B. G. LAMME.

DYNAMO ELECTRIC MACHINE.

APPLICATION FILED JUNE 2, 1905.

947,389. Patented Jan. 25, 1910.

Fig. 1.

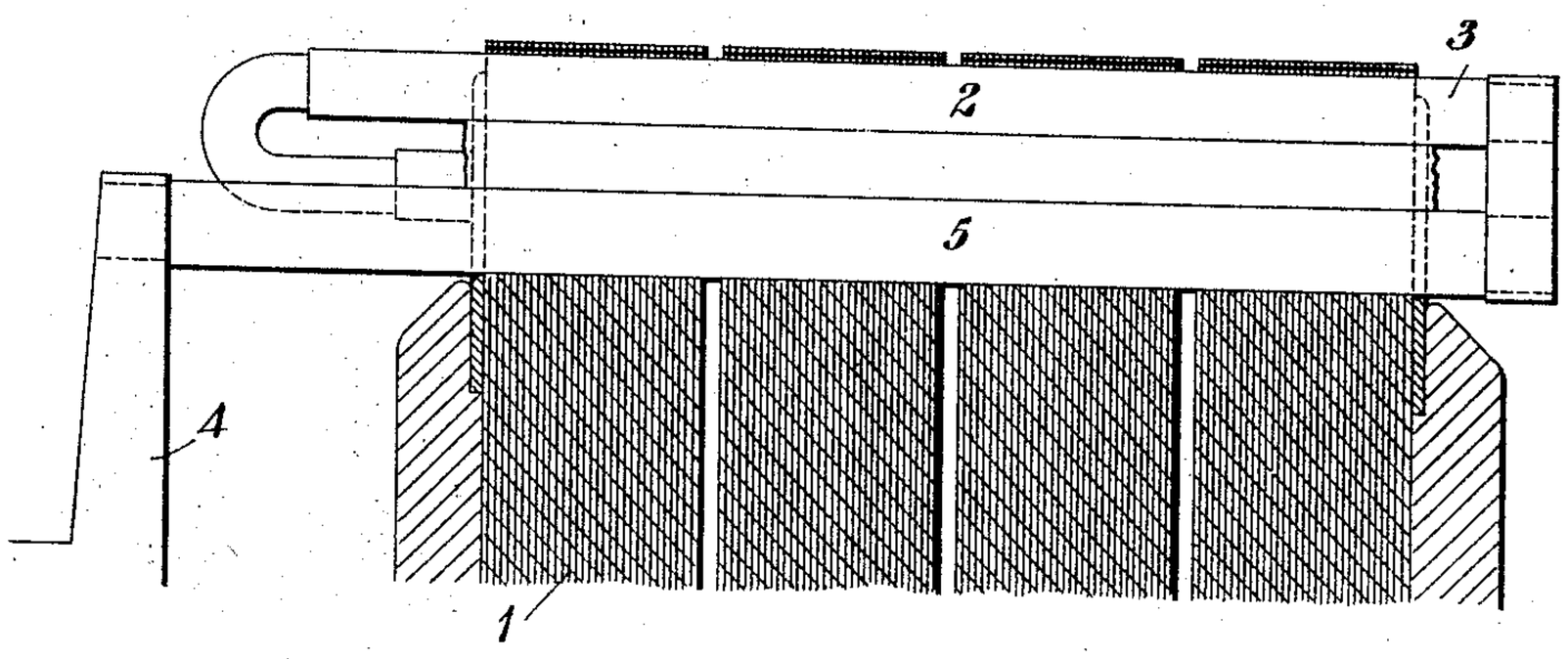


Fig. 2.

