(No Model.) 4 Sheets—Sheet 1.

J. LEWIS.

DYNAMO ELECTRIC MACHINE.

No. 270,230. Patented Jan. 9, 1883.

Fig 2.

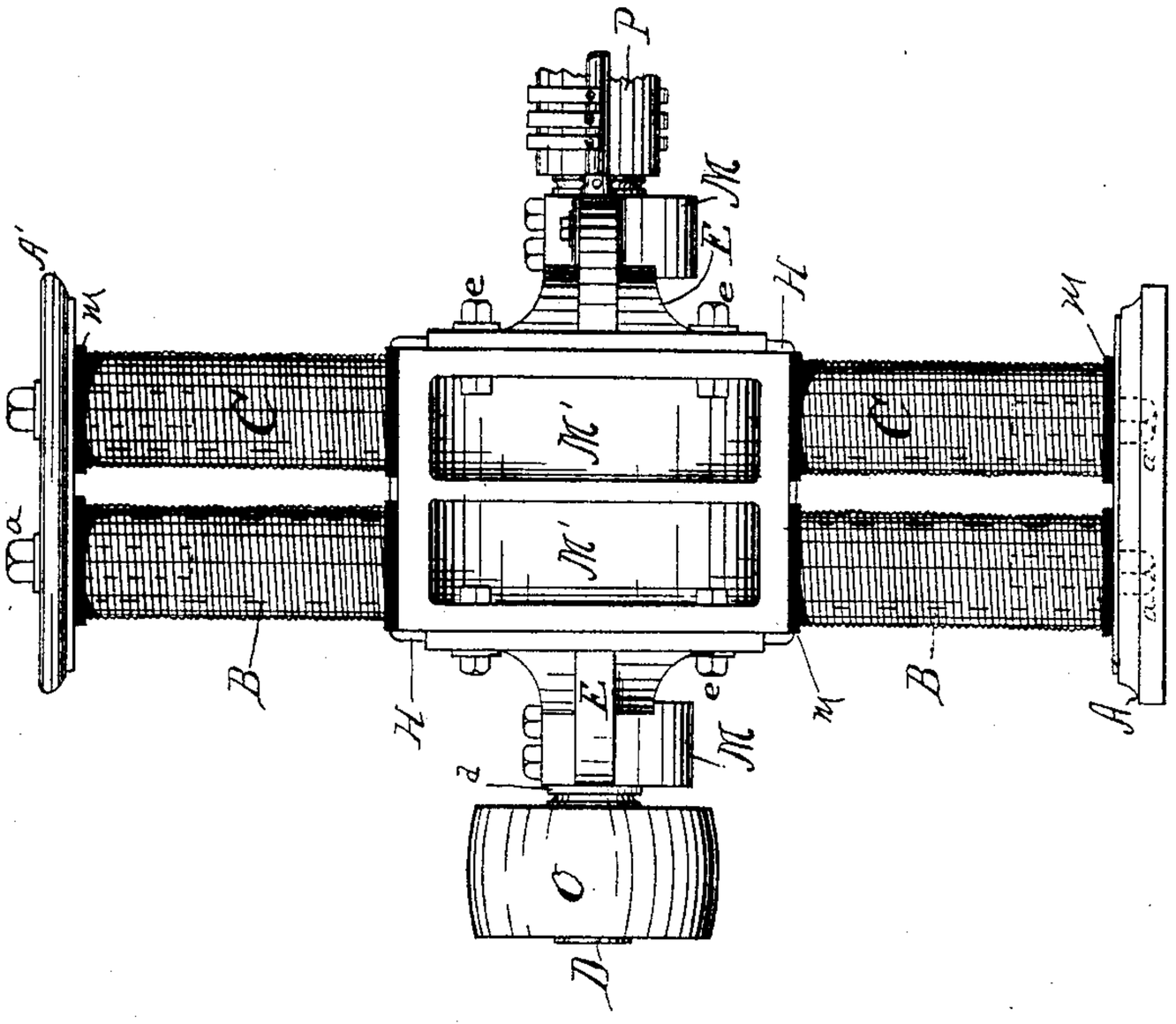
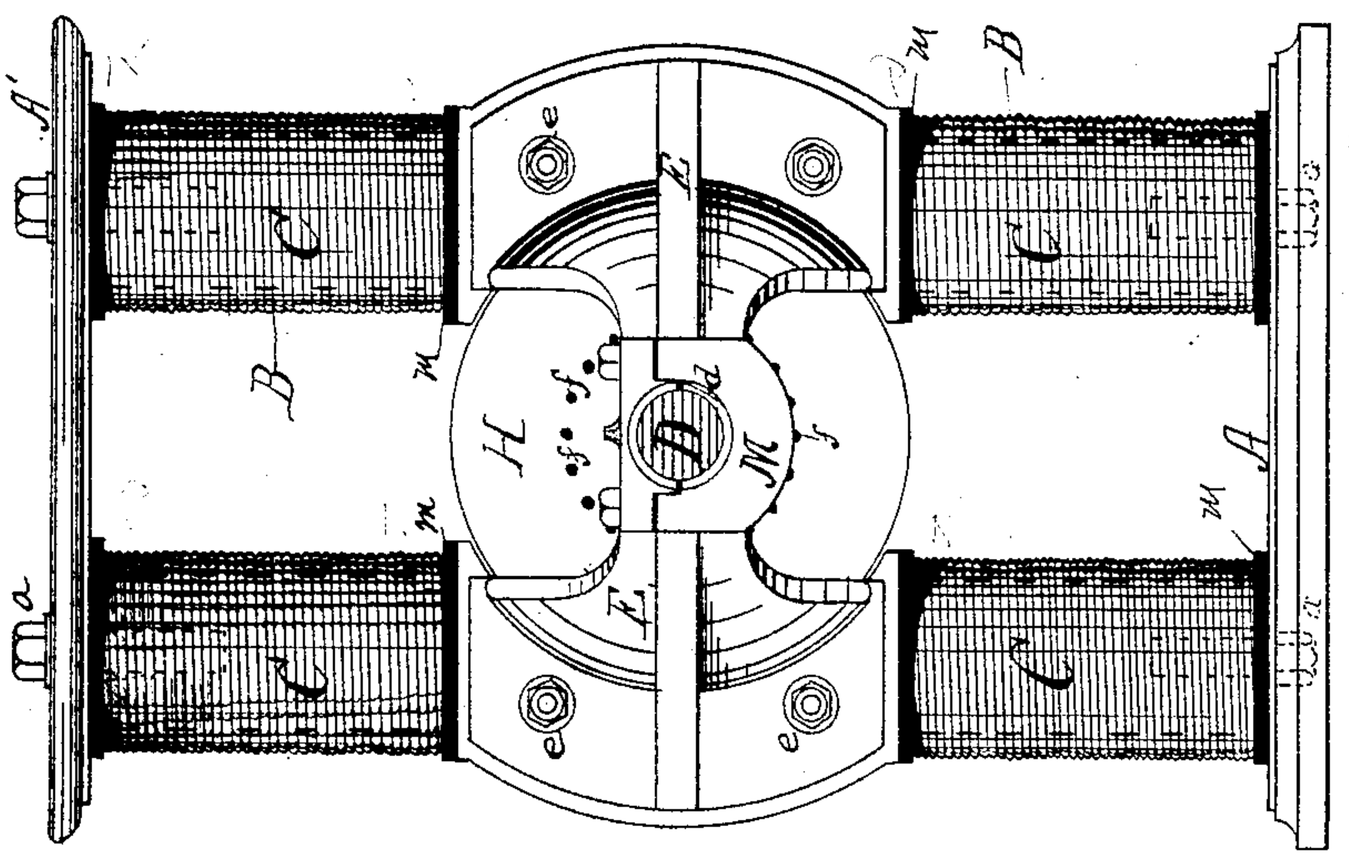


