(No Model.) 4 Sheets—Sheet 1.

C. E. L. BROWN.

METHOD OF WINDING DYNAMO ARMATURES.

No. 441,391. Patented Nov. 25, 1890.

Fig. 1.

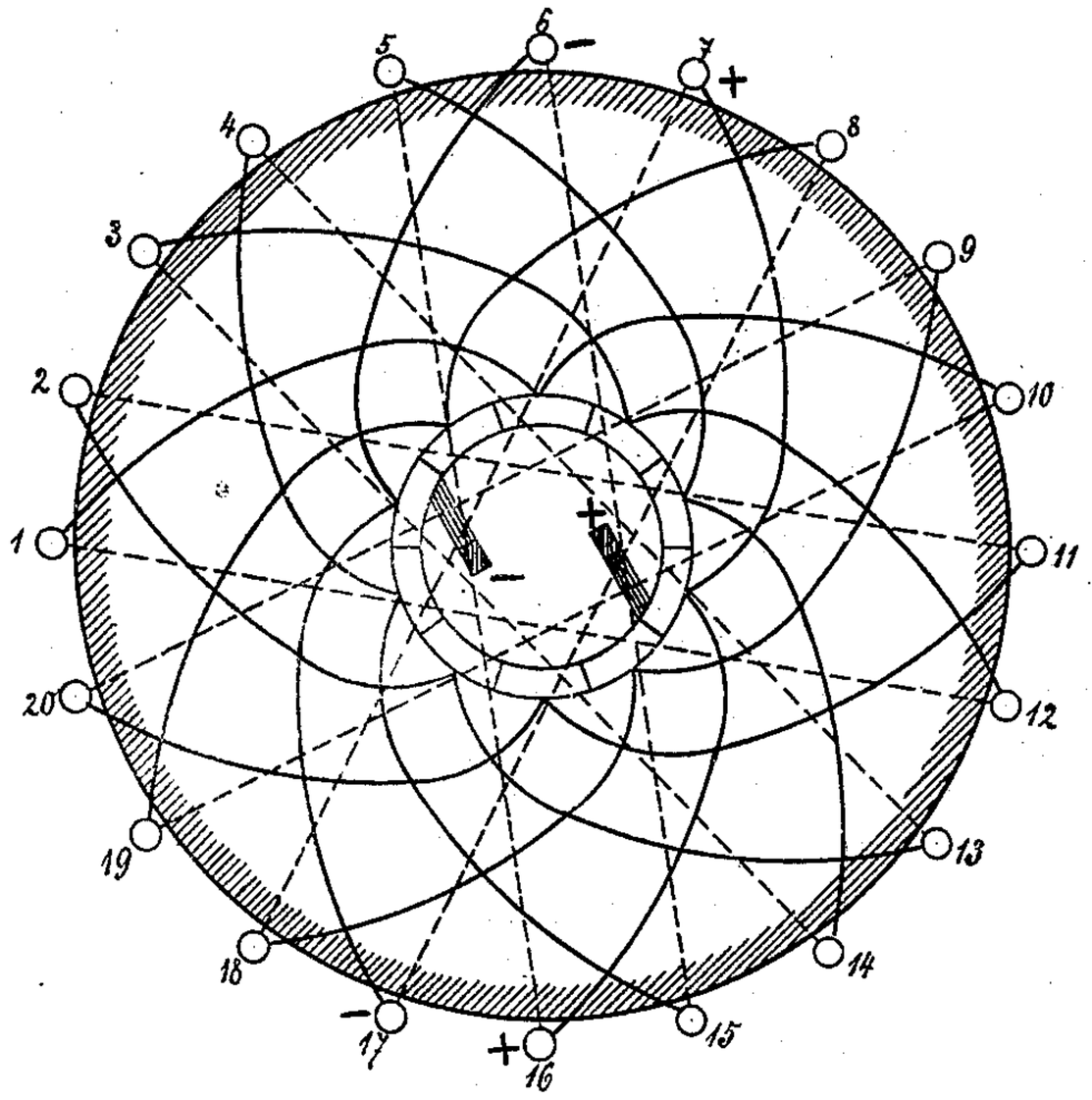

Fig: 2

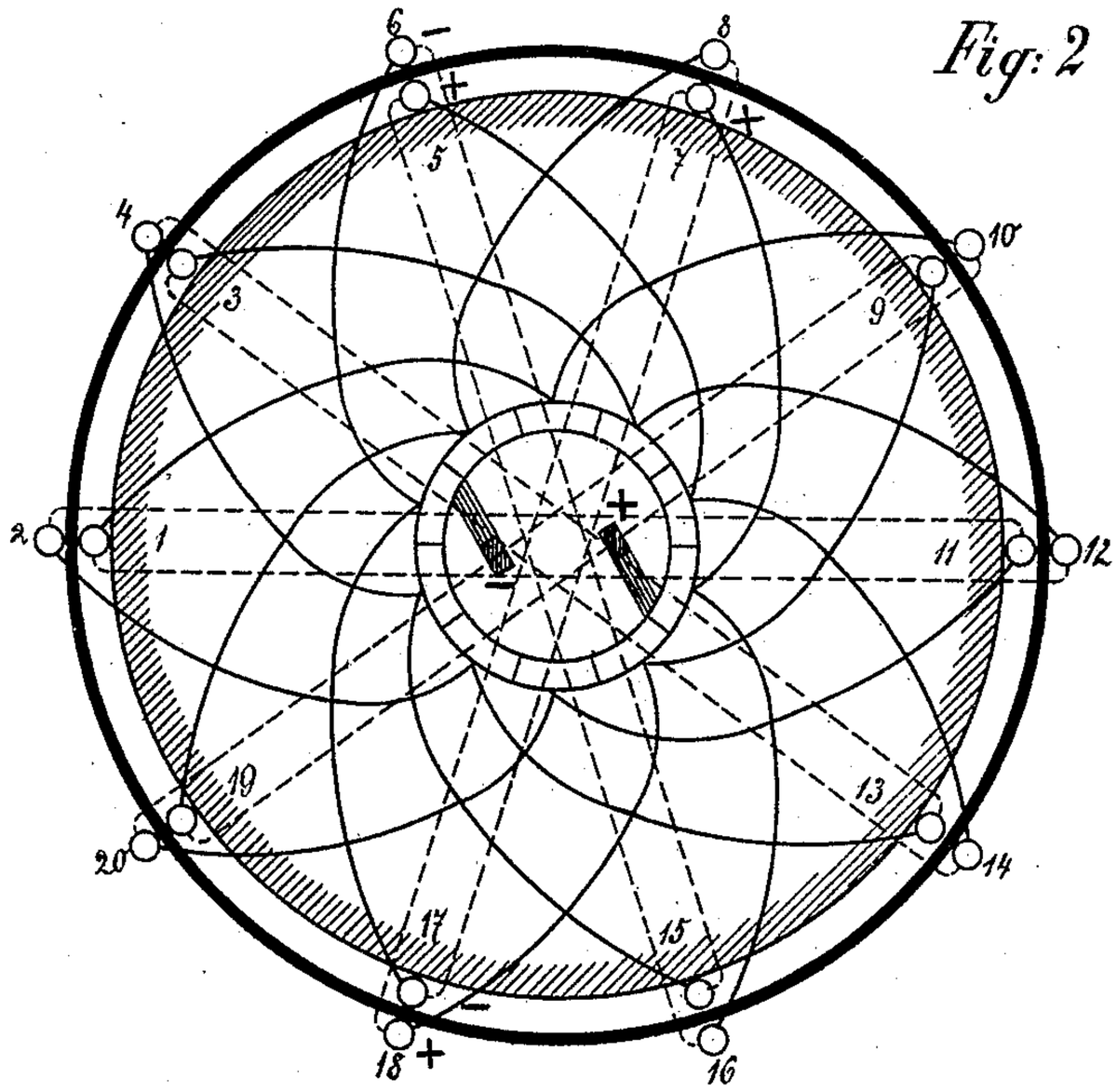

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Fig. 4

Fig. 3.

