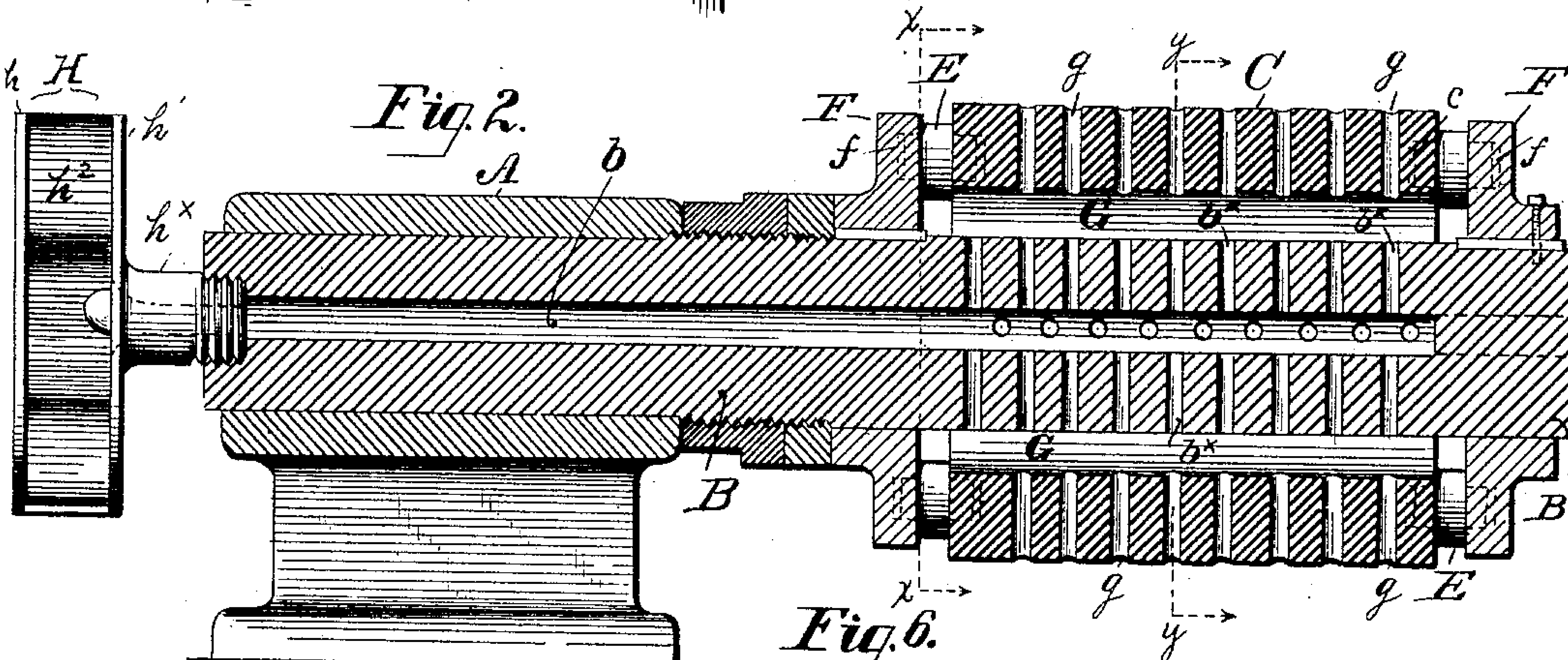


Fig. 6.

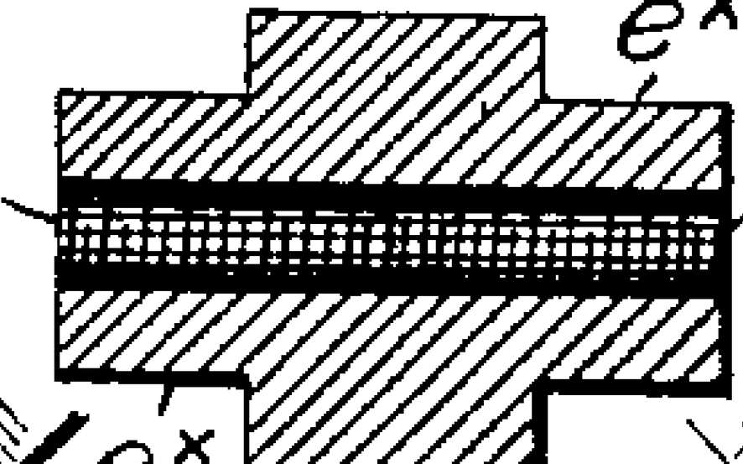


Fig. 3.