Fig 1.



WITNESSES—

S. Everett Brown

A. M. Munday.

INVENTOR—

Joseph Lewis

per Munday, Evarts & Adcock

his Attorneys.

(No Model.) 4 Sheets—Sheet 2.

J. LEWIS.

DYNAMO ELECTRIC MACHINE.

No. 270,230. Patented Jan. 9, 1883.

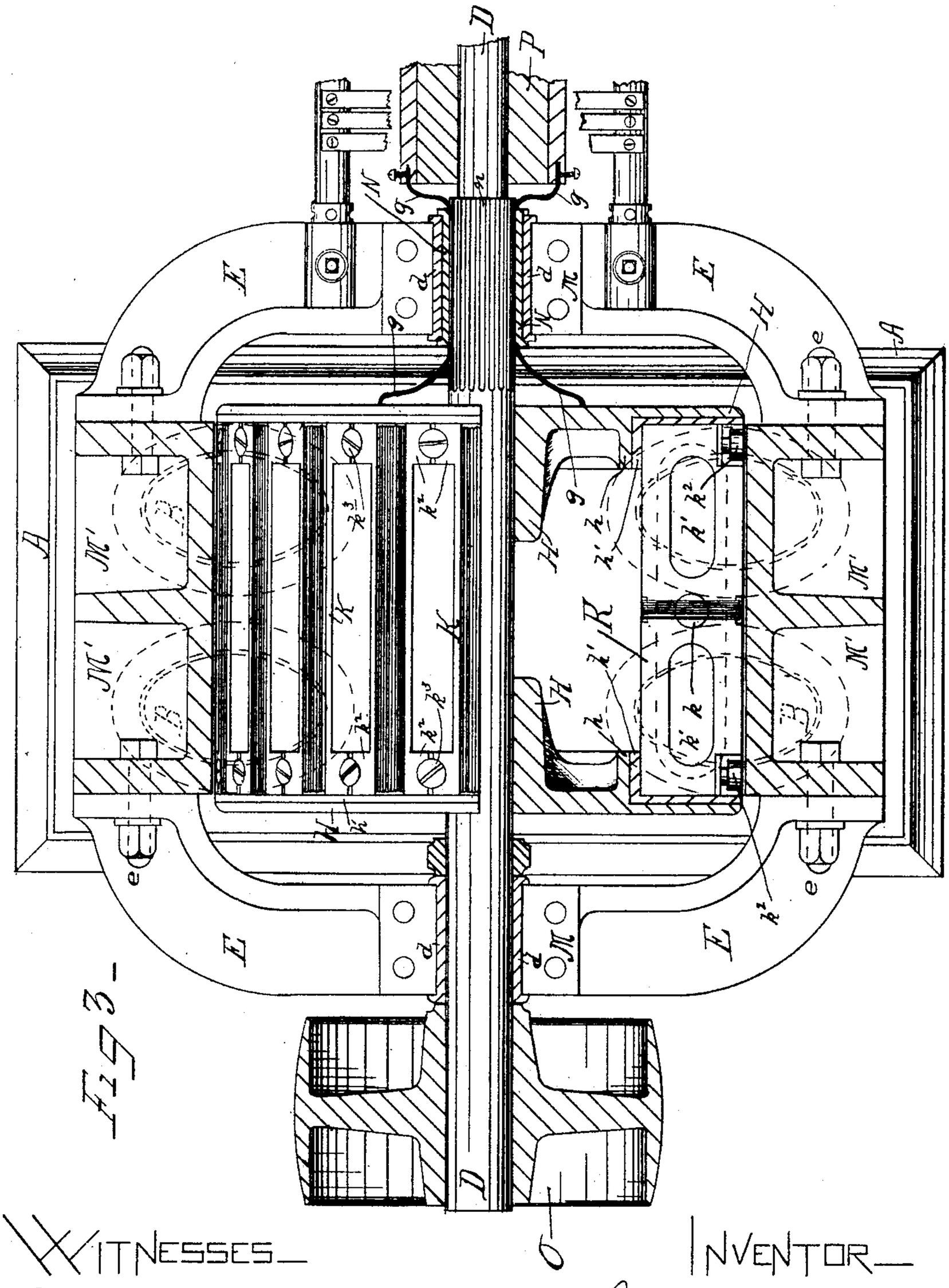


Fig 3.

WITNESSES—

S. Everett Brown

A. M. Munday

INVENTOR—

Joseph Lewis

per Munday, Evarts & Adcock

his Attorneys.

(No Model.) 4 Sheets—Sheet 3.

J. LEWIS.

DYNAMO ELECTRIC MACHINE.

No. 270,230. Patented Jan. 9, 1883.

Fig 4.