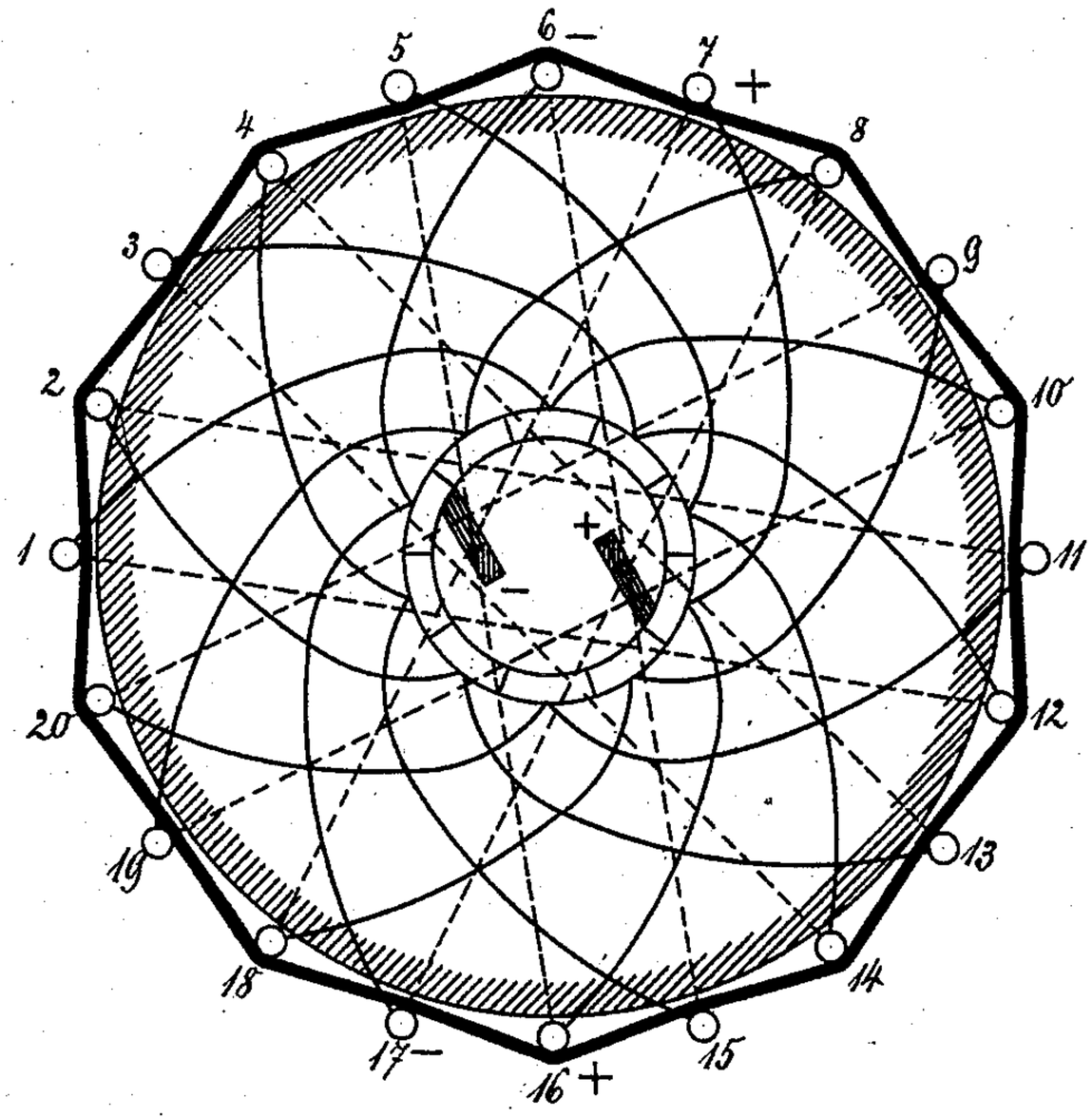

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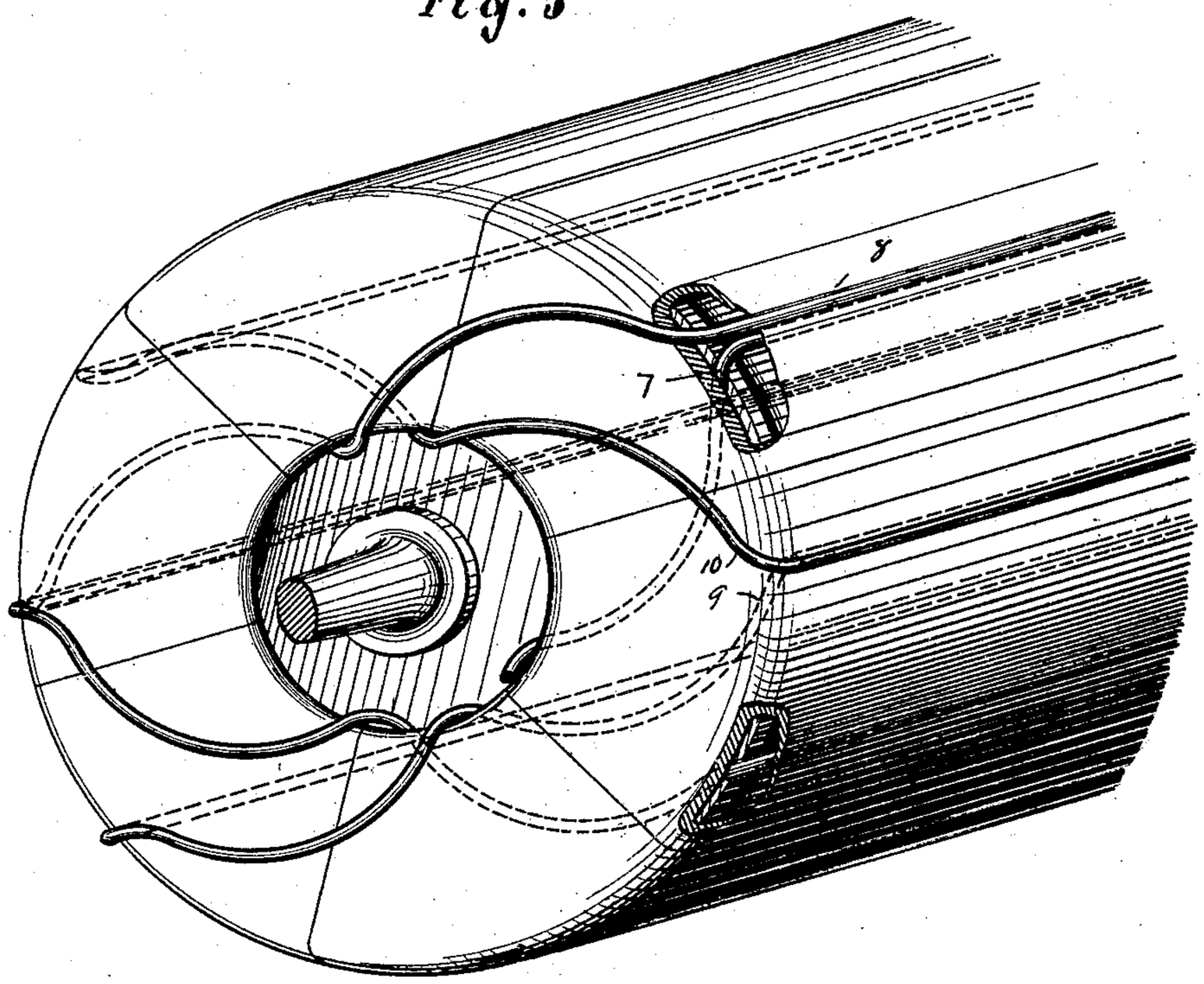
Fig. 5



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METHOD OF WINDING DYNAMO ARMATURES.