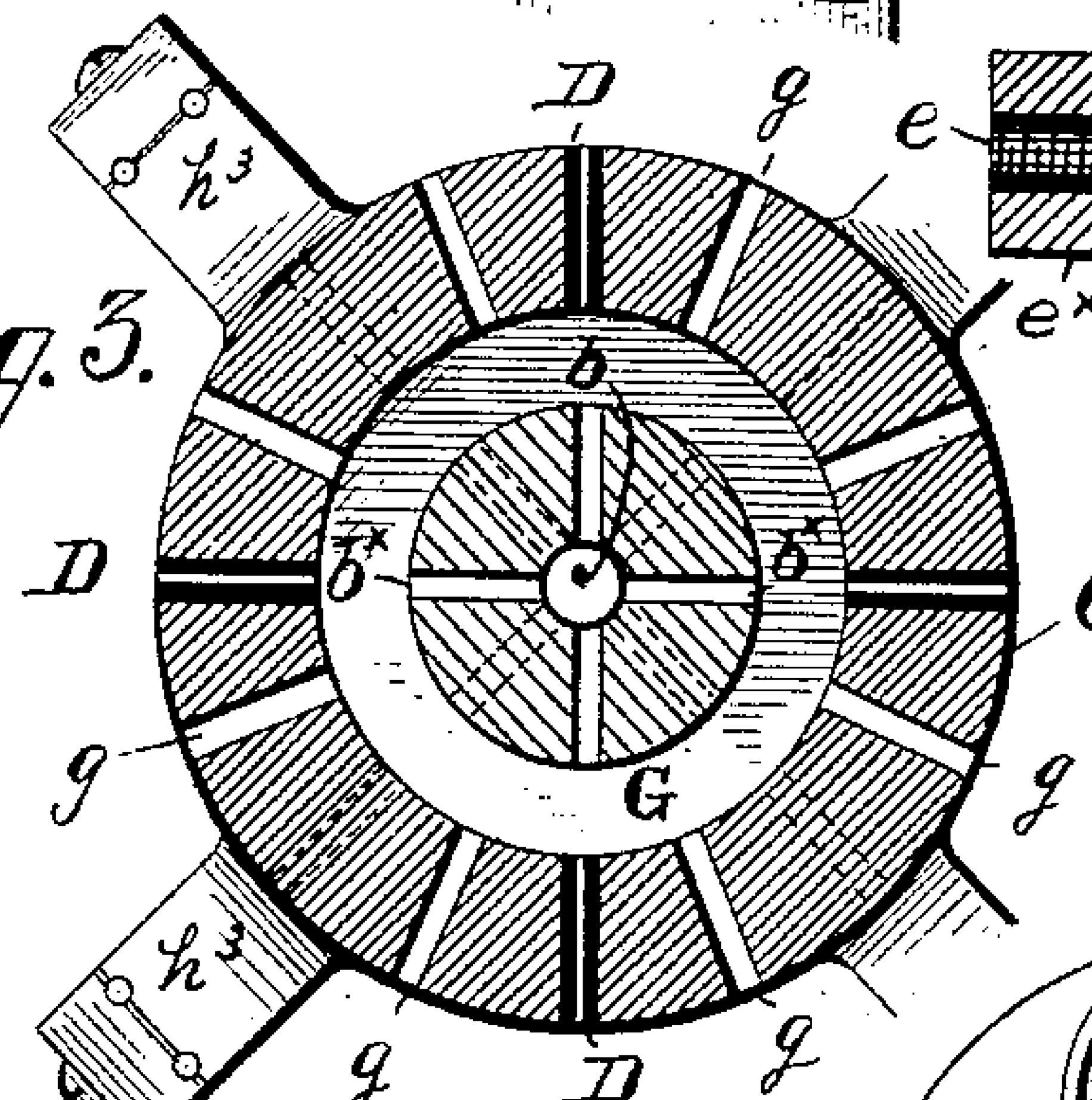


Fig. 4.