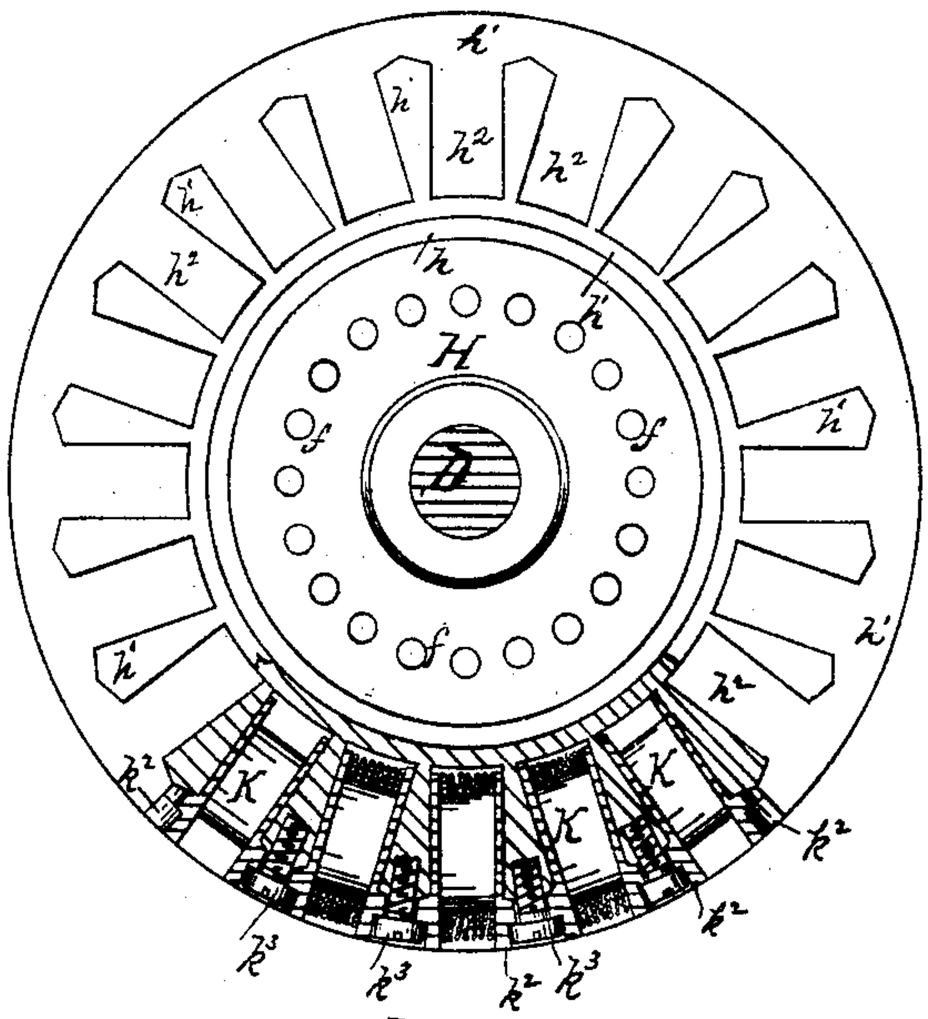


Fig 5.

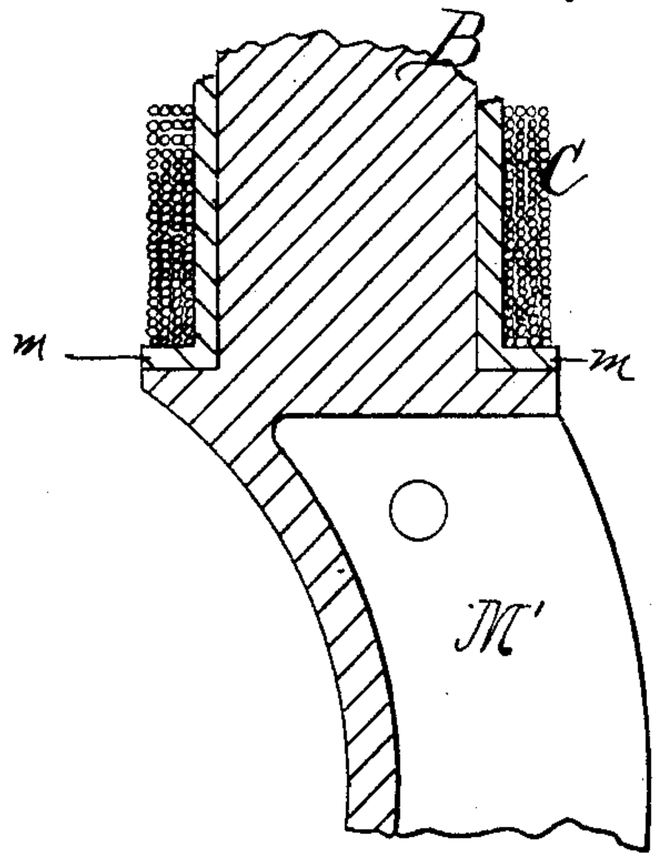
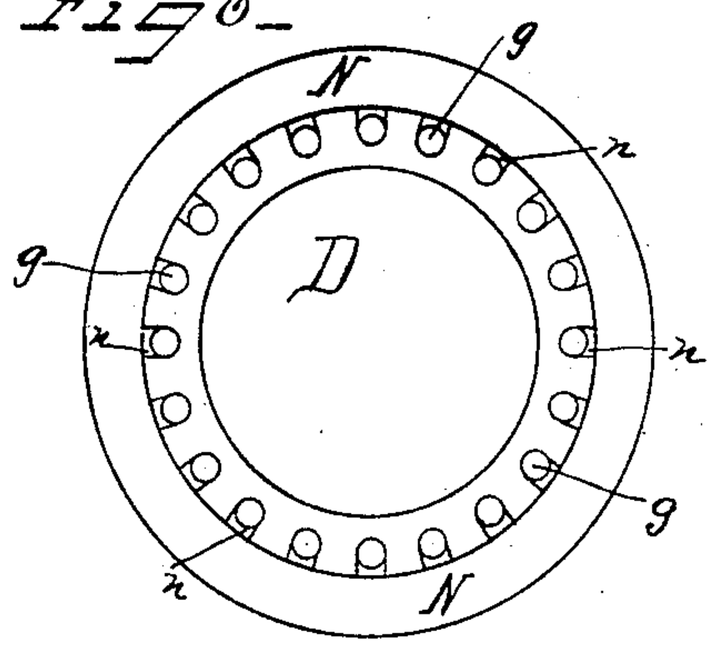


