No. 788,365. PATENTED APR. 25, 1905.

J. H. ST. H. MAWDSLEY.

DYNAMO ELECTRIC MACHINERY.

APPLICATION FILED SEPT. 17, 1902.

2 SHEETS—SHEET 1.

Fig. II.

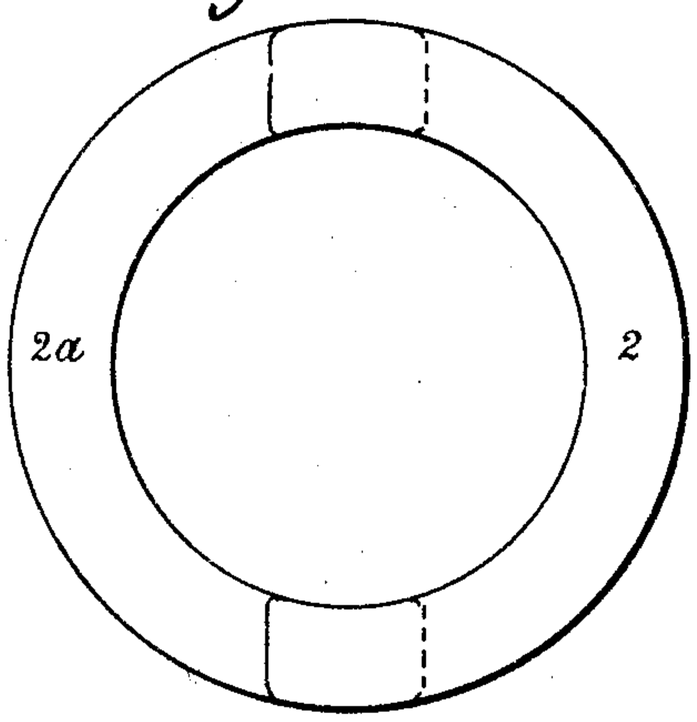


Fig. VIII.

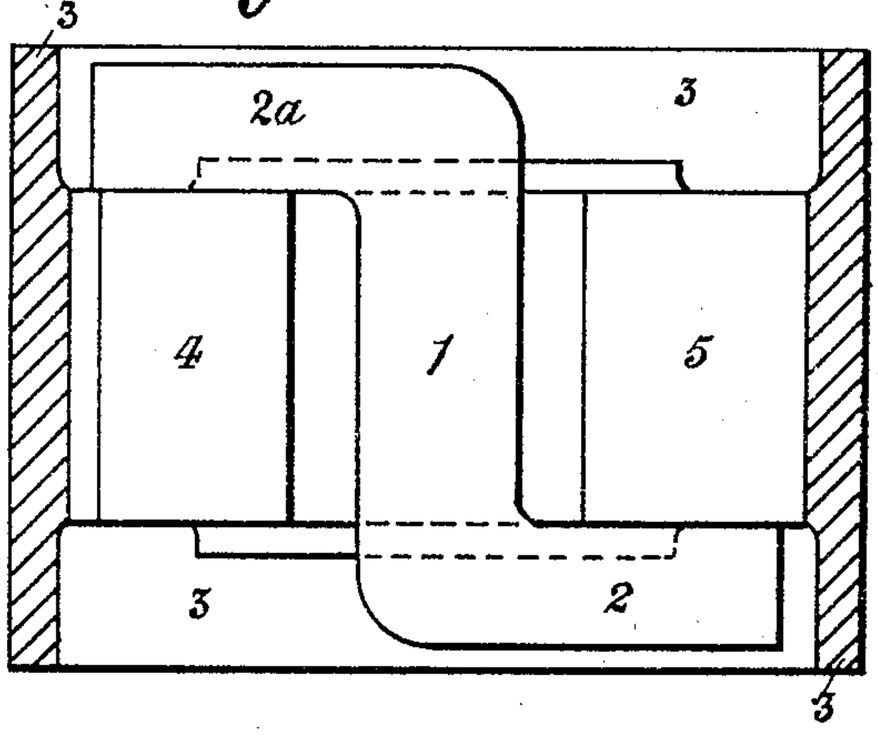


Fig. I.

