(No Model.) 3 Sheets—Sheet 1.

W. B. SAYERS.

CONSTRUCTION OF ARMATURES FOR DYNAMO ELECTRIC MACHINES.

No. 543,895. Patented Aug. 6, 1895.

Fig. 2.

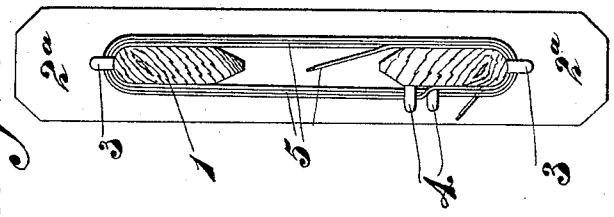


Fig. 1.

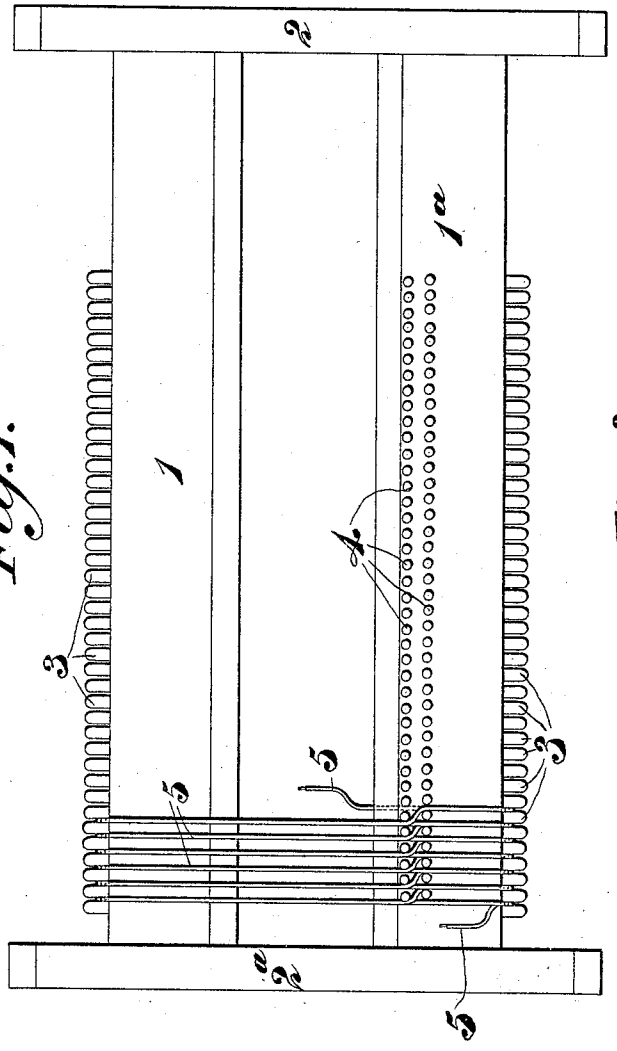


Fig. 3.

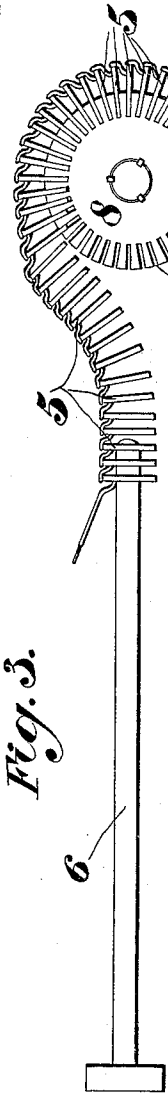
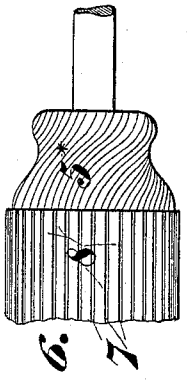


Fig. 6.



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(No Model.) 3 Sheets—Sheet 2.

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CONSTRUCTION OF ARMATURES FOR DYNAMO ELECTRIC MACHINES.

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Fig. 5.