Fig 6.



WITNESSES—

S. Everett Brown

A. W. Munday

INVENTOR—

Joseph Lewis

per Munday, Evarts & Adcock

his Attorneys.

(No Model.) 4 Sheets—Sheet 4.

J. LEWIS.

DYNAMO ELECTRIC MACHINE.

No. 270,230. Patented Jan. 9, 1883.

Fig 7.

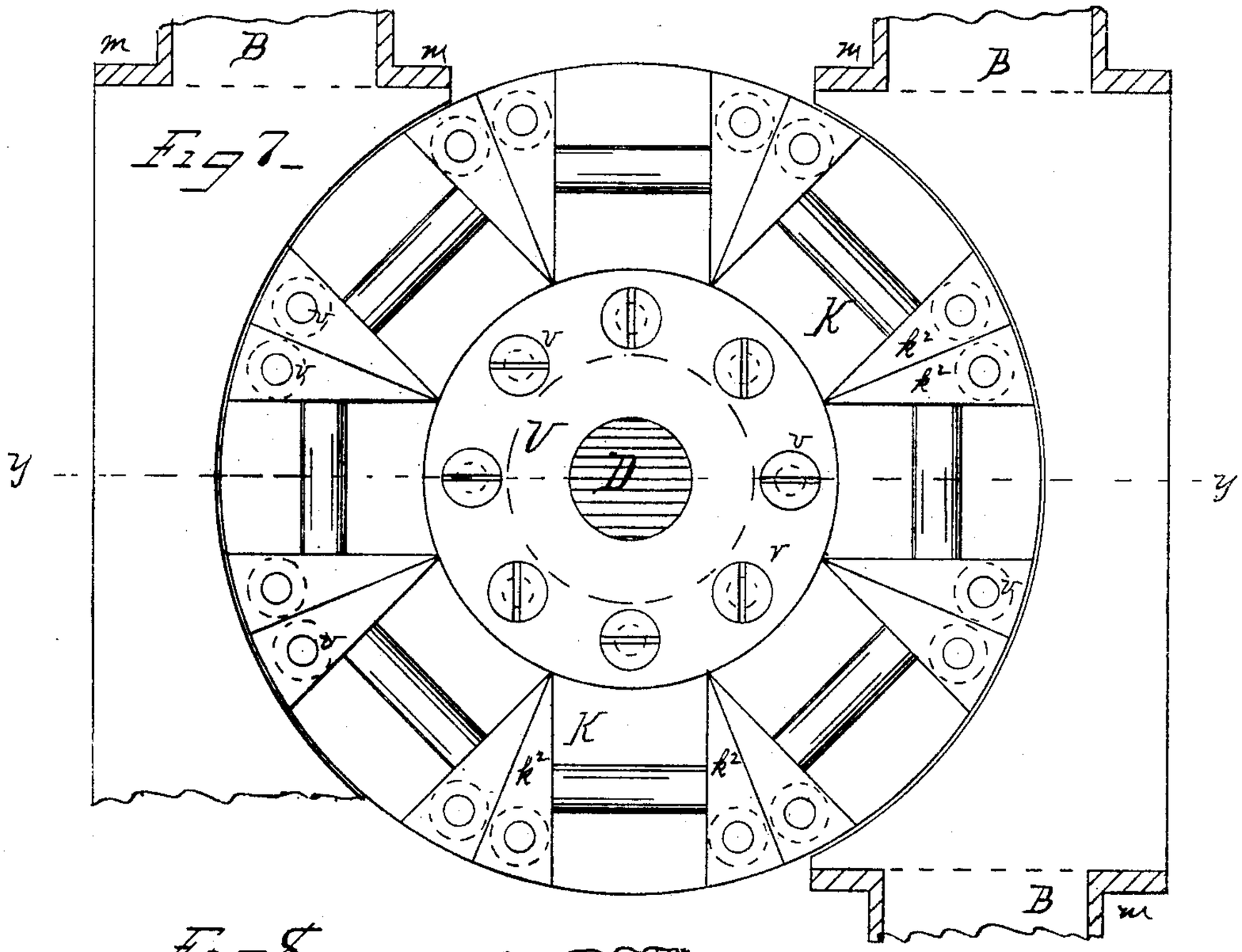