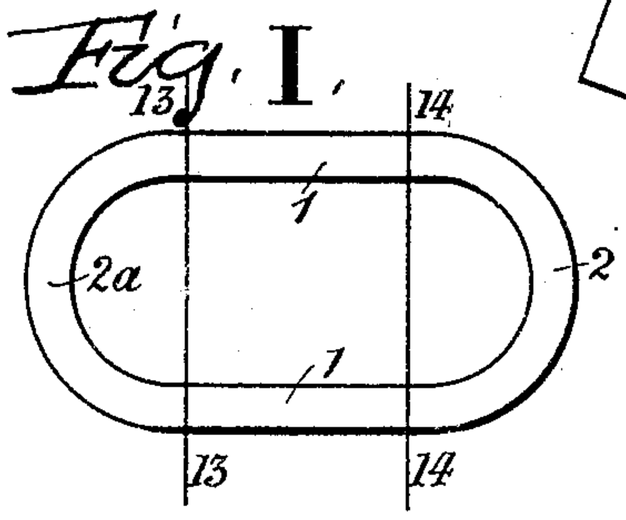


Fig. III.

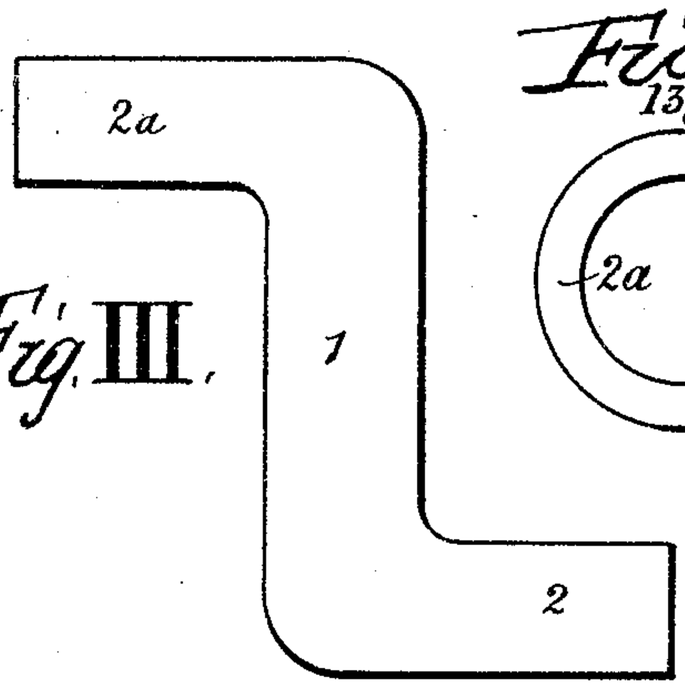


Fig. IX.

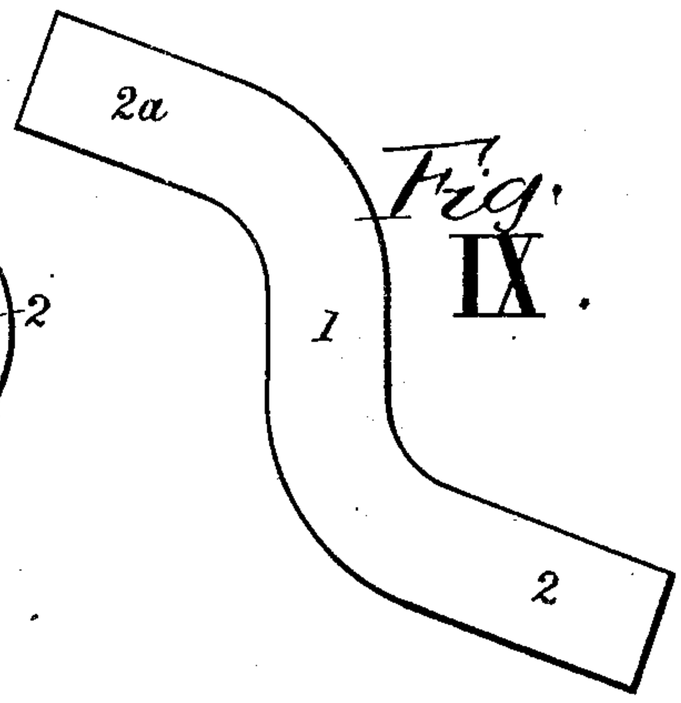
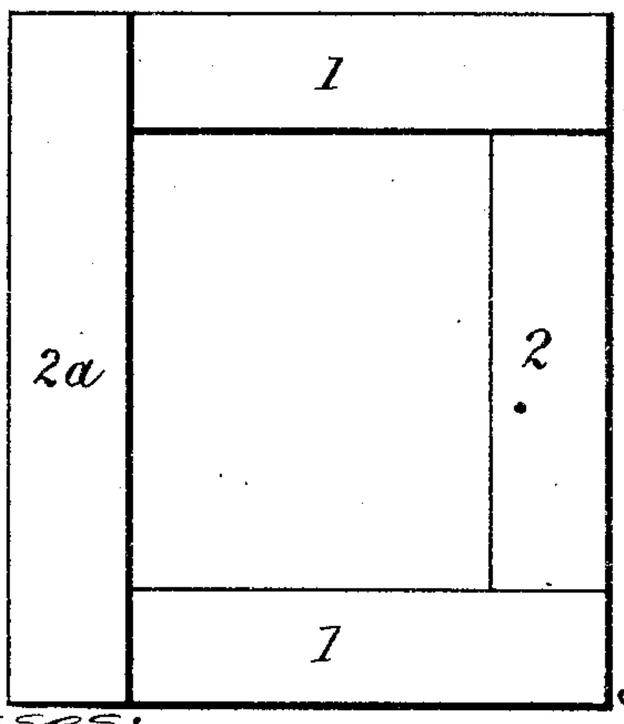