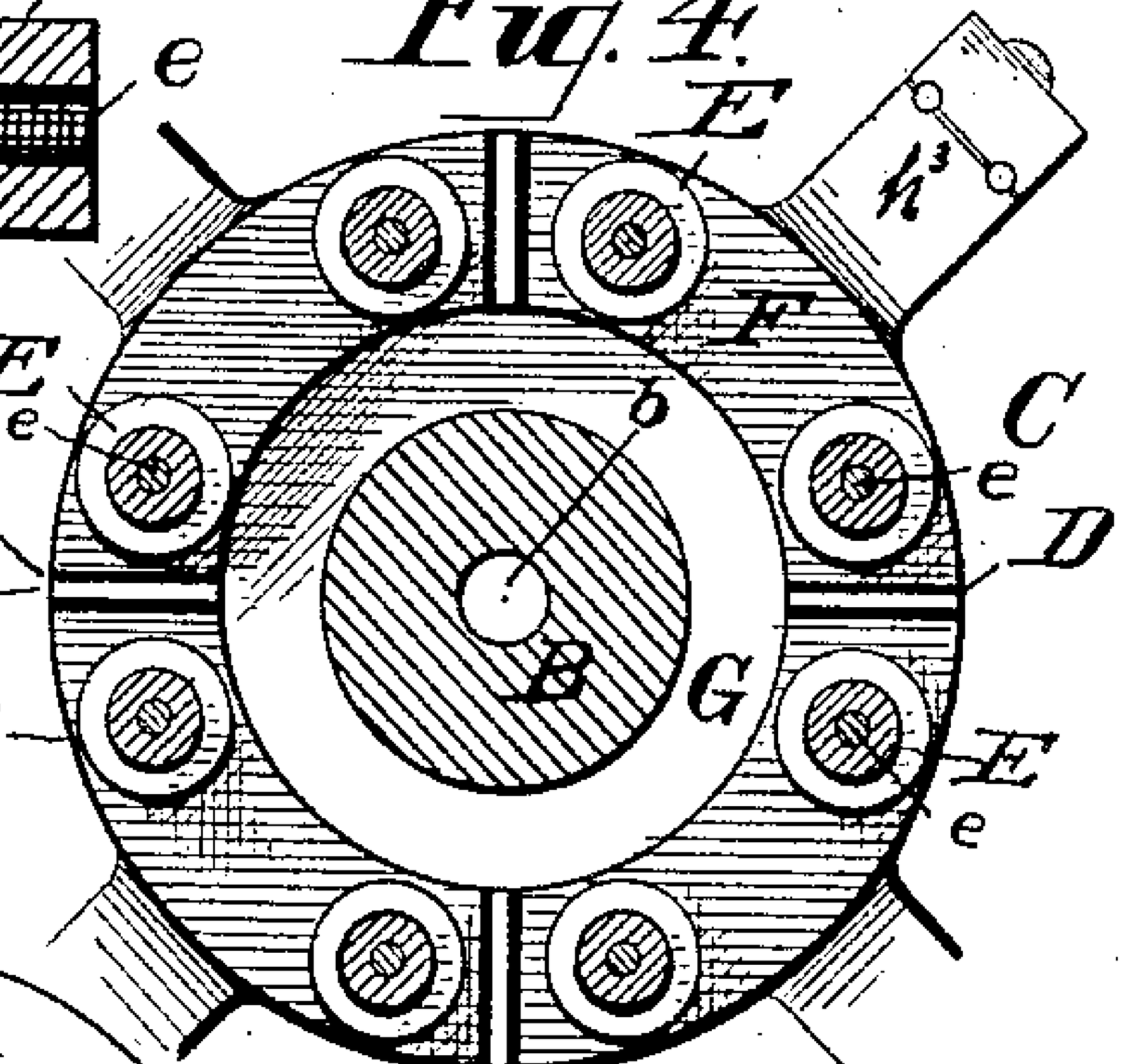
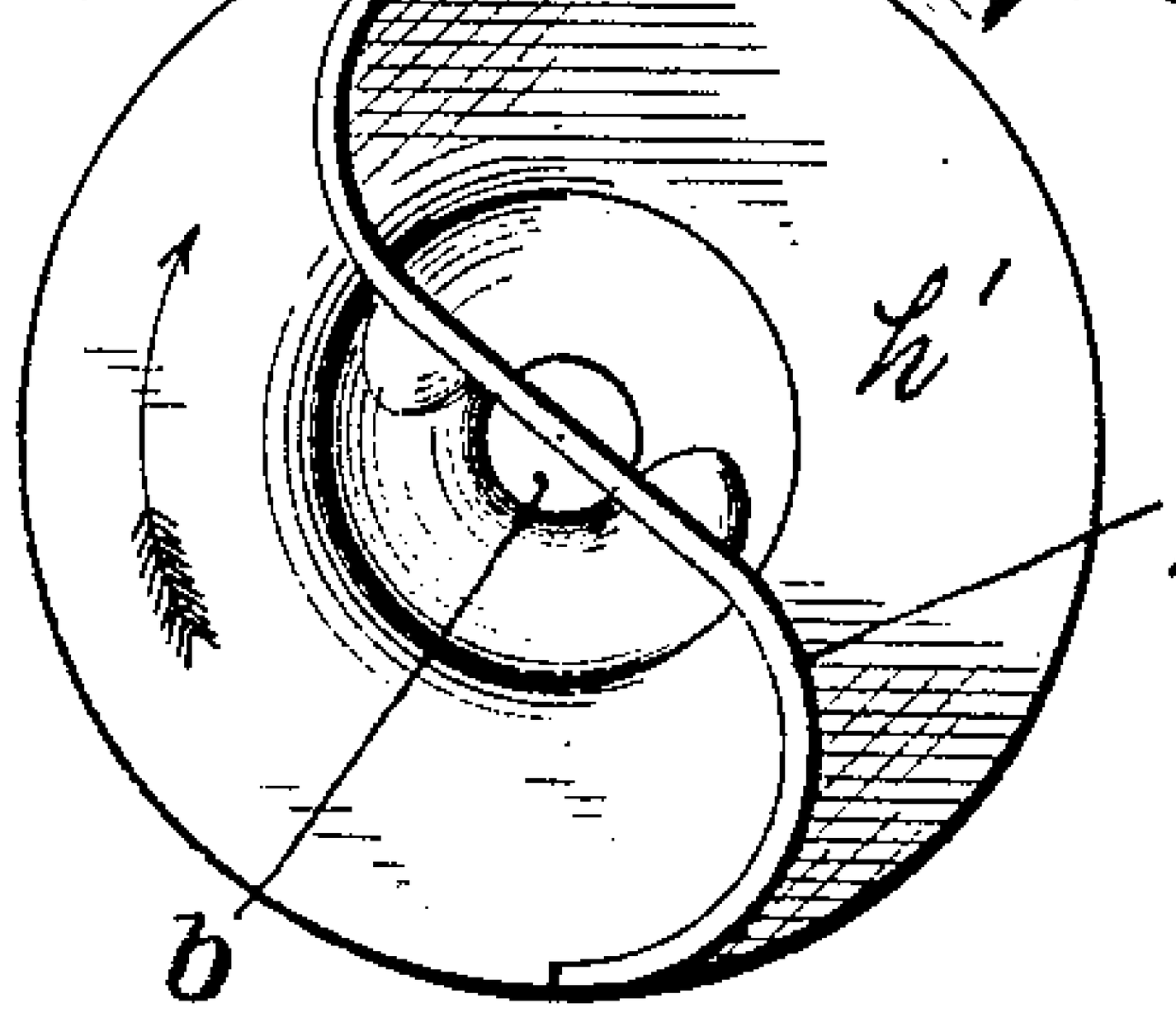
