(No Model.)

J. A. I. CRAIG.

DYNAMO ELECTRIC MACHINE.

No. 277,238. Patented May 8, 1883.

Fig. 1

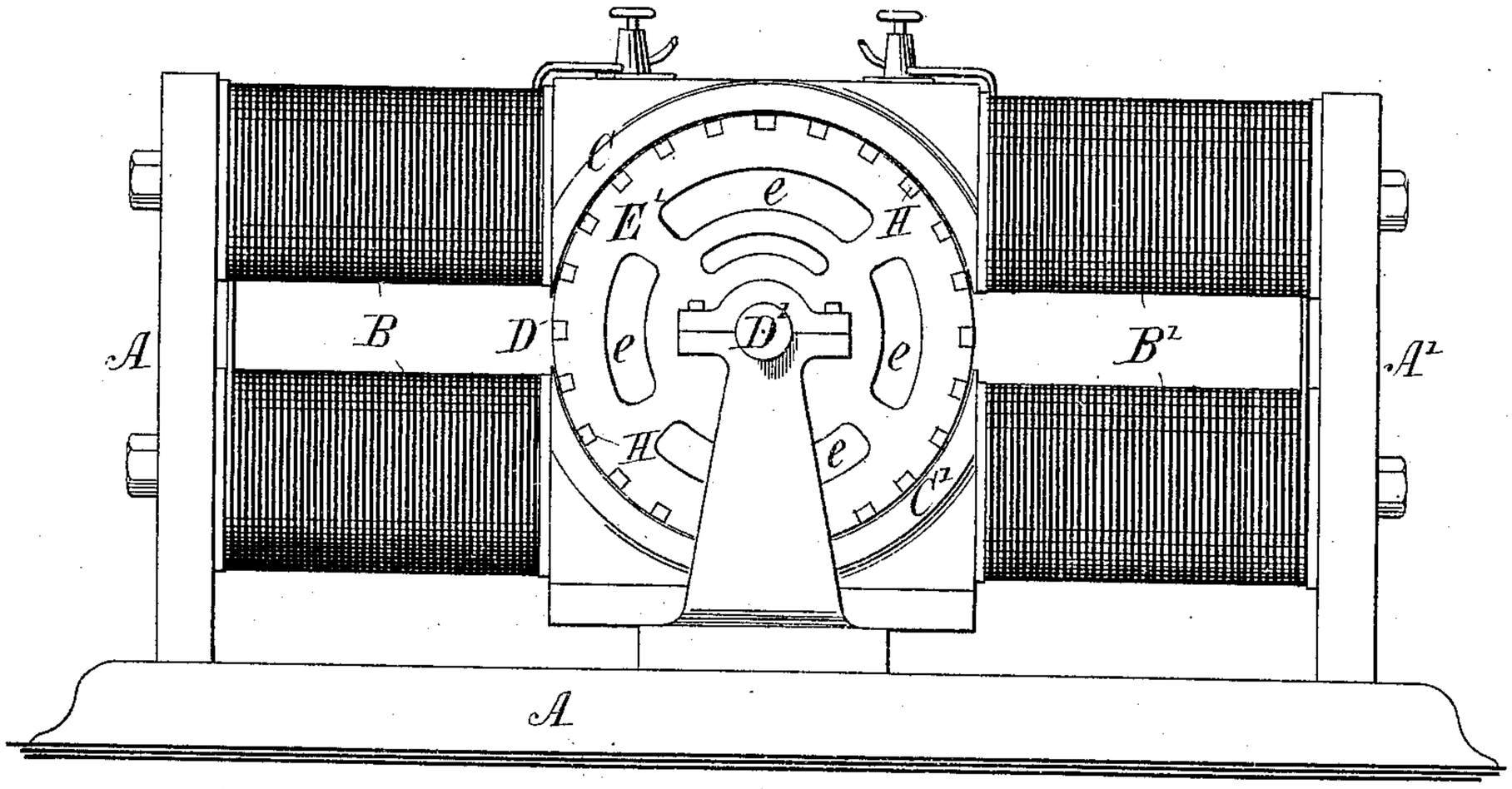


Fig. 10

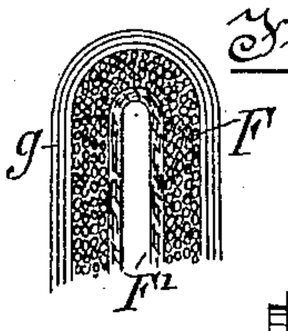


Fig. 2

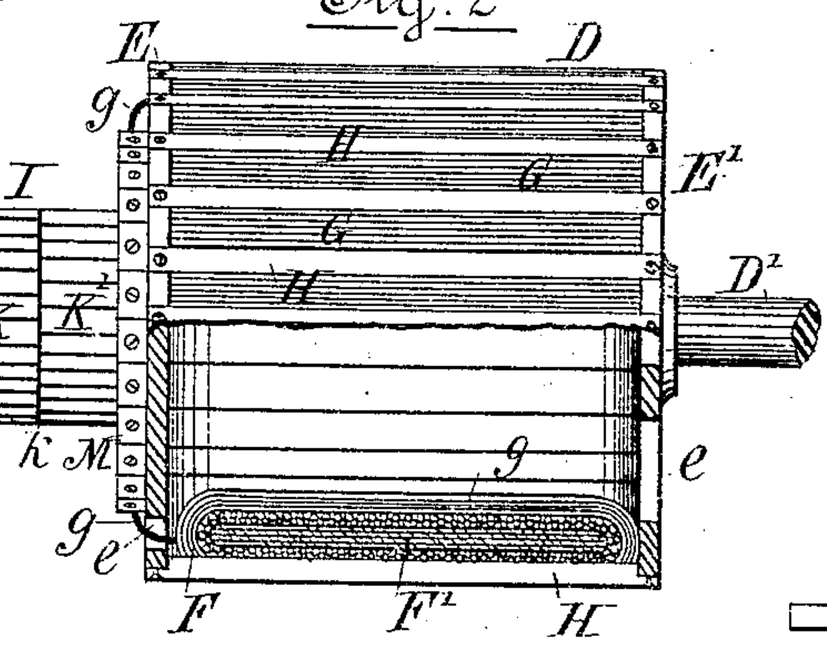


Fig. 3

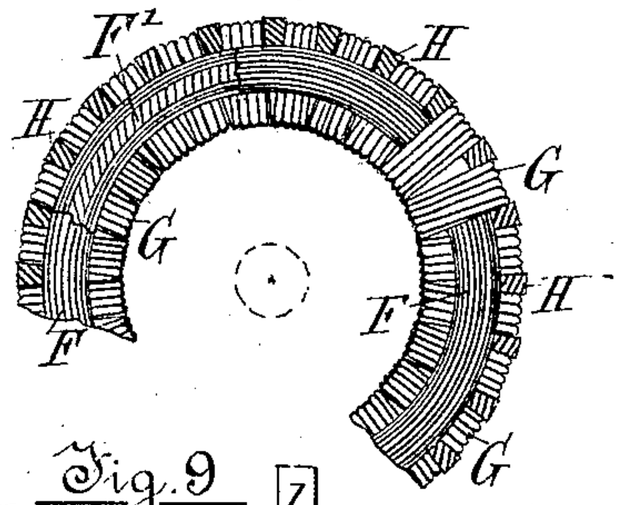


Fig. 8

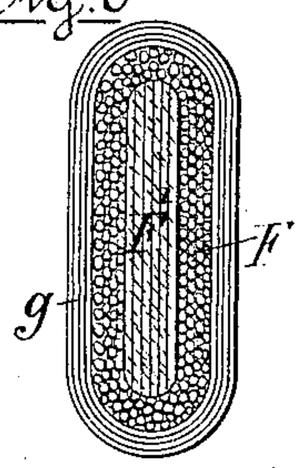


Fig. 9

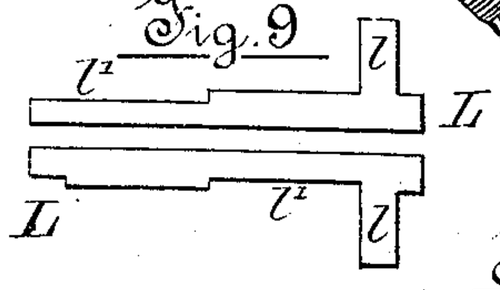


Fig. 6

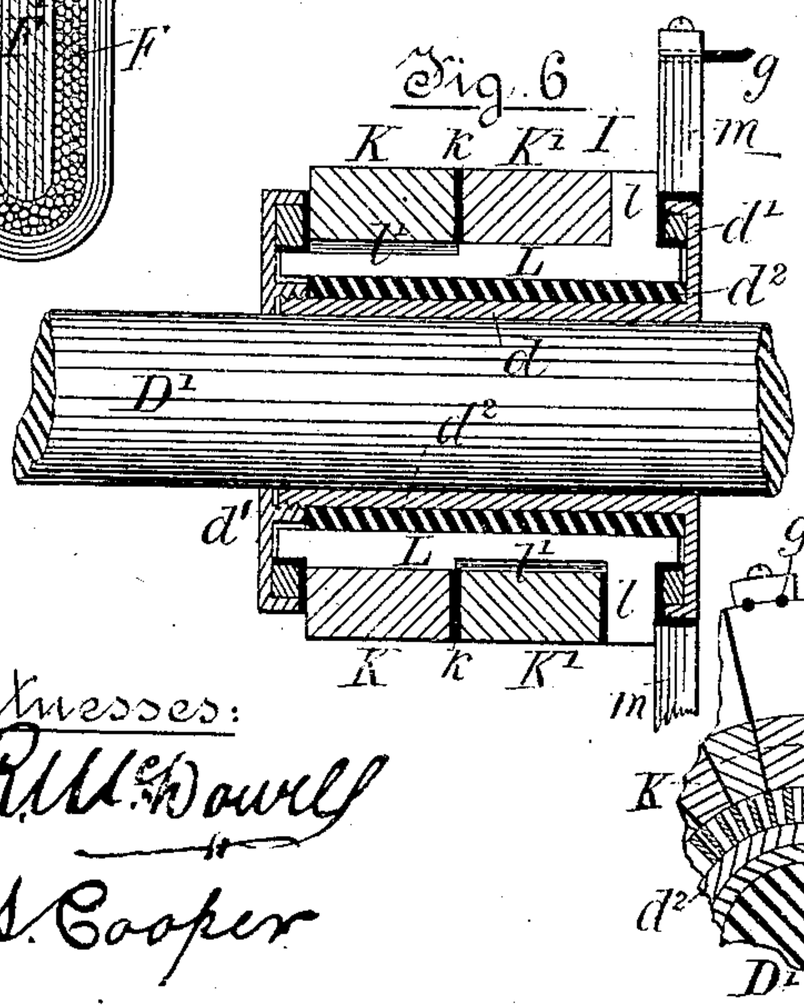


Fig. 4

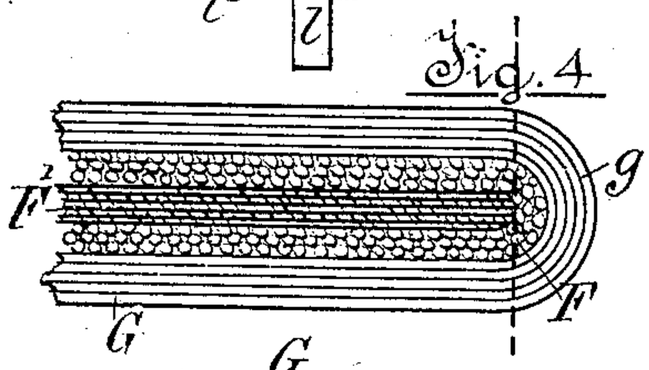


Fig. 5

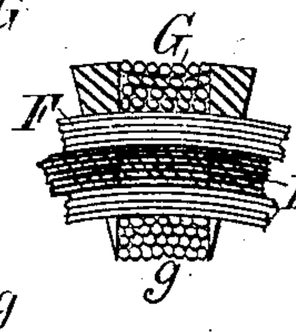
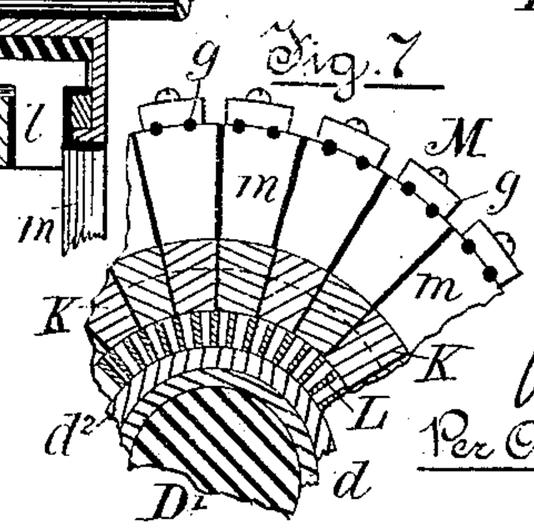


Fig. 7



Witnesses:

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UNITED STATES PATENT OFFICE.

JOSEPH A. I. CRAIG, OF MONTREAL, QUEBEC, CANADA.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 277,238, dated May 8, 1883.

Application filed November 4, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH A. I. CRAIG, of the city of Montreal, in the district of Montreal and Province of Quebec, in the Dominion of Canada, have invented certain new and useful Improvements in Dynamo-Electric Machines; and I do hereby declare that the following is a full, clear, and exact description of the same.