Fig. IV.



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2 SHEETS—SHEET 2.

Fig. V.

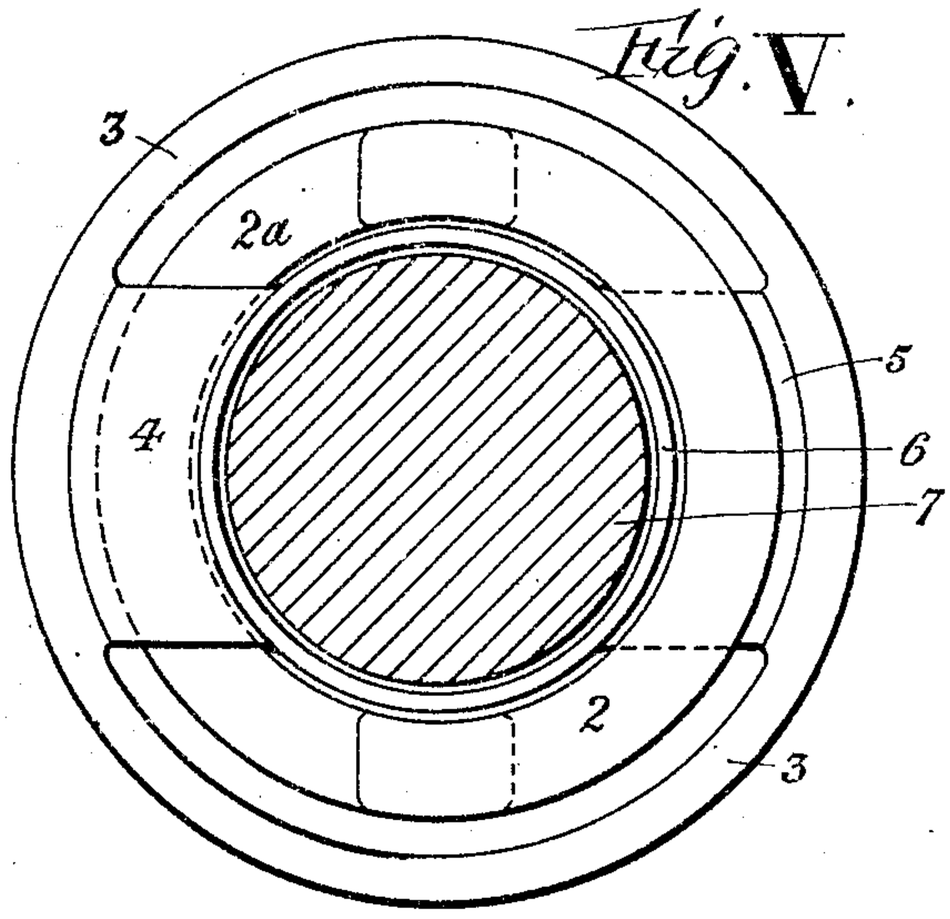


Fig. VII.

