

(No Model.)

R. EICKEMEYER.

WINDING FOR DRUM ARMATURES IN DYNAMO MACHINES.

No. 525,697.

Patented Sept. 11, 1894.

Fig. 1.

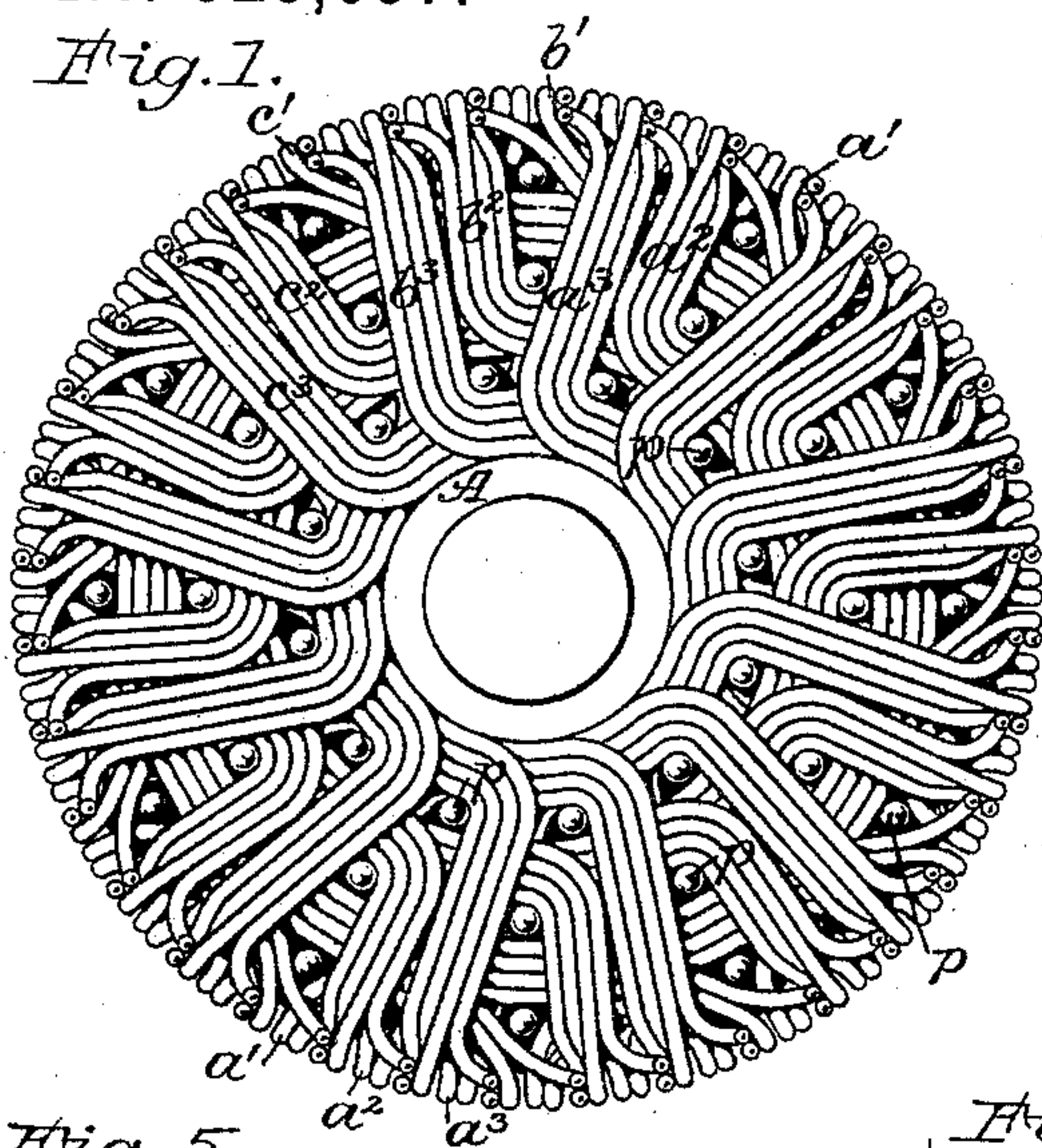


Fig. 2.

