

(No Model.)

B. G. LAMME.
COIL FOR ELECTRICAL MACHINES AND METHOD OF MAKING SAME.
No. 589,838. Patented Sept. 14, 1897.

Fig. 1.

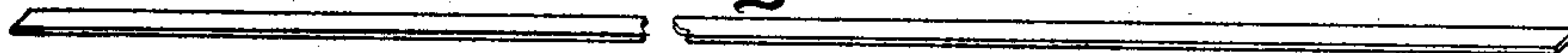


Fig. 2.

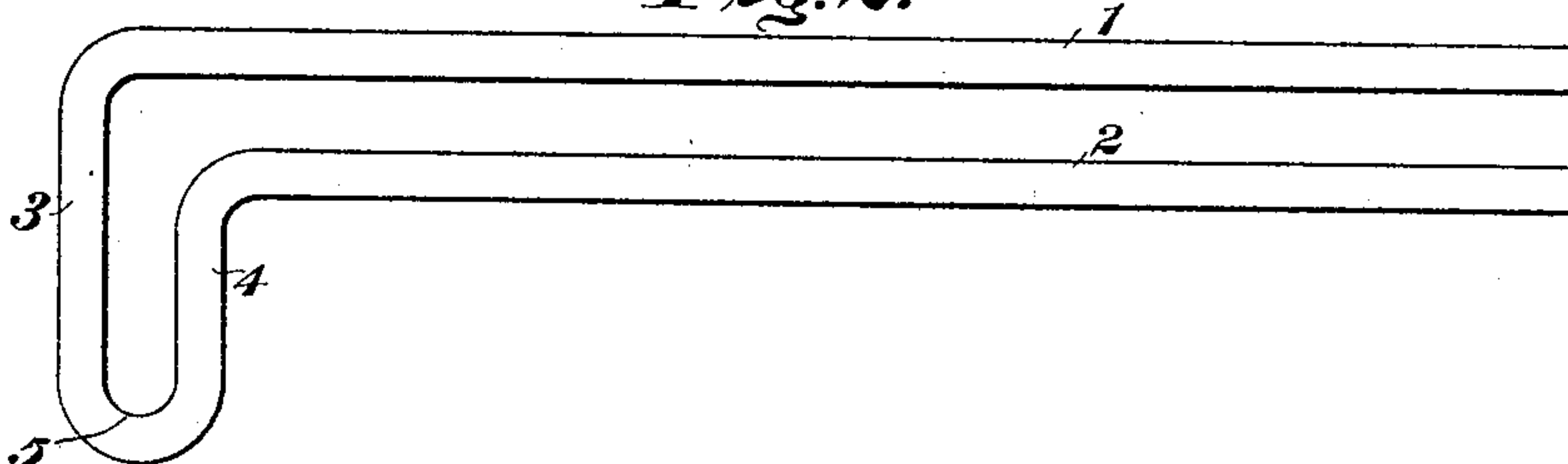


Fig. 3.