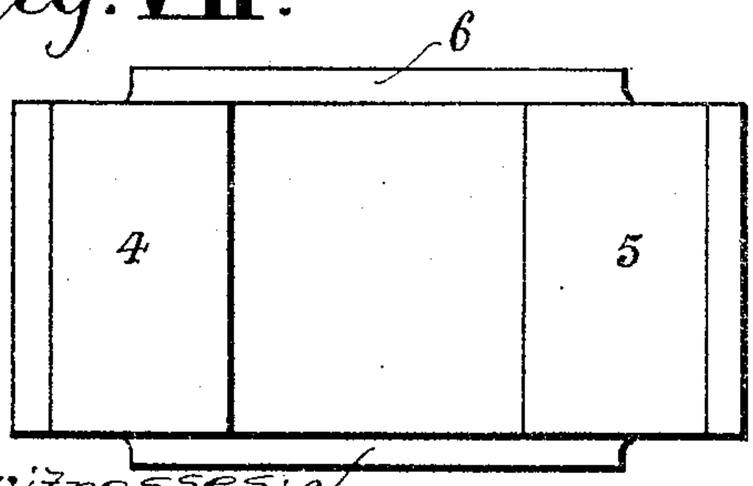
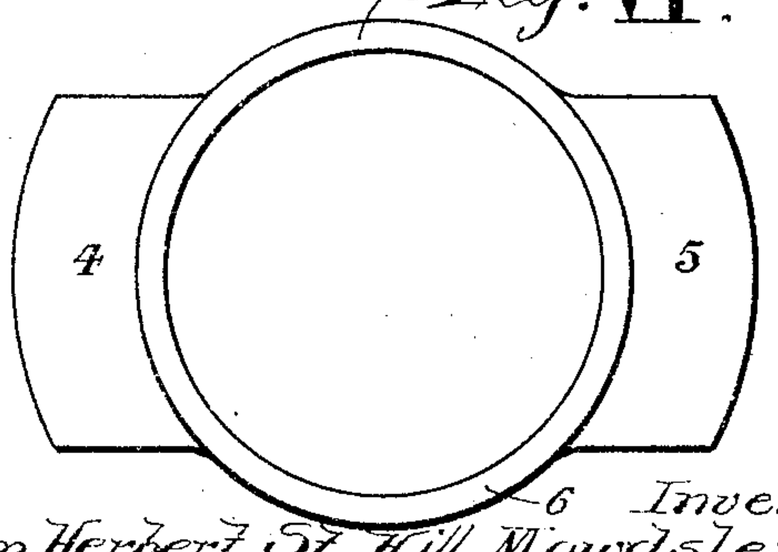


Fig. VI.



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UNITED STATES PATENT OFFICE.

JOHN HERBERT ST. HILL MAWDSLEY, OF TAUNTON, ENGLAND.

DYNAMO-ELECTRIC MACHINERY.

SPECIFICATION forming part of Letters Patent No. 788,365, dated April 25, 1905.

Application filed September 17, 1902. Serial No. 123,729.

To all whom it may concern:

Be it known that I, JOHN HERBERT ST. HILL MAWDSLEY, a subject of the King of Great Britain, and a resident of Taunton, England, have invented certain new and useful Improvements in Dynamo-Electric Machinery, of which the following is a specification.

My invention relates to dynamo-electric machines, and has special reference to a new or improved coil therefor.

In order that my invention may be more readily understood, I append drawings hereto, in which—

Figure I shows a coil of known form with two curved ends and two straight sides, all of which are in one plane. This figure is for convenience drawn to a smaller scale than the remaining figures. Figs. II, III, and IV show in end elevation, plan, and side elevation, respectively, a form of coil embraced by my invention which I term my "Z-coil" and which is adapted to excite two cores of a field-magnet. Fig. V is an end elevation of a field-magnet, showing a coil of Z form in position. Fig. VI is an end elevation, and Fig. VII is a plan, of the field-magnet cores and of the connecting-rings hereinafter described. Fig. VIII is a plan showing a coil of Z form in position on the field-magnet cores, the yoke being shown in section. Fig. IX shows in plan a modified form of coil.

I shall now proceed to describe first one form of my coil, then the application of the said coil to the field-magnets of a two-pole motor of the inclosed type, which will be described later, and afterward a slightly-modified form of my coil.