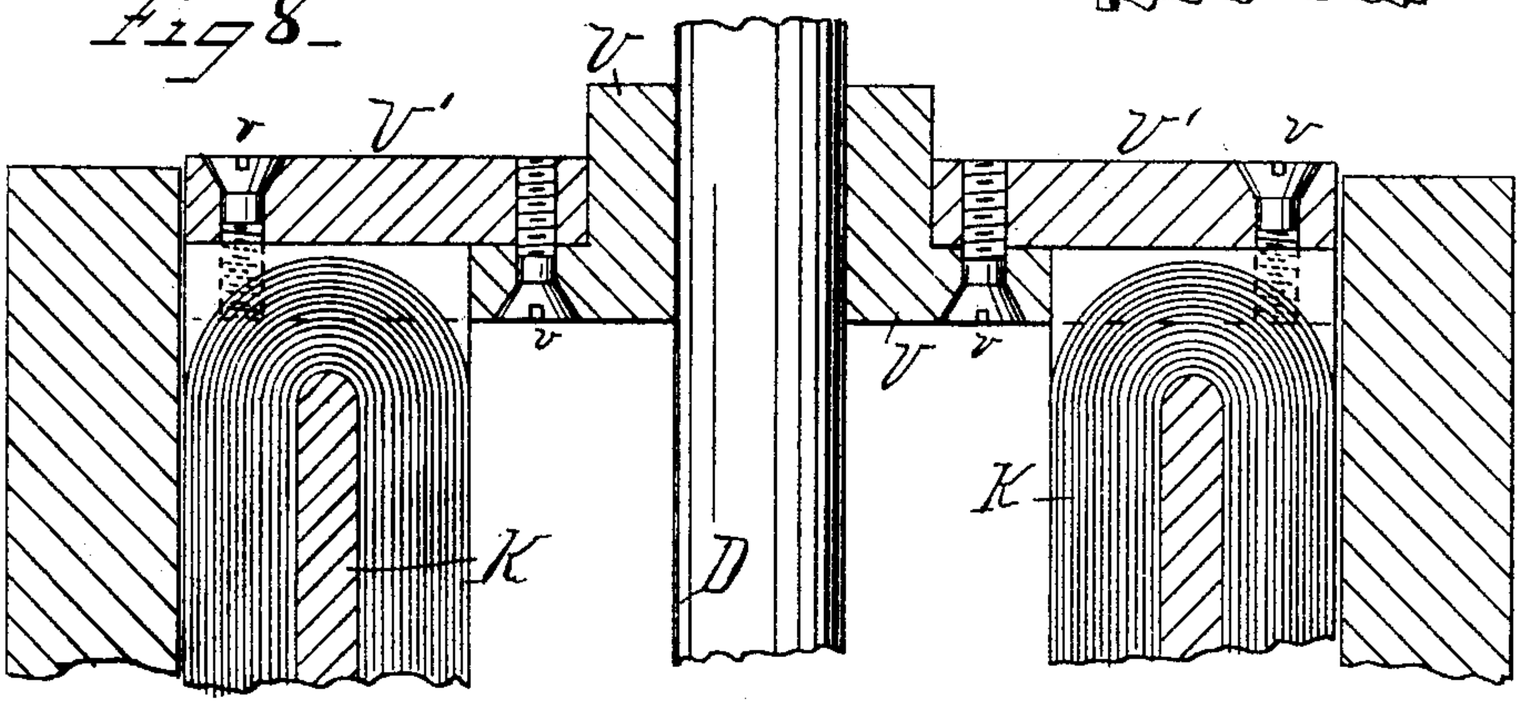


Fig 8.



WITNESSES.

S. Everett Brown

A. W. Munday

INVENTOR.

Joseph Lewis

per Munday, Evarts & Adcock

his Attorneys.

UNITED STATES PATENT OFFICE.

JOSEPH LEWIS, OF CHICAGO, ILLINOIS.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 270,230, dated January 9, 1883.