This invention consists, first, in improvements in the construction and arrangement of the revolving armature; secondly, in an improved commutator; and, thirdly, in a novel construction of field-magnet; and it has for its object to provide a dynamo-electric machine which will produce a stronger current than those at present in use, and thus enable me to light more lamps with a smaller and more compact machine, and at the same time to insure the thorough ventilation of the parts to prevent heating and simplify and cheapen the cost of manufacture.

Many other advantages will be derived from the use of my invention which it is not necessary to explain here; but for complete comprehension of the principle and construction of the different parts reference must be had to the accompanying drawings, where letters similar to those used in the following description indicate like parts, and in which—

Figure 1 is an elevation of a dynamo-electric machine provided with my newly-invented armature or bobbin. Fig. 2 is an enlarged side view, partly in section, of said bobbin. Fig. 3 is a cross-section of same. Figs. 4 and 5 are enlarged details, showing interior construction of armature-bobbins; Figs. 6 and 7, sections of my improved commutator; Fig. 8, a section of my field-magnet; Fig. 9, detail views of conducting-strips; and Fig. 10 is a view showing a modified construction of core for armature and magnet.

A is the bed-plate of the machine, and A A′ the end standards, and B B′ the field-magnets; C C′, the polar extensions; D, the armature, and D′ its shaft, properly journaled, and revolved by a belt and pulley in the usual manner.

The armature D is constructed as follows: On the shaft D′ are firmly secured two disks or flanges, E E′, preferably of brass, the same being slotted or perforated, as seen at *e e*, for the purpose of allowing the free circulation of air through the interior of the armature. F represents the core of the armature, made up of an annular coil of iron wire wound upon another core or center, F′, of pasteboard, wood, or other non-magnetic material, which may further be left hollow in the center, if desired, as shown in Fig. 10. It is apparent from the drawings that in winding the iron wire F around the pasteboard ring F′, when the point indicated by the dotted lines in Fig. 4—that is, the edge of the non-magnetic ring—is reached, in order to cover said edge the iron wire must be bunched or wound upon itself, the direction of the coil, however, being unchanged. Thus the non-magnetic ring is completely enveloped on all sides by said iron wires, and the surrounding coils of insulated wire will be in contact with the metal of the core at every point. I have found that by the use of my non-magnetic ring in the interior of the core the armature may be made much lighter than that of Gramme, and the complete envelopment of such ring with iron wire gives me a result superior to that produced by ordinary wire cores in a much cheaper and more convenient manner. These coils or bobbins are represented at G G, and, as will be seen, are wound or placed on the core, made up as just described, in such a manner as to form a circumferential ring of bobbins, as shown in Fig. 3, said bobbins being kept separate from each other and the whole kept firmly in place within the disks E E′ by strips or bars H H, of wood or other non-conductor, said bars being sunk or forced between each bobbin, and their ends being let into recesses formed therefor in the peripheries of the disks E E′ and held thereto by screws or other suitable means. The wires *g g* are brought out through the apertures *e* and connected to the commutator I, either as shown in Figs. 6 and 7 or in any other approved way. This construction of armature—viz., the circumferential arrangement of the bobbins—allows me to have the armature open from end to end, and thus permits of a free circulation of air through the interior. This I have found to be specially necessary and desirable in view of the special construction of my armature—viz., with coils of iron wire (which are well known to give out considerable heat during revolution) arranged on the inner as well as on the outer periphery