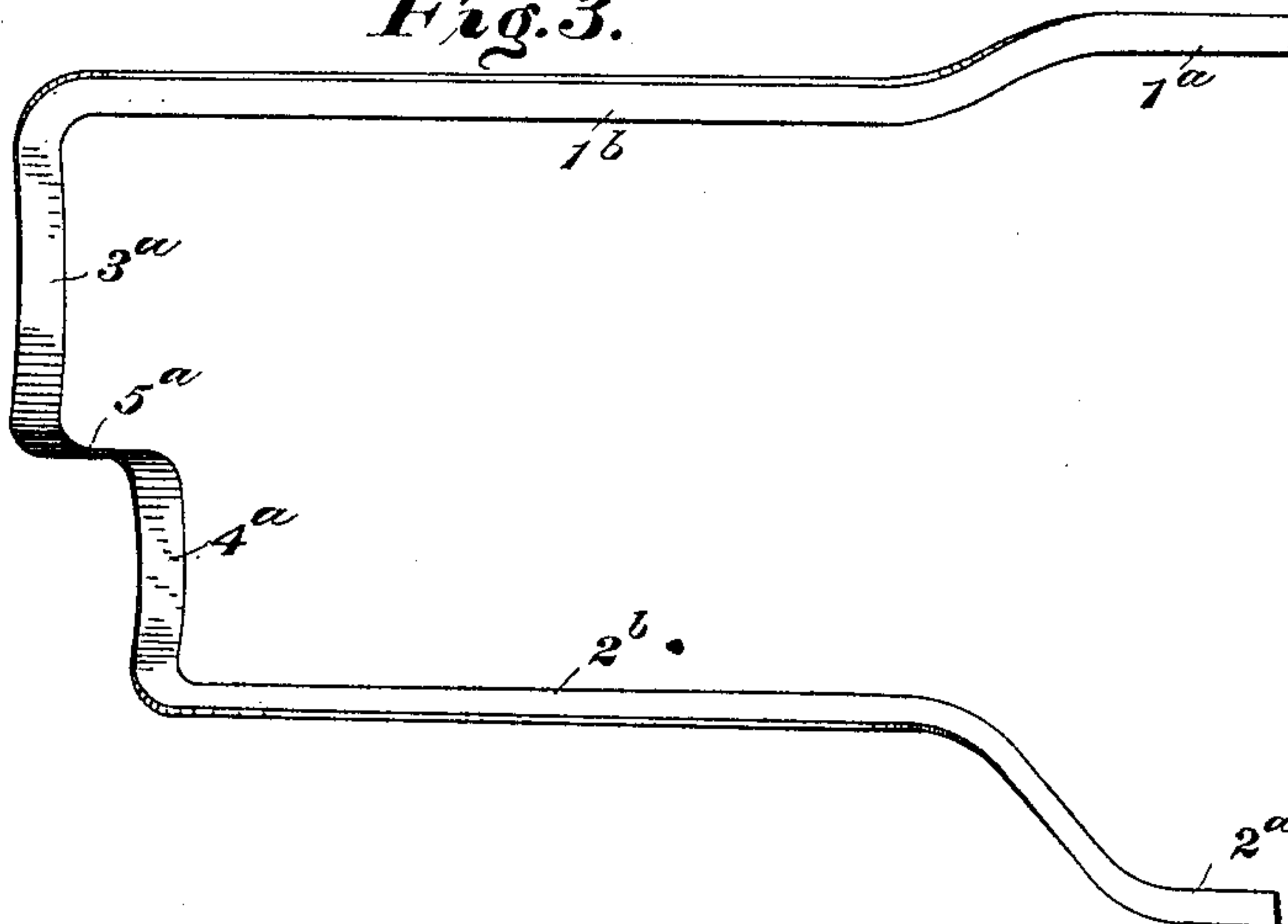
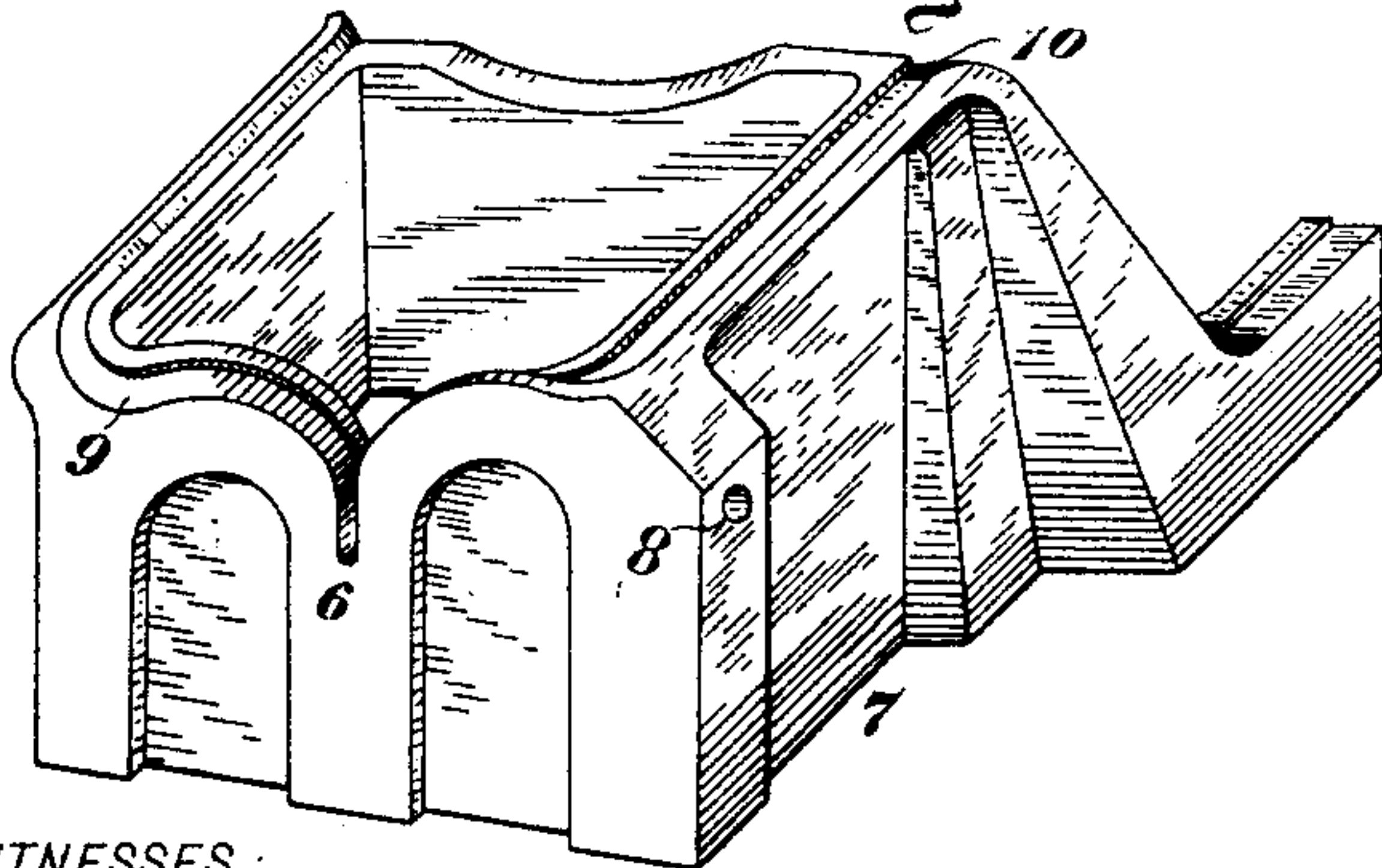