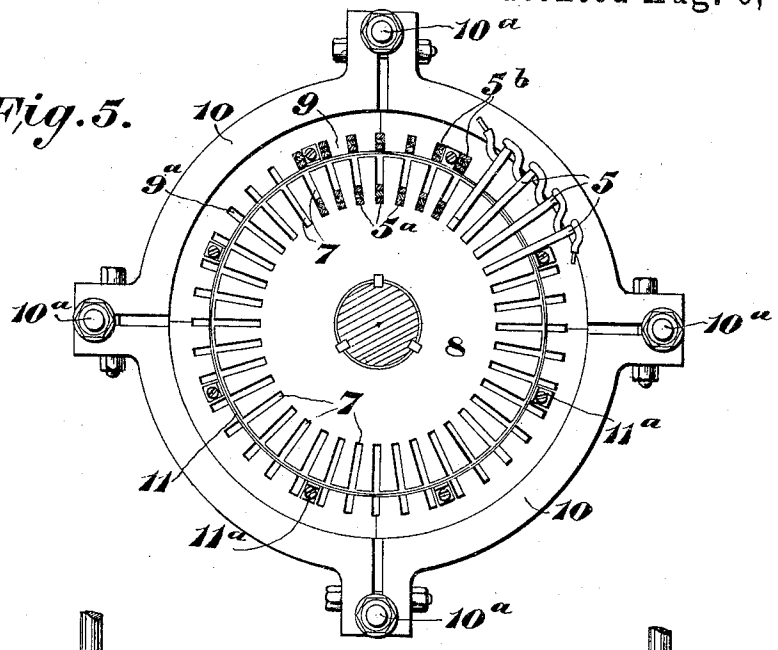


Fig. 5.a

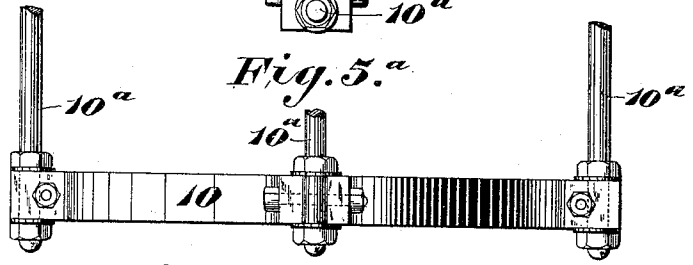


Fig. 4.

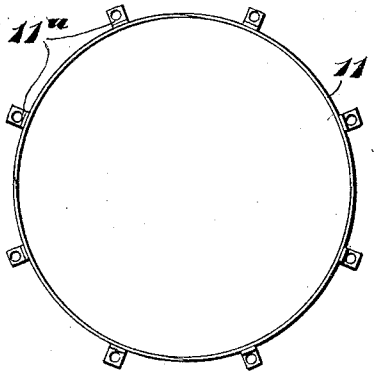
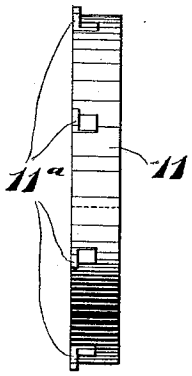


Fig. 4.a



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(No Model.) 3 Sheets—Sheet 3.

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CONSTRUCTION OF ARMATURES FOR DYNAMO ELECTRIC MACHINES.

No. 543,895. Patented Aug. 6, 1895.

Fig. 7.

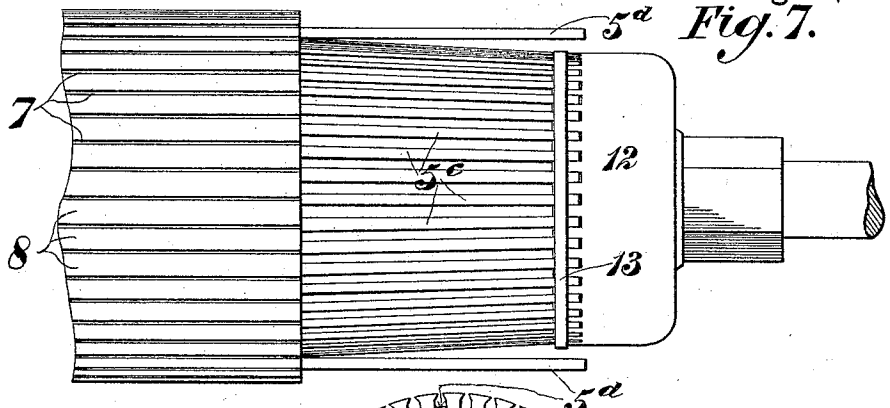


Fig. 8.

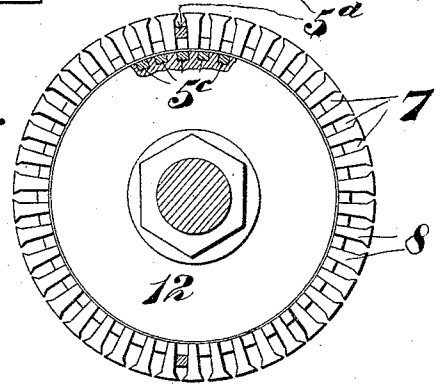


Fig. 9.