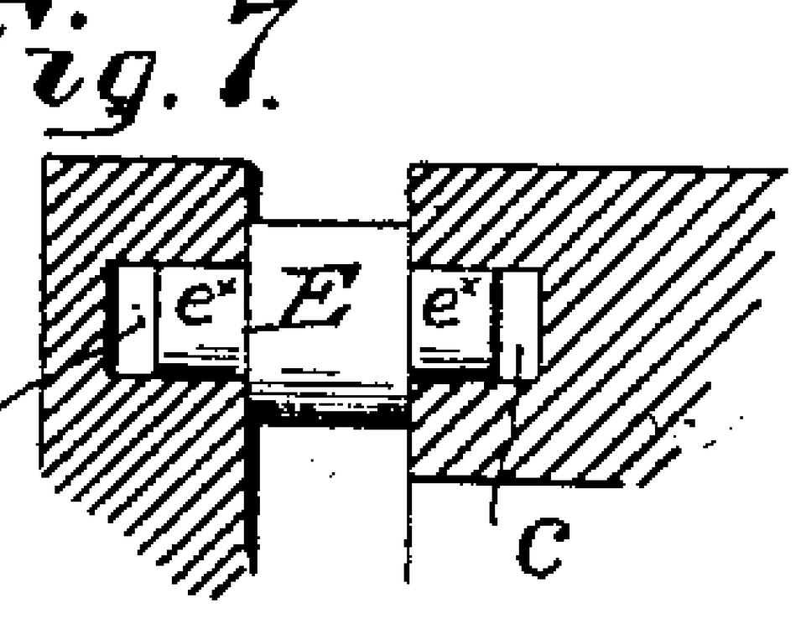