I take a coil, such as is shown in Fig. I, having two straight and parallel sides 1 1 and two curved ends 2 and 2^a, all in one plane, and bend the coil about the lines 13 13 and 14 14, so that the planes of the ends 2 and 2^a lie at right angles to the plane of the sides 1 1 and project on opposite sides thereof. The coil so produced is shown on a larger scale in Figs. II, III, and IV. In practice the coil of the shape described would not necessarily be made by actually bending a plane coil, although this may be done; but it would usually be made by winding the insulated wire on a properly-shaped former, as is well understood. The object of making the coil of this shape is that when placed in position on the cores of the field-magnet the conductors in the two straight and parallel sides may lie close to and parallel to the armature over or near the coils of the armature which are passing through the neutral zones on each side of the pole. By this means the waste magnetic leakage is made very small and the size and weight of the machine for a given output is much reduced. Further, I find that the construction described whereby a portion of the field-coil is placed just over the armature-coil undergoing commutation conduces to sparkless collection at the brushes of the machine.

I shall now describe the carcass of a field-magnet which I find very suitable for use with my improved coil.

The yoke of the field-magnet (see Figs. V and VIII) consists of a hollow cylinder 3. The two cores 4 and 5 of the magnet, (let us suppose of rectangular section,) together with their pole-pieces, are preferably formed in one piece, the two pole-pieces being for this purpose integrally connected by thin pieces or rings of metal 6 6. The two cores, with their connecting-rings, are shown separately in Figs. VI and VII. A convenient method of making the cores and pole-pieces described is to form the whole of one casting. In order to complete the carcass of the field-magnet, all that is now necessary is to bore or turn out the interior of the yoke and trim the exterior of the cores, so that these will slide tightly into the cylindrical yoke. The two parts—yoke and cores—may then be fastened together by screws or bolts. There is thus produced the carcass of a field-magnet composed of a hollow cylindrical yoke with two horizontal inwardly-projecting poles. The armature 7, as will be readily understood, will revolve in the space left between the poles for that purpose.

In order to excite the magnet, the coil described is placed in such a position that the end 2 thereof lies against core 5, while the end 2^a lies against core 4. (See Figs. V and VIII.) Both cores are thus excited by the one coil. When the several parts of the motor are in position, the straight sides 1 1 of

the coil will be parallel to the armature-shaft and occupy positions in the neutral zone over and under the top and bottom of the armature, respectively.

A modification of the coil just described is shown in Fig. IX. In this modification the ends 2 and 2^a instead of being bent round the lines 13 13 and 14 14 of Fig. I until perpendicular to the sides 1 1 are each bent through a smaller angle, as shown in plan in Fig. IX. When employing this modified form of coil, the armature-coils in entering and leaving the field produced by the straight sides 1 1 of the magnet-coil pass through the effectively weaker field produced by a portion of the inclined sides 2 and 2^a, thus producing a more gradual inductive effect on the said coils, which in my opinion conduces greatly to sparkless commutation.

I have described my invention as applied to a bipolar machine; but it may also be applied to multipolar machines, as will be readily understood by persons skilled in the art.

My coil is particularly applicable in the case of small electromotors.

In the figures I have shown the ends 2 and 2^a of the coils as circular in form. I find it convenient to make them of such shape in order to suit a cylindrical yoke; but it is obvious that in the case of yokes which are rectangular in cross-section the coils would be of rectangular form also. In other words, it will be obvious that the shape of the coil may be modified to suit the yoke.

It will of course be understood that when I employ a coil of the modified form shown in Fig. IX instead of having the ends of the field-magnet cores perpendicular to their faces, as shown in Fig. VIII, I incline or taper them, so as to suit the angle to which the ends 2 and 2^a are bent with respect to the plane of part 1 of the coil.

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

1. In a dynamo-electric machine the combination of a Z-coil, the straight part 1 of which lies in the neutral zone and close over and parallel with the coil of the armature which is undergoing commutation, with two field-magnet cores in such manner that the two cores are excited by the said coil.

2. The combination of a Z-coil, the straight part 1 of which lies in the neutral zone and close over and parallel with the coil of the armature which is undergoing commutation, two field-magnet cores excited by the said coil, and a yoke substantially as set forth.

3. The combination of a Z-coil, the straight part 1 of which lies in the neutral zone and close over and parallel with the coil of the armature which is undergoing commutation, two field-magnet cores excited by said coil, a yoke and rings 6, 6, substantially as set forth.

In witness whereof I have hereunto set my hand in presence of two witnesses.

JOHN HERBERT ST. HILL MAWDSLEY.

Witnesses:

JOHN WESLEY BURLEIGH,

ERNEST SPENCER COX.