Application filed April 3, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH LEWIS, engineer, of Manchester, England, but now residing in Chicago, Cook county, State of Illinois, have invented certain new and useful Improvements in Dynamo-Electric Machines, of which the following is a specification.

The object of the present invention is to provide a means for preventing the usual overheating of dynamo-machines, and the consequent destruction or injury of its parts; to make the bobbins of the armature interchangeable and separately removable, and the coils of the magnet likewise, so that a damaged bobbin or coil may be quickly removed for the purpose of repairs or examination and a new bobbin or coil slipped into place without stopping the machine for but a moment, and to simplify the general construction of the machine, so as to materially reduce the cost and labor of its manufacture, and at the same time to produce a more durable and perfect working machine in all its parts than has heretofore been attained. In the present invention the bobbins of the revolving armature are provided or cast with central openings, and they are arranged circumferentially between the two side plates of the armature, with open spaces between the separate bobbins, so that the revolution of the armature will cause a strong current of air, as from a blowing-fan, to constantly pass through the central openings in the bobbins and the open spaces between them, and thus prevent their heating; and the side plates are also provided with holes to admit air. The side plates of the armature are provided on their inner faces with a brass ring for magnetic insulation, having recesses cast therein for the reception of the bobbins, which are secured thereto by means of screws or bolts, as hereinafter more fully described, so as to permit of the bobbins being separately and easily removed. If other means of insulating the bobbins should be employed, the recesses for the reception of the ends of the bobbins may be cast in the side plates of the armature and the brass ring dispensed with.

In manufacturing my machine the pole-extensions of the magnet may be made or cast with any number of arms for coils desired, as I first wind the wire of the coils upon hollow bobbins, made of papier-maché, hard rubber, or other insulating material, adapted to fit on the arms of the magnet, so that the coils may be slipped onto the arms and secured in place after being formed. Of course, if other means of insulating the coils from the magnet-arms were employed, the hollow bobbins on which the coils are wound might be made of other than insulating material. In this way it will be seen that the coil from any one of the magnet-arms may be separately and quickly removed for the purpose of repairs or examination without disturbing the rest, and replaced by a new one; and by this means, also, the cost and labor of manufacturing the machine are very much diminished. By these means all the coils of the armature and all the coils of the magnet are separately made, so as to drop into their proper places, and are interchangeable, thus cheapening the construction and making repairs easily and quickly done; and I am also enabled to wind the armature-bobbins more closely and uniformly, so that they may be made to revolve nearer the extension-poles of the magnet, and hence produce more powerful currents; and in my machine, also, every part of the insulation may be examined separately, and if any particular coil should be burned out or otherwise damaged it can be at once removed and replaced with a new one without disturbing any other part of the machine or stopping it for any length of time.

In the accompanying drawings, which form a part of this specification, and in which similar letters of reference indicate like parts, Figure 1 is an end view of a device embodying my invention. Fig. 2 is a side elevation. Fig. 3 is a central horizontal section, showing one-half the armature in plan view. Fig. 4 is a detail view of one of the side plates of the revolving armature, partly in section to show some of bobbins in position. Fig. 5 is a central longitudinal section of a portion of one of the magnet-arms. Fig. 6 is an end view of the armature-shaft enlarged. Fig. 7 shows a modification in the construction of the bobbins and side plates, and Fig. 8 is a section on line *y y* of Fig. 7.

In the drawings, A represents the base-plate of the machine, upon which it rests.

B B are the arms or cores of the magnet,

which are surrounded by the coils C C. The arms B are eight in number, and the lower four of them serve as legs or pedestals, upon which the machine stands, the same being secured to the base-plate by bolts *a*. A′ is the cap-plate, which is bolted to the ends of the upper four arms of the magnet.

D is the axis or shaft of the revolving armature, which is journaled at each end in suitable brass or insulating bearings, *d*, on the cross pieces or bars E, which are secured on either side to the middle portion of the magnet by bolts *e*. The side plates, H, of the revolving armature are secured to shaft D, so as to revolve with it, and are each provided with a circular shoulder or flange, *h*, on their inner faces, over which fits a brass ring, *h′*, provided with recesses h^2 in its periphery for the reception of one end of the bobbins K. The bobbins K are each provided with a central hole, *k*, for mounting the same upon a spindle for the purpose of winding the wire on them, and with central openings, *k′ k′*, for the passage of air through them when the armature is revolving. The bobbins K have also at each end lugs or ears k^2, having each a half bolt-hole and countersunk head therein, so that when the bobbins are placed in their places one screw will secure two bobbins to the ring at one side and end. The bobbins are fire-japanned before the coils are wound thereon, the japanning serving to insulate the bobbin. The heads of the screws k^3, which hold the bobbins in place, serve also to connect the contiguous bobbins together magnetically, so as to form a continuous ring, the japanning being filed off or removed from the bobbin on the interior of the recessed lug, in which the screw fits, so as to accomplish this result. The coupling-wires *g* from the commutator to the coils of the bobbins (one for each bobbin) are led out through holes *f* in the side plate, H. These holes in each of the side plates also serve to admit air to the interior of the revolving armature, and thereby increase the force of the air-currents produced by the revolution of the armature. The bearing part of the shaft D is provided with longitudinal grooves *n* in its periphery, through which pass the coupling-wires, one in each groove, and N is a steel sleeve shrunk over the shaft to cover the wires, and which forms the bearing-surface of the shaft. M is the boxing for the journal, and P represents a portion of the commutator.