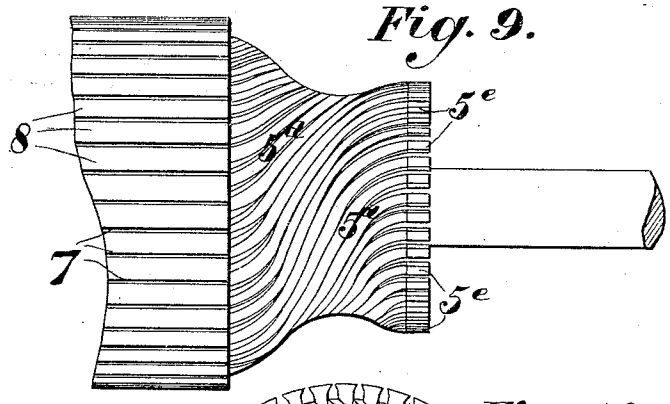
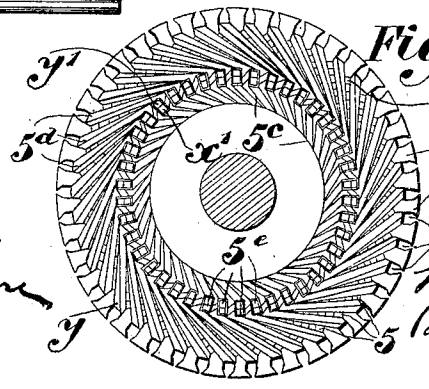


Fig. 10.



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UNITED STATES PATENT OFFICE.

WILLIAM BROOKS SAYERS, OF BEARSDEN, SCOTLAND.

CONSTRUCTION OF ARMATURES FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 543,895, dated August 6, 1895.

Application filed August 16, 1894. Serial No. 520,495. (No model.) Patented in England May 20, 1893, No. 10,134.

To all whom it may concern:

Be it known that I, WILLIAM BROOKS SAYERS, a subject of the Queen of Great Britain and Ireland, residing at Bearsden, near Glasgow, in the county of Dumbarton, Scotland, have invented Improvements in the Construction of Armatures for Dynamo-Electric Machines, (for which a British patent has been obtained, dated May 20, 1893, No. 10,134,) of which the following is a specification.

This invention has for its object to facilitate, cheapen, and improve the construction of drum-armatures for dynamo-electric machines, both generators and motors, and also to enable the several sections or coils (hereinafter called "coils") constituting the winding thereof to be made of equal length and resistance. For this purpose the several coils which constitute the armature-winding, and which are preferably made of equal length and resistance, are wound in the form of long loops arranged around the armature-core, within or upon which one side of each of them is secured. A suitable clamp or holding device is then applied to the other side of each coil, and the armature-core, with the portions of the coils secured thereto, is then rotated relatively to the portions of the coils held by the holding device until these portions of the coils are brought opposite to the required portions of the armature-core, to or within which they are then secured in any suitable manner.

In the accompanying illustrative drawings, Figures 1 and 2 show, respectively, in side elevation and in cross-section a core upon which the insulated conductor to form the armature-winding can be wound in the form of long loops or coils of equal length and resistance, some of such coils being shown in position on the said core. Fig. 3 is an end elevation showing the mode of applying the armature-winding, consisting in the example shown of forty coils to a longitudinally-slotted armature-core. Figs. 4 and 4ª are end and side views, respectively, of a separating device hereinafter referred to. Fig. 5 is an end view, partly in cross-section, showing the armature-core with some of the armature-coils and with a clamp or holding device for portions of said coils. Fig. 5ª is a plan of one of the clamping-rings and its attached parts, hereinafter referred to. Fig. 6 is a side elevation showing one of the ends of the finished armature. Figs. 7 and 8 are side and sectional end elevations, respectively, showing a modified way of carrying out the invention. Figs. 9 and 10 are side and end elevations showing the appearance of the end portions of the armature-conductors when bent according to such modified way of carrying out the invention.