Fig. 5.



WITNESSES: *Fig. 7.*



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VENTILATING DEVICE FOR COMMUTATORS OF DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 332,427, dated December 15, 1885.

Application filed July 21, 1885. Serial No. 172,216. (No model.)

To all whom it may concern:

Be it known that I, CHARLES PARHAM, a citizen of the United States, residing in the city and county of Philadelphia, and State of Pennsylvania, have invented certain Improvements in Dynamo-Electric Machines, of which the following is a specification.

My invention relates more particularly to the commutators, but is also capable of application in connection with the armatures of the various types of dynamo-electric machines. As is well known, revolving commutators are apt to become heated to an extent interfering with the efficiency of their action. To a certain extent, also, such heating occasions the abrasion both of the revolving surfaces of the commutator and of the contact extremities of the brushes, with the result that the particles of abraded metal adhering to the surface of the commutator and passing beneath the brushes frequently occasion sparking, attended by an increase of heat, and with the further result that the accumulation of such abraded particles of metal upon the insulating segments or divisions between the acting segments of the commutator occasions the bridging of such insulating-segments, from whence "short-circuiting" results.

The object of my invention is to overcome the foregoing disadvantageous results, and to wholly obviate the heating of the commutator. I have discovered that such result can be accomplished by supplying air to the interior of the commutator, and from thence discharging it externally through the acting segments and their associated insulated segments.

Apparatus embodying a good form of a convenient embodiment of my improvements is represented in the accompanying drawings and described in this specification, the particular subject-matter claimed as novel being hereinafter definitely specified.

In the accompanying drawings, Figure 1 is a side elevational view of an apparatus embodying my invention. Fig. 2 is a central vertical longitudinal sectional elevation through the same, the suction-wheel and its hub, however, not being shown in section. Fig. 3 is a transverse sectional elevation through the commutator in the plane of the dotted line *y y* of Fig. 2, and sight being taken in the direction of the arrows upon said line. Fig. 4 is a view of a similar character, in the plane, however, of the dotted line *x x* of Fig. 2. Fig. 5 is an end elevational view of the suction-wheel, the outer disk being supposed removed. Fig. 6 is a longitudinal sectional central elevational detail through one of the insulating-studs, the inclosed stem, however, not being in section. Fig. 7 is a side elevational and partly sectional detail, showing the mode of application of the studs.

Similar letters of reference indicate corresponding parts.

In the accompanying drawings, A represents one of the boxes or bearings for the armature-shaft B, upon which the commutator is represented as mounted. The commutator in the form of apparatus represented is composed of a series of acting metal segments, C, and of a series of interposed-insulating segments D. These segments are maintained in their assembled relationship by means of insulating-studs E, of a character represented in detail in Fig. 6, and which are conveniently made axially apertured and provided with a metallic stem, *e*, conveniently secured by being screwed into the aperture of the stud.

F are head-plates, of metal, which are rigidly connected with the armature-shaft, and which are provided with sockets *f*, into which one extremity $e^{\times}$ of the insulating-studs is entered. The other extremity $e^{\times}$ of the said insulating-studs is entered within sockets *c*, formed in the metal segments of the commutator, as will be best observed by a reference to Fig. 7. The sockets *f* and *c* are respectively of greater depth than the cylindriform extensions $e^{\times}$ of the insulating-studs, so as to avoid any possibility of the transmission of a current through the stems within the studs. Such being a preferred mode in which the segments of the commutator are connected with the shaft, it will be obvious by a reference to the drawings that an annular interspace, G, exists between the commutator and the shaft, and that circumferential interspaces exist between the extremities of the commutator-segments and the head-plates which support said segments.

b is a hole or aperture preferably concentric

with the axis of the armature-shaft, extending through said armature-shaft.

$b^{\times}$ are a series of holes, preferably radial, formed through that portion of the armature-shaft which is circumscribed by the commutator, and which, on the one hand, communicate with the axial aperture *b* of the shaft, and on the other hand with the interspace G, which circumscribes the said shaft.

g are a series of holes, preferably radial, formed through the segments of the commutator, and which communicate, on the one hand, with the interspace G, and on the other hand with the atmosphere surrounding the commutator.