Fig. 4.



WITNESSES:

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COIL FOR ELECTRICAL MACHINES AND METHOD OF MAKING SAME.

SPECIFICATION forming part of Letters Patent No. 589,838, dated September 14, 1897.

Application filed April 17, 1897. Serial No. 632,607. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN G. LAMME, a citizen of the United States, residing in Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Coils for Electrical Machines and Methods of Making the Same, (Case No. 737,) of which the following is a specification, this application being a continuation of my application filed June 4, 1895, Serial No. 551,671.

My invention relates to electrical machines, and more particularly to the coils or conductors for the armatures of such machines.

My invention has for its object to provide a low-resistance armature-coil or conductor of simple and effective construction; and it embodies both the article of manufacture and the method by which it is constructed.

In the manufacture of armature conductors or coils it has usually been the practice to form each coil of several turns of wire, or if bar conductors were employed the end connections were formed as separate pieces and soldered or riveted, or both soldered and riveted, to the ends of the bars which extended longitudinally either upon the surface of the core or in slots cut therein.

My present invention differs from the construction and methods above indicated in that it involves the construction of a complete coil or conductor of peculiar form from a single bar or strip of metal which is uniform in dimensions and homogeneous throughout.

In the accompanying drawings, Figure 1 is a perspective view of a strip or bar of copper such as is suitable for the manufacture of my armature-coil, and Fig. 2 is a side elevation showing the form of the bar after the first step in the process of manufacture. Fig. 3 is a perspective view of a completed coil, and Fig. 4 is a perspective view of a mold or former used in forging the conductor having the form shown in Fig. 2 to the form shown in Fig. 3.