of the core. My armature may be revolved very close to the poles C C′, and the bars H H will absolutely prevent the short-circuiting; and from the fact of the mass of iron generally being reduced in quantity, magnetization and demagnetization are very rapidly performed, thus enabling the machine to be run at a very high rate of speed with but little expenditure of power.

K K′ represent sections of the commutator, which is divided not only longitudinally, as shown in Figs. 2 and 7, but also transversely at the line *k*, as seen in Figs. 2 and 6, thus forming, in fact, two commutators in one, two collectors being used when it is desired to send the current in different directions, or only one extending across the face so as to touch both the sections K and those marked K′, if the whole strength of the current is to go to the field-magnets and then to line. Each of these commutator-sections is insulated from the others.

On the central shaft, D′, is slipped a brass tube, *d*, having flanges or collars *d′ d′* at each end, attached thereto by screwing or otherwise; or one collar may be formed in one with the tube *d* and the other collar screwed thereto, as shown.

d^2 represents an insulating-sleeve, made generally of wood, surrounding the tube *d*, on which are arranged, as shown, conducting-strips L L, of suitable metal, of the shape shown in Figs. 6 and 9—*i. e.*, each with an outwardly-projecting end, *l*, and a step, *l′*. The steps *l′* are cut out for about half the length of the strip for the purpose of avoiding contact with more than one section K or K′, as the case may be, these steps being arranged alternately, as will be seen in Figs. 6 and 9. Each of the outwardly-projecting ends *l* is in contact with one of the sections *m* of the divided commutator-disk marked M, to the construction of which disk I lay no claim, this connection of these parts, however, being shown in Figs. 6 and 7. By this arrangement I am enabled, as mentioned, to collect two currents from the one commutator, if desired, for the purpose mentioned, thus economizing in the construction of a multiple-light machine by avoiding the necessity of using more than one commutator. Fig. 8 shows a section of a field-magnet, which, it will be seen, is precisely similar in construction to one of the bobbins of the armature—*i. e.*, with a core made up of iron wire F, wound upon another core, F′, of pasteboard or other non-conducting material, around the whole being wound the helix-wire. I have found this part of my invention specially valuable for magnets as well as for an armature or bobbins. I do not, however, claim this construction in this case, as I intend to make it the subject of a separate application for Letters Patent, it being apparent that the construction of the supporting-frame and polar extensions would require modification in some respects to adapt them to this special form of field-magnet.

What I claim, and desire to secure by Letters Patent, is as follows:

1. An armature for a dynamo-electric machine, made up of the following elements, viz: an annular ring of pasteboard or other non-magnetic material, iron wire wound on and around said non-magnetic ring concentrically therewith, and completely enveloping the same on all sides, to constitute the core of the armature, and insulated wire coils placed on said core to form the bobbins, substantially as described and shown.

2. In an armature for a dynamo-electric machine, the combination, with the central shaft, D′, and perforated disks E E′, mounted on same, of the bobbins G G, arranged circumferentially upon an annular core composed of a ring of non-magnetic material completely enveloped by iron wire, and bars H H, of wood or similar non-conducting material, fastened at their ends to said disks to hold them together, and passing between the different bobbins at the periphery, the whole being constructed and arranged so as to permit of a free circulation of air through the perforations in said disks to the interior of the armature.

3. A commutator for a dynamo-electric machine, made up of two sets of metal strips, K K′, placed end to end with relation to each other, each separate strip being insulated from its neighboring strip at sides and ends, and the strips in each set being connected alternately with the different sections of the commutator plate or disk M (and thus forming connection with the bobbin-wires) by means of metal connecting strips L, constructed with steps *l′* and projecting ends *l*, and arranged between the strips K K′ and the central shaft, but insulated from the latter, all combined and arranged substantially in the manner and for the purpose specified.

JOSEPH A. I. CRAIG.

Witnesses:
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E. ARMANT.