H is a suction-wheel applied to that extremity of the armature-shaft which is adapted to the bearing A. The suction-wheel is conveniently composed of two parallel disks, *h h'*, one of which is mounted upon or a part of an axially-apertured hub, $h^{\times}$, which is connected with the extremity of the armature-shaft, so that the respective apertures in the said hub and shaft are aligned.

h^2 is a curved suction blade or web conveniently of the form represented in Fig. 5, interposed between the two disks of the suction-wheel. The said blades serve to "catch," so to speak, the air in the revolution of the wheel and throw it into the axial aperture.

h^3 are binding-posts applied to the metal segments of the commutator.

Such being a description of a good form of my device, its operation will be readily understood. In the revolution of the commutator the suction-wheel, which is supposed to revolve in the direction of the arrow upon it in Fig. 5, sucks in a volume of air, which has no escape, except through the axial aperture in the armature-shaft, and thence through the radial holes in said shaft into the annular interspace between said shaft and the commutator, and thence either through the holes in the commutator or between the head-plates and the extremities of the segments of the commutator, which air being constantly sucked in constantly circulates between, throughout, and around both the segments of the commutator and the shaft in the region of the commutator, with the result that not only are the segments of the commutator kept cool, but the shaft itself and the brushes of the commutator are also kept cool, and any abraded particles of metal or foreign matter constantly blown off. The constant passage of the air through the gudgeon or journal portion of the shaft keeps it cool and prevents the heating of the boxing, thereby lessening friction and adding to the efficiency of the device.

I do not restrict myself to the suction-wheel represented as a device for supplying air to the interior of the shaft and commutator, as any air blowing or sucking contrivance may be substituted in the stead of the said wheel. Nor, again, do I restrict myself to a radial disposition of the exit-holes in the shaft and segments of the commutator, although I believe it to be the best. It is also manifest that the axial aperture *b* may, as indicated in dotted lines in Fig. 2, be continued entirely through the shaft, or be continued through such portion of the shaft as is surrounded by the armature, and, if desired, that holes may be drilled through the armature, conveniently through the webs of its armature-bobbins, so as in like manner to keep the armature cool.

I am aware that heretofore air has been supplied to the exterior surfaces of journals and of a commutator; but I believe myself to be the originator of the idea of supplying air from within outward through the shaft, the commutator, and the armature itself.

It is obvious that the segments of the commutator may be connected with their corresponding head-plates by other means than the insulated studs represented and described.

Having thus described my invention, I claim—

1. The combination, in a dynamo-electric machine, with a commutator the segments of which are perforated, of means of supplying air to the interior of the said commutator, substantially as and for the purposes set forth.

2. The combination of a hollow or perforated armature-shaft, an air-supplying device adapted to supply air to the hollow interior of said shaft, vents whereby the air supplied to can escape from the interior of said shaft, and a commutator surrounding the shaft and adapted to be cooled by the air supplied internally to it, substantially as described.

3. In a dynamo-electric machine, the combination of a hollow or perforated armature-shaft and air-supplying device adapted to supply air to the hollow interior of said shaft, holes or openings through the shaft communicating with the hollow interior thereof, a commutator surrounding the shaft, and holes or openings through the segments of the commutator, substantially as and for the purposes set forth.

4. In a dynamo-electric machine, the combination of a hollow or perforated armature-shaft, an air-supplying device adapted to supply air to the hollow interior of said shaft, holes through the shaft communicating with hollow interior thereof, a commutator surrounding the shaft in such manner as to leave an air-space between the shaft and commutator, and holes through the commutator for the passage of air, substantially as and for the purposes set forth.

5. In a dynamo-electric machine, the combination of a hollow or perforated armature-shaft, an air-supplying device adapted to supply air to the hollow interior of said shaft, holes through the shaft communicating with the hollow interior thereof, a commutator surrounding the shaft in such manner as to leave an air-space between the shaft and itself, (the said commutator,) holes through the commutator for the passage of air, head-plates con-

nected with the shaft, and insulating-studs interposed between the commutator-segments and the said head-plates in such manner as to leave an interspace between said head-plates and the ends of the segments, substantially as and for the purposes set forth.

6. As a means for securing the segments of a commutator in suitable relationship to a shaft with which the commutator revolves and in such manner as to leave an air-space at each end of the commutator, the combination of the head-plates and the insulating-studs, constructed as described, substantially as and for the purposes set forth.

7. As an improvement in insulating-studs for the maintenance of a commutator, a stud of insulating material containing a stiffening-stem of metal or other rigid material.

In testimony whereof I have hereunto signed my name this 17th day of July, A. D. 1885.

CHAS. PARHAM.

In presence of—

J. BONSALL TAYLOR,

W. C. STRAWBRIDGE.