The core shown in Figs. 1 and 2 consists of two bars 1 1ª, connected by detachable end pieces 2 2ª and provided with corresponding guide-pins 3 arranged at short distances apart, corresponding to the width of the required armature-coils, the bar 1ª being provided with additional and detachable pairs of guide-pins 4. The insulated conductor to form the armature-winding is wound a desired number of times around the bars 1 1ª between two opposite pairs of the guide pins 3 to form an armature-coil 5, and is then passed between the next forward pair of guide-pins 4 and similarly wound around the bars 1 1ª between the next adjacent pairs of guide-pins 3 to form the next coil, these operations being repeated until the whole of the conductor has in this way been converted into the desired number of long loops or coils, each of which has parallel sides, as shown in end view in Fig. 2. The end pieces 2 2ª and the guide-pins 4 are then detached from the bars 1 1ª and these bars are moved toward each other and withdrawn from the coils. The coils, for convenience, may then be threaded upon a bar 6, from which they are transferred to the longitudinal slots 7 in the armature-core 8 in the manner shown in Fig. 3, so that one of the long sides—say 5ª—of each coil is located within one of the said slots, Fig. 5, within which it may be fixed in any convenient manner. The other long sides—viz., 5ᵇ—of the coils which are left outside the armature-core, as are also the curved ends of the coils, are then engaged by a clamp or holding device that may conveniently consist of two white-metal rings 9 formed internally with longitudinal slots 9ª to receive the said sides 5ᵇ of the coils near their ends, as shown in cross-section in Fig. 5, and each made in segments that are held together by segmental clamping-rings 10, located one at each end of the armature-core 8, and separated by dis-

tance-roads 10^a, as shown in Fig. 5^a. 11, Figs. 4 and 4^a, is a cylindrical shell or layer of suitable sheet material that may advantageously be placed between the slotted exterior of the armature-core and the slotted interior of the rings 9 for the purpose of separating the two sets of side portions 5^a 5^b of the coils held by these parts and permit of the one set being moved relatively to the other without liability of the one becoming engaged with the other or with the edges of the slots in the armature-core. In the example shown the shell 11 is of sheet metal provided with extensions 11^a that are provided with holes for screws for attachment to the rings 9, whereby the said shell is held in place. When the two sides 5^a 5^b of each coil have been engaged with the core and holding device, respectively, the core is partly rotated relatively to the holding device until the sides 5^b of the coils held by such device are brought opposite the required slots in the said core, in which they are then inserted and secured in any convenient manner. In this way the curved end portions 5^x of the loops or coils 5, which project beyond the ends of the armature-core, will be caused to arrange themselves in a symmetrical manner at the ends of the said core, as shown in Fig. 6, and thereby present a more finished appearance than the corresponding portions of armature-coils wound in the ordinary way. When the armature is constructed with more than one layer of coils or one layer of groups of coils, each layer may be applied in the manner described.

According to the modified way of carrying out the invention shown in Figs. 7 to 10, inclusive, the coils constituting the armature-winding are composed of a number of lengths of conductor that are secured within or upon the armature-core in the required positions, with their end portions projecting beyond the ends of the armature-core, as shown in side and sectional end elevations, respectively, in Figs. 7 and 8. Some of the end portions—say 5^c—of the conductors projecting from one end of the armature-core are then placed in a suitable holding device—such, for example, as the externally-slotted sleeve 12—in which they are held by a band 13, and the armature-core is partly rotated relatively to said device, so as to bend these end portions 5^c in a direction toward the projecting end portions 5^d of the conductors to which they are required to be connected at the same end of the armature, and which end portions 5^d are then bent in a similar manner toward those first bent, as shown in side and end elevation in Figs. 9 and 10, respectively, after which the adjacent ends 5^e of the said bent end portions 5^c 5^d of the conductors are united together in pairs—it may be by soldering—in order to electrically connect the conductors at one end of the armature in the required manner. In this way each of the end portions 5^c of the conductors is, in the example shown, bent through an angle of about ninety degrees toward the diametrically-opposite portion 5^d to which it is to be connected, so that if $x\,x'$ be one of the end portions and $y\,y'$ the other their free ends will come together at $x'\,y'$, where they are united. The end portions of the conductors projecting from the other end of the armature-core are then treated in a similar manner, thereby converting the said conductors into coils, and the coils so formed into a series of coils in the required manner to constitute a drum-winding, the end portions of which are arranged in a symmetrical and uniform manner at the ends of the armature-core, those at one end being connected to the strips of the commutator in any known or required manner, as well understood.

What I claim is—

1. The method of winding armatures for dynamo-electric machines which consists in fixing portions of the armature winding to the armature core, engaging other portions of the winding by a holding device, rotating the armature core with the portions of winding secured thereto, relatively to the holding device so as to cause portions of the winding at one or at each end of the core to become bent to the required extent in a symmetrical manner about the axis of the armature, and then securing said end portions in place, as set forth.

2. The herein described method of winding armatures for dynamo electric machines, which consists in winding the armature conductor into the form of long loops or coils, arranging said coils around the armature core and securing one side of each of them thereto, engaging the other side of said coils in a holding device, rotating the armature core with the portions of the coils secured thereto relatively to said holding device until the portions of the coils held by the latter are brought opposite to the required parts of the armature core, and securing such portions of coils in place, in or on said core, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM BROOKS SAYERS.

Witnesses:

CHAS. F. P. FRASER,

P. F. W. EDINGTON.