The arms or cores B, it will be observed, are oval in form, and their minor diameters are placed parallel with the axis of the revolving armature, so as to occupy as little space in this direction as possible. The central portion of the magnet is cut out or cast with openings M′ M′, for the purpose of admitting air nearer to the concave surface of the magnet. The coils are first wound on the hollow papier-maché bobbins *m*, which are adapted to fit the arms B of the magnet, and after being thus formed they are simply slipped onto the arms B of the magnet, the papier-maché bobbin thus serving to insulate the coil from the magnet-arms. After the coils are fitted in this way on the arms B the plates A and A′ are applied and secured to the arms B by the screws or bolts *a*, which serve to hold the coils in place and to give the requisite strength and rigidity to the machine as a whole. The magnet is cast in two parts, each part having two arms for coils on each end, as shown in Fig. 2, and the two parts united by the plates A and A′ and the cross-bars E. As the coils are first wound on hollow bobbins, which are then slipped over the arms, no difficulty is experienced in getting the coils on the arms from their number, and, if desired, the magnets may be cast with a greater number of arms. To double or still further increase the capacity of the machine, I simply cast each side of the magnet wider and with twice the number of arms or more, and mount two or more similar revolving armatures on the same shaft, in which case a commutator is provided on each end of the shaft, and the wires passed out through each of the side plates of the revolving armature.

O represents the driving-pulley.

In Figs. 7 and 8 I have shown a modification of my invention in which the bobbins are made wedge-shaped at their ends, so as to fit together and form a ring resting upon the brass insulating bush or collar V, secured to the driving-shaft. In this construction the bobbins are held in place by screws or bolts *v*, inserted in the ends of the bobbins through the annular plate V′, which is fitted on the brass bush V. In this construction, which is designed more especially for a quantity machine wherein large wires are used for the bobbin-coils, I make the bobbins solid, as there is little danger of such machines overheating, and as the open spaces between the bobbins, except at their ends, where they fit together on the ring on bush V, will suffice to keep the bobbins cool. Of course this or other equivalent construction may also be used for a tension-machine; but I prefer the construction first shown for such machines.

It will be observed that the two parts of the magnet are alike, so that they may be cast from the same mold, and that all the arms B thereof are precisely alike in form, so that the papier-maché bobbins are interchangeable and will fit on any arm, and that the iron bobbins of the revolving armature are all alike, so that they are interchangeable and will fit in any position in the armature. In this way, by having on hand one or two extra iron bobbins for the armature and papier-maché coils for the magnet, repairs may be almost instantly made.

It will also be observed that all the parts of the machine, except the shaft and its boxings and the coils, are of cast metal, and very simple and cheap of construction, so that the whole machine may be produced at comparatively small cost, and the different parts very quickly and easily put together.

I claim—

1. The cast bobbin K for the revolving armature of a dynamo-electric machine, provided with ears or lugs k^2 for securing the bobbin in place in the armature, and provided with central openings, k k', for the passage of air through the same, substantially as specified.

2. The combination, in a dynamo-electric machine, of the side plates, H, of the revolving armature provided with shoulders h, brass or non-magnetic ring h', provided with recesses h^2 for the reception of the bobbins, and the separately-removable bobbins mounted in said recesses and separately secured to said ring, substantially as specified.

3. In a dynamo-electric machine, the revolving armature consisting of a series of separately-removable cast bobbins having central air-passages through the same and mounted in an annular ring, with open air-spaces between the separate bobbins, substantially as specified.

4. The combination of the driving-shaft, the perforated side plates, H, the separately-removable cast-iron bobbins having central air-passages through the same and mounted in an annular ring, with open air-spaces between the separate bobbins, substantially as specified.

JOSEPH LEWIS.

Witnesses:
T. EVERETT BROWN,
H. M. MUNDAY.