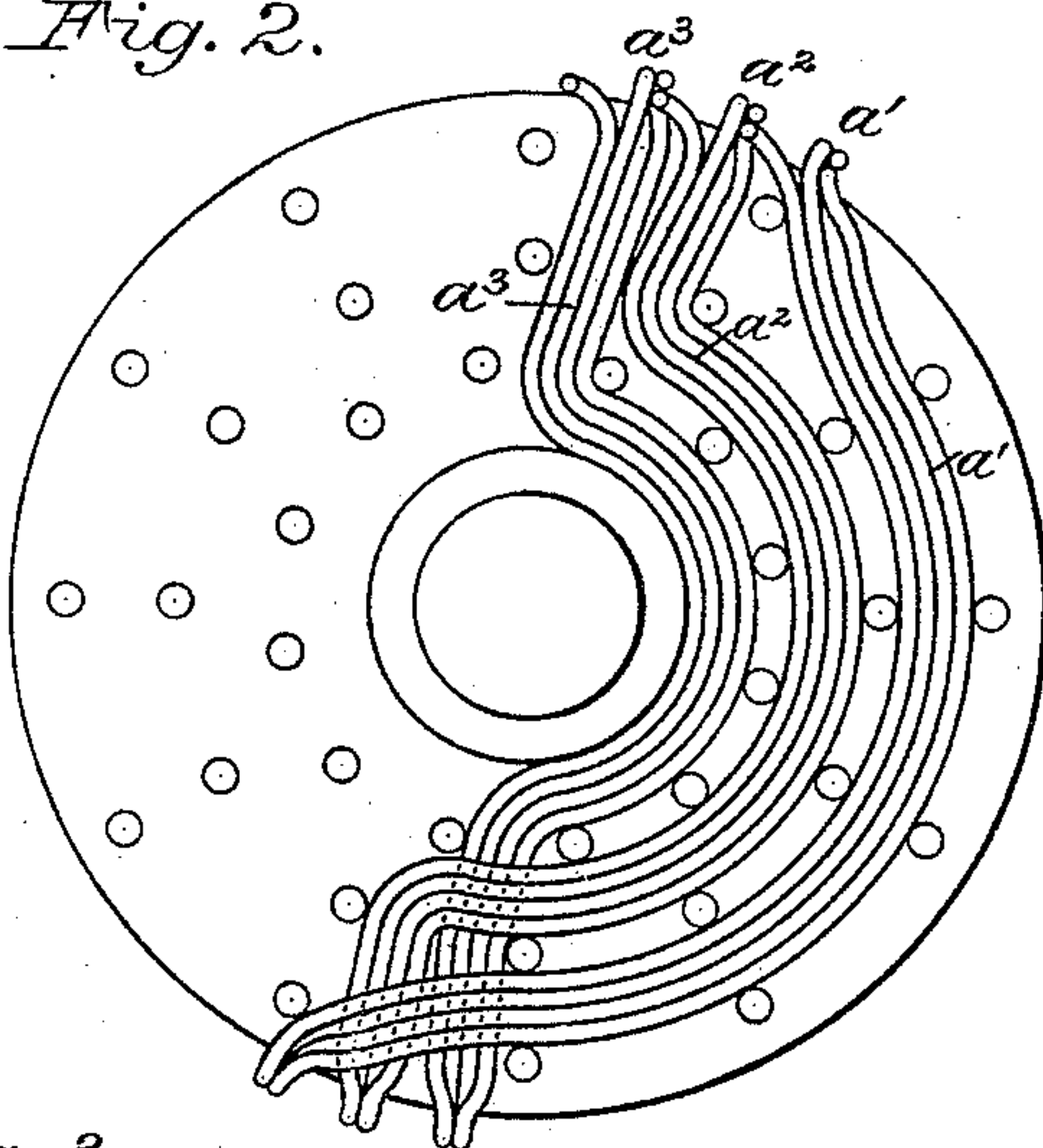


Fig. 5.