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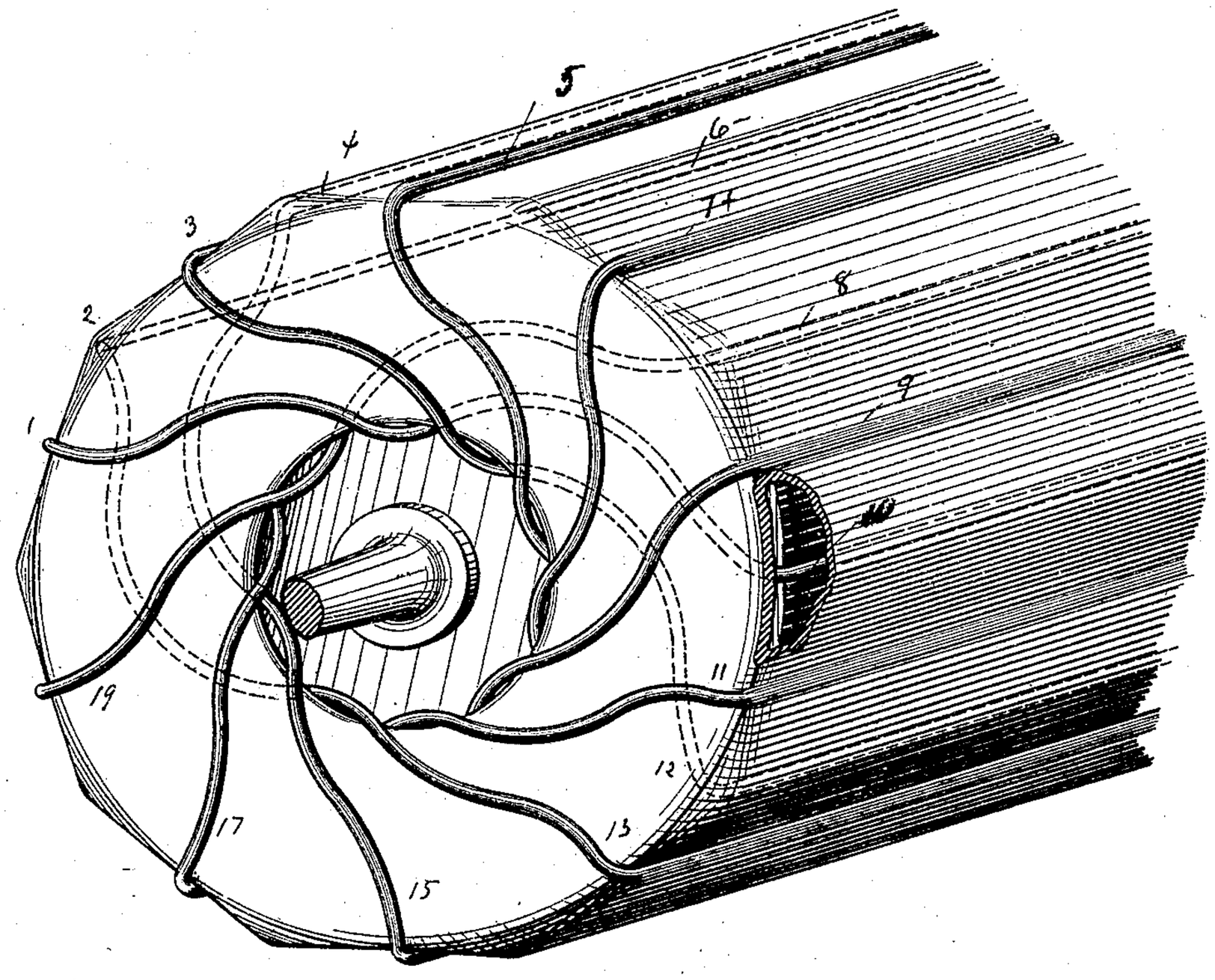
Fig. 6.



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UNITED STATES PATENT OFFICE.

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METHOD OF WINDING DYNAMO-ARMATURES.

SPECIFICATION forming part of Letters Patent No. 441,391, dated November 25, 1890.

Application filed February 5, 1890. Serial No. 339,322. (No model.)

To all whom it may concern:

Be it known that I, CHARLES EUGEN LANCELOT BROWN, a subject of the Queen of England, residing at Zurich, Unterstrass, in Switzerland, have invented a certain new and useful Method of Winding Dynamo-Armatures for Dynamo-Machines, of which the following is a specification.

There exists a great disadvantage in armatures of the drum type wound with the ordinary Siemens winding, especially when constructed to give a high tension—viz., wires which lie side by side have momentarily the full difference of potential between them which the machine can give. On this account there is great danger of the insulation giving way after a time owing to deposits of dust, particles of copper from the brushes, &c., being formed between the wires. Even when the latter are separated in the dangerous parts by thick insulation the danger is not entirely avoided, as the insulation does not form a continuous covering, but becomes bridged over in time by the above-mentioned deposits of dust, grease, &c. In order to completely avoid this disadvantage of drum-armatures, I have devised a new system of winding.