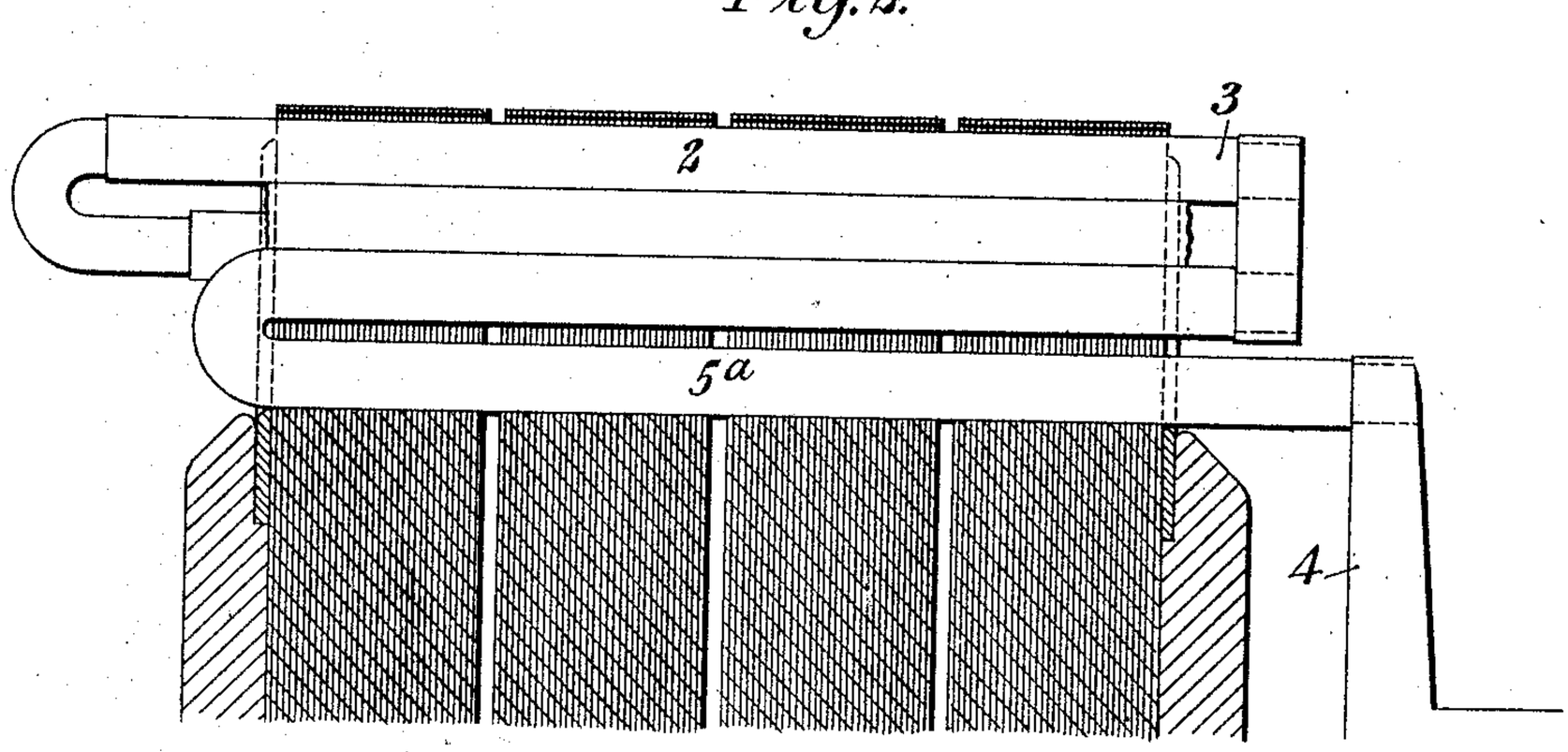
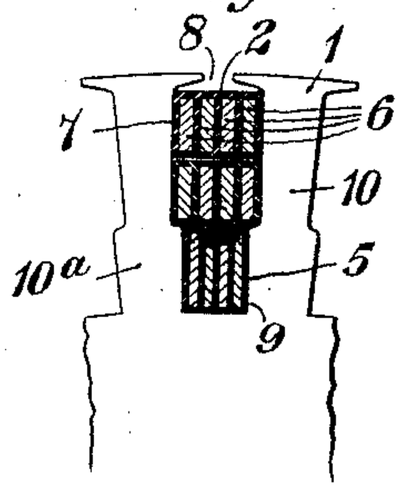


Fig. 3.



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DYNAMO-ELECTRIC MACHINE.

947,389. Specification of Letters Patent. Patented Jan. 25, 1910.

Application filed June 2, 1905. Serial No. 263,478.

To all whom it may concern:

Be it known that I, BENJAMIN G. LAMME, a citizen of the United States, and a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Dynamo-Electric Machines, of which the following is a specification.

My invention relates to dynamo-electric machines, and it has for its object to provide an improved form of core structure for such machines.

In order to prevent or reduce sparking between the commutator brushes and segments of a dynamo-electric machine, it has become a well known practice to employ high-resistance conductors between the armature coils and the commutator segments and to locate such resistance conductors either in the bottoms of the slots that contain the armature coils or in separate slots provided for that purpose. If the resistance conductors are placed in the bottoms of the slots that contain the conductors of the armature winding, additional depth must be provided to accommodate them, and if the slots are made of the same width from top to bottom, as is usually done, the cross-section of the core at the bases of the teeth that are formed by the slots may be less than is required for the most satisfactory conditions of operation. Experiments have proved that, with a given core and magnetizing winding, the amount of alternating current required to produce a certain flux density in the core is greater than the amount of direct current required for the same result, and when the core becomes saturated, or nearly so, the alternating magneto-motive force required for a certain flux density may be two or three times as great as that required if direct current were used.