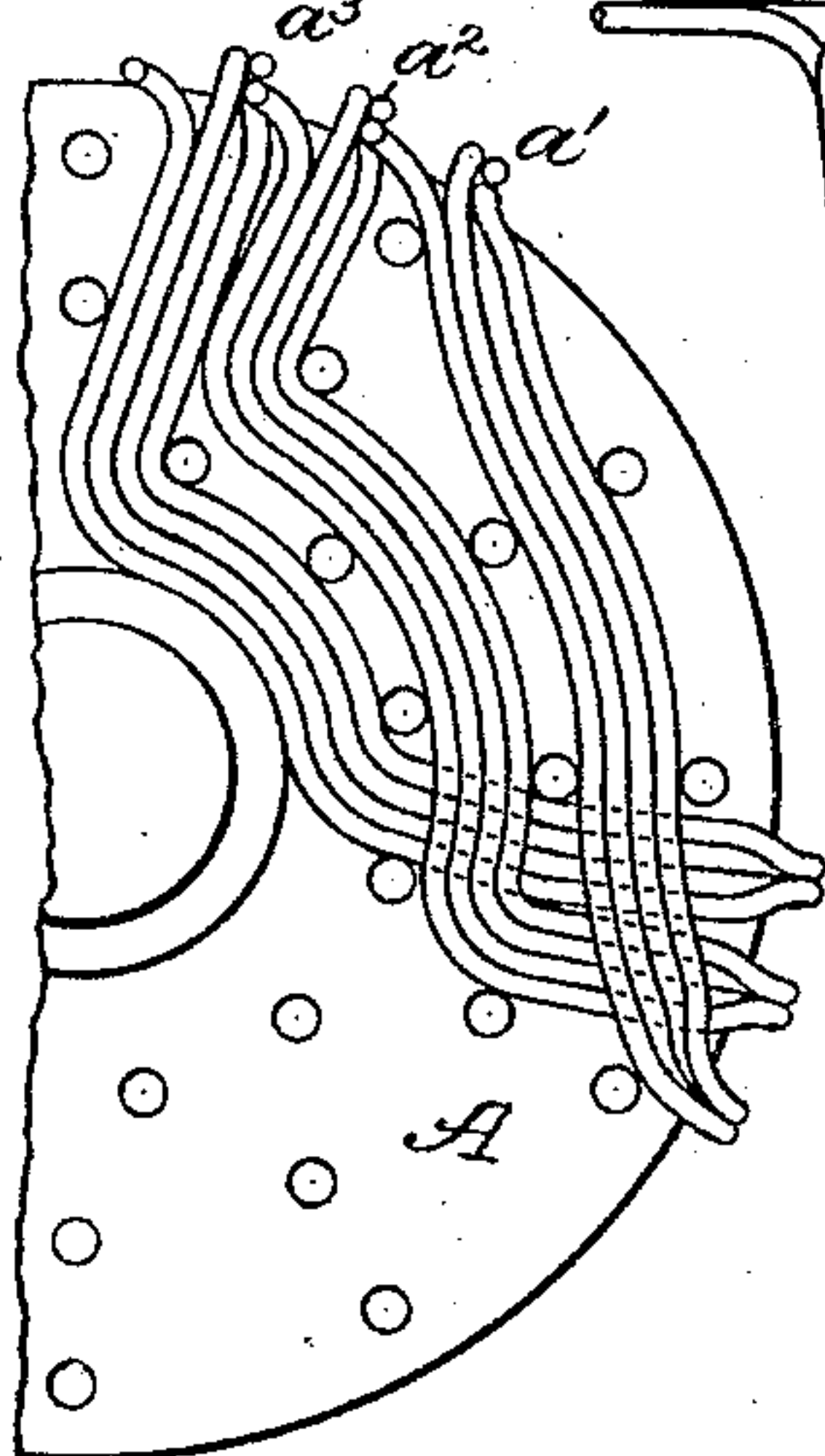


Fig. 3.