In the accompanying drawings, Figure 1 is a diagrammatical view of the ordinary drum-winding. Fig. 2 is a diagrammatical view of my improved armature-winding. Fig. 3 is a diagrammatical view showing a modification of the method of winding. Fig. 4 is a detail sectional view showing the method of applying the upper wire layers of the same. Fig. 5 is an end perspective view of the armature shown in section in Fig. 2, parts being broken out and others in section; and Fig. 6 is an end perspective view of the armature shown in section in Fig. 3, parts being broken out and others in section.

Similar figures of reference indicate corresponding parts.

The wires are numbered at the periphery 1 to 20 consecutively, the position of the brushes being, for example, indicated in the drawings. A simple inspection will show that between the wires 6 and 7 and 16 and 17, the same difference of potential exists as between the two brushes—*i. e.*, the maximum—while between the wires 5 and 7, 6 and 8, 15 and 17, or 16 and 18 the tension corresponds to that existing between two neighboring sections of the collector. While, then, between two wires bearing consecutive numbers the tension attains a maximum twice in each revolution of the armature, the tension between any two neighboring wires which bear even numbers, or two which bear odd numbers, is never higher than that which exists between two consecutive collector-bars. On the other hand, according to the system I have invented, an armature, as shown in Fig. 2 diagrammatically and in Fig. 5 in perspective, is wound in the following manner: I put in place first all the wires carrying, say, uneven numbers, taking care that the total number of the wires and the circumference of the drum may have such a relation to one another that the wires entirely cover the exterior cylindrical surface of the drum. I afterward cover this first layer with a continuous sheet of insulation, which extends over the whole surface, including the ends or side faces of the drum, as shown in Figs. 2 and 5, of a thickness corresponding to the tension of the machine. Above this I put the second layer of the winding—viz., the wires bearing even numbers. I obtain in this manner a drum wound with two layers of wire with the peculiarity that between two neighboring wires of one and the same layer there exists only a very small tension, while the two layers are insulated from one another as thickly as may be desired. In addition to this the insulation wound round upon the first layer of wires serves at the same time to bind them together and permits the final bandages outside the complete armature to be considerably weaker.

At first glance it may seem an objection that an armature wound as above described must always possess two layers of wire. Armatures of high-tension machines, however, even when wound with ordinary winding, generally possess two layers of wire, and when my system is used the wires may have such a cross-section or be connected parallel in such a way that a reduced height of the winding may be obtained, although two layers are used. In special cases where two layers cannot be employed I may modify my method of winding as follows: I wind the first layer of wire in such a way as to leave between two consecutive wires a space corresponding to the

size of the wire, together with twice the thickness of the required insulation. Above this first layer I place the insulating-covering in a loose manner, and afterward put in place the second layer of wires, pressing them down on the insulation in the space left between the wires of the first layer. In the method of winding (schematically shown in Fig. 3 and perspective in Fig. 6) the wires are drawn as if being farther apart from one another than they really are, while the manner of inserting the upper wire layers is represented by Fig. 4.

It will easily be seen that the whole winding of the armature is divided into two distinct parts by a continuous layer of insulation, which separates the wires between which a high tension exists for the whole of their length from one another. This continuity of the insulating-layer constitutes the principal part in my improvement, for it is precisely this continuity of the insulation which prevents an accumulation of copper dust, grease, &c., setting up communication between wires belonging to two different parts of the winding.

It is evident that this method of winding is applicable not only to two-pole machines, but to machines with any number of poles and to a drum-winding in series or parallel.

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

The method of winding dynamo-armatures, consisting in winding one layer of wires upon the drum, placing a suitable continuous insulation upon said layer of wires, and then winding a second layer of wires upon the insulation, substantially as set forth.

In testimony whereof I hereunto sign my name, in the presence of two subscribing witnesses, this 15th day of January, 1890.

CHARLES EUGEN LANCELOT BROWN.

Witnesses:

EMIL BLUM,

H. LABHART.