Since the self-induction of an alternating current, commutator type motor depends largely upon the number of ampere turns required for magnetization, and since it is desirable to reduce the self-induction to the lowest practicable limits, it is important that the number of ampere turns required for magnetization shall be low. If the armature slots are made of the same width from top to bottom, the magnetic flux density at the bases of the teeth may be much greater than that at the free ends of the teeth and the number of ampere turns required to produce this flux density at the bases of the teeth may be a relatively large percentage of the total number of ampere turns required for the magnetization of the iron circuit. It has been found that the limiting conditions in the design of many of such motors lie in the available cross-sectional area of the iron at the bases of the armature teeth. In order to avoid reducing the cross-section of the teeth at their bases to such an amount that the magnetizing ampere turns become excessive, I propose to reduce the width of the portions of the slots in which the resistance conductors are located and to increase the depth of the slot proportionately, and also to employ resistance conductors that are flat and wide, as compared with those which are ordinarily employed and as compared with the conductors of the armature coils.

In the accompanying drawing, Figure 1 is a longitudinal, cross-sectional view of a part of an armature of a dynamo-electric machine constructed in accordance with my invention. Fig. 2 is a similar view of a modification of the machine shown in Fig. 1, and Fig. 3 is a view, partially in transverse section, through the magnetizable core of the machine shown in Fig. 1, illustrating the shape of the slots and the armature coils and resistance conductors located therein.

Referring first to Figs. 1 and 3, a magnetizable core 1 is provided with a winding 2 the terminals 3 of which are connected to commutator segments 4 by means of relatively high resistance conductors 5, the terminals 3 being located at the opposite end of the armature from the commutator segments 4. As indicated in Fig. 3, the coil 2 comprises a plurality of conductors 6 that are insulated from each other and from the magnetizable core 1 and that are located in an upper, wide portion 7 of an armature slot 8. The resistance conductors 5 are located in a deeper narrow portion 9 of the slot 8. It will be noted that the width of the base portion 10^a of each tooth 10 that is formed by adjacent slots may be the same or nearly the same as the outer portion if the slots 8 are properly formed. In order to accommodate the conductors to the shape of the slots, the resistance conductors 5 preferably are made thin and wide and the portions 9 of the slots 8 correspondingly deeper as compared with the structure which is ordinarily employed.

As shown in Fig. 2, the resistance conductor 5^a is doubled on itself and the end 3 of the coil 2 may be located at the same end of the armature as the commutator. Obviously, the arrangement of the armature coils and resistance conductors and the shape of the slots may be varied considerably from what I have specifically shown and described, and I desire that my invention be construed to include all such modifications.

I claim as my invention:

1. The combination with an armature core provided with slots the outer portions of which are wider than the inner portions, of low-resistance conductors located side by side in the outer wide portions of the core slots, and thinner flat high-resistance conductors arranged side by side across the inner narrow portions of the core slots with their larger faces substantially parallel to radii passing through the slots in which they are located.

2. The combination with an armature core provided with slots the outer portions of which are wider than the inner portions and the sides of which are substantially parallel, of low-resistance conductors located side by side in the outer portions of the core slots, and thinner flat high-resistance conductors arranged side by side across the inner narrow portions of the core slots with their wider faces parallel to the sides of the slots.

3. The combination with an armature core provided with slots having relatively narrow openings at the circumference of the armature and the outer portions of which are wider than the inner portions and the sides of which are substantially parallel, of low-resistance conductors located side by side in the outer wide portions of the core slots, and thinner flat high-resistance conductors arranged side by side across the inner narrow portions of the core slots with their wider faces parallel to the sides of the slots.

4. The combination with an armature core provided with slots the outer portions of which are wider than the inner portions and the sides of which are substantially parallel, of low-resistance conductors arranged side by side in superposed groups in the outer wide portions of the core slots, and thinner flat high-resistance conductors equal in number to those in each of said groups arranged side by side across the inner narrow portions of the core slots with their wider faces parallel to the sides of the slots.

In testimony whereof, I have hereunto subscribed my name this 31st day of May 1905.

BENJ. G. LAMME.

Witnesses:

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BIRNEY HINES.