In carrying out the method which constitutes one portion of my invention I take a straight strip or bar, such as shown in Fig. 1, and by means of suitable appliances bend the

same edgewise, so as to form two straight parallel sides 1 and 2 of unequal length and two portions 3 and 4, preferably, though not necessarily, at right angles to the sides 1 and 2, joined by a curved portion 5, the whole constituting an L-shaped conductor having a loop at one end, all of the parts of which lie in the same plane, as shown in Fig. 2. This bending of the bar may be effected without the application of heat when the bars are of small or medium size, but in the manufacture of large conductors it will be found necessary to heat the bar in order to bend it into the form indicated.

The next step in the process of manufacture consists in placing the end 5 of the L-shaped conductor in the recess 6 of the mold 7 and inserting a pin in the hole 8 of the mold, this pin extending between the portions 3 and 4 adjacent to the part 5. The conductor is thus held in position and the portions 1, 2, 3, and 4 are hammered or forged into the recessed portions 9 and 10 of the mold or former 7, these recessed portions having the shape desired for the coil. It will be seen that this second step of the method involves the bending of the parts 1 3 and 2 4 away from each other in opposite directions about an axis which is parallel to the sides 1 and 2 and passes through the loop at the end of the conductor. The particular shape of mold-recess into which the coil is hammered or forged may obviously be varied somewhat from that shown in the drawings, if desired. The coil thus produced is shown in Fig. 3, its main side portions 1^b and 2^b being parallel and having opposing faces which lie in converging planes.

The end portions 1^a and 2^a are bent out of alinement with the main portions 1^b and 2^b as much as may be necessary in order to permit of soldering them to the commutator-bars without materially changing their form or position. The ends 3^a and 4^a may be curved, as shown, so that the coils will readily pass each other. The end 5 of the bent bar shown in Fig. 2 constitutes an offset 5^a in the direction of the length of the coil, as shown in Fig. 3, the two parts 3^a and 4^a being connected thereby. This coil may be insulated by the

application of insulating-tape or other suitable insulating material before application to the core, and, if desired, two, three, or more of these coils may be placed side by side with
5 a layer of insulation between the adjacent portions, and an insulating-cell placed around the compound coil thus produced.

A coil constructed in accordance with my invention has the maximum amount of copper
10 per that can be gotten into the space occupied by it. It may be completely insulated before it is applied to the armature-core. It has no joints and the dissipation of heat from the coil and core is facilitated by the edgewise
15 position of the sides of the coil with reference to the magnetic flux from the field.

I claim as my invention—

1. The method of manufacturing bar windings for armatures of electrical machines
20 which consists in forming a single flat bar of approximately uniform lateral dimensions into a loop the arms of which are approximately parallel and lie in the same plane, then bending the respective arms in opposite directions about an axis which is parallel to the
25 long portions of said arms and passes through the end of the loop.

2. The method of forming bar windings for armatures of electrical machines which consists in bending a flat bar of approximately
30 uniform lateral dimensions into a loop, each arm of the loop being approximately of an L shape, one arm being within the angle of the other, and then bending the two arms in

opposite directions about an axis passing
35 through the end of the loop.

3. An armature-winding comprising a flat bar provided with an edgewise bend to form parallel arms and with a sidewise bend to separate said parallel arms from each other, the
40 free ends of the latter being bent to bring the same into proper position for attachment to the commutator-segments.

4. An armature-winding comprising a flat bar bent into a loop having approximately
45 parallel sides, the opposing faces of which lie in converging planes and the portion uniting these sides having a middle U-shaped section the flat sides of which are in a plane which is approximately parallel to the general direction
50 of the respective sides.

5. An armature-winding comprising a flat bar bent into a loop having approximately parallel sides, the opposing faces of which lie in converging planes and the portion uniting
55 these sides being curved and embodying a middle U-shaped section the flat sides of which are in a plane which is approximately parallel to the general direction of the respective sides.
60

In testimony whereof I have hereunto subscribed my name this 15th day of April, A. D. 1897.

BENJ. G. LAMME.

Witnesses:

WESLEY G. CARR,
HUBERT C. TENER.