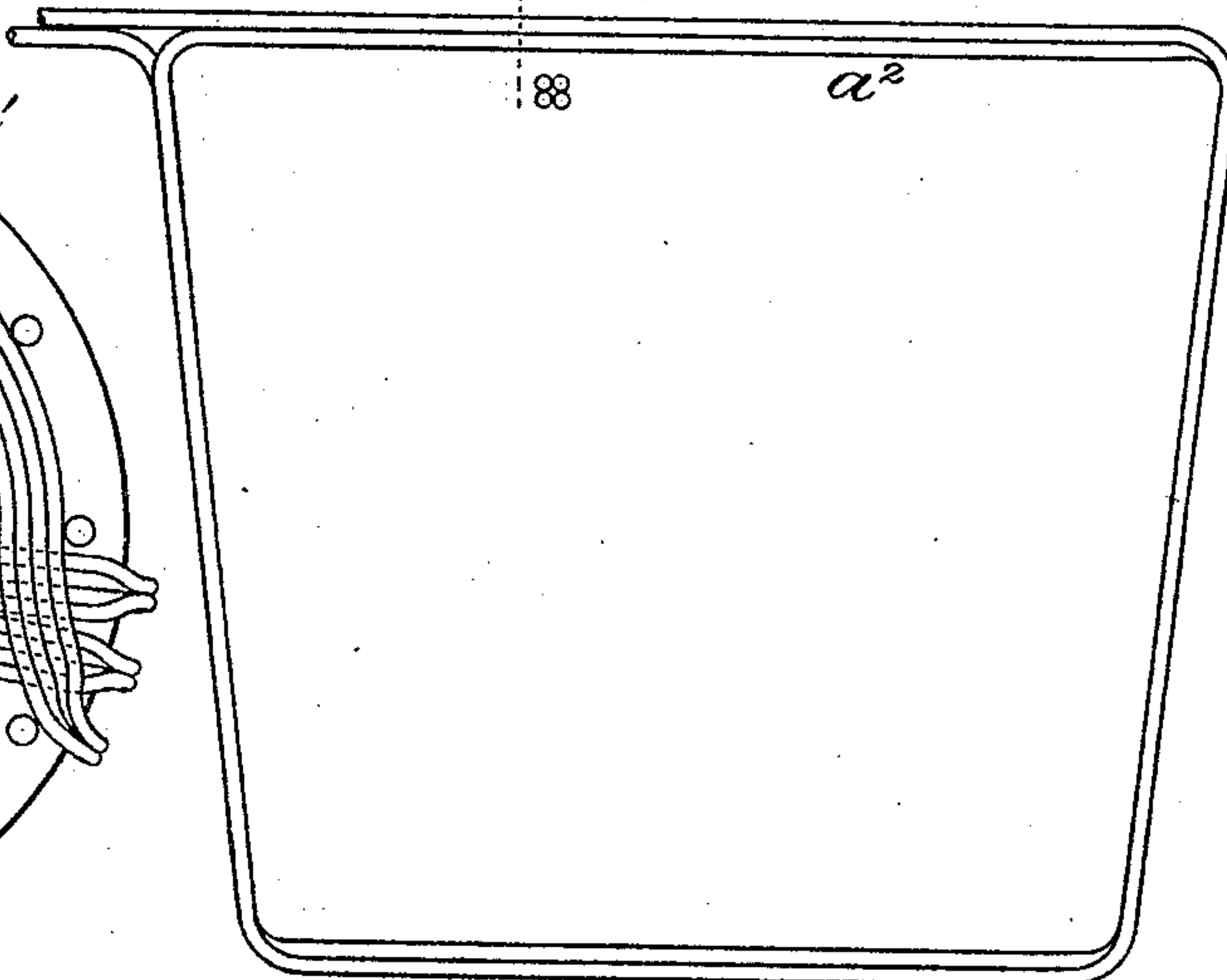


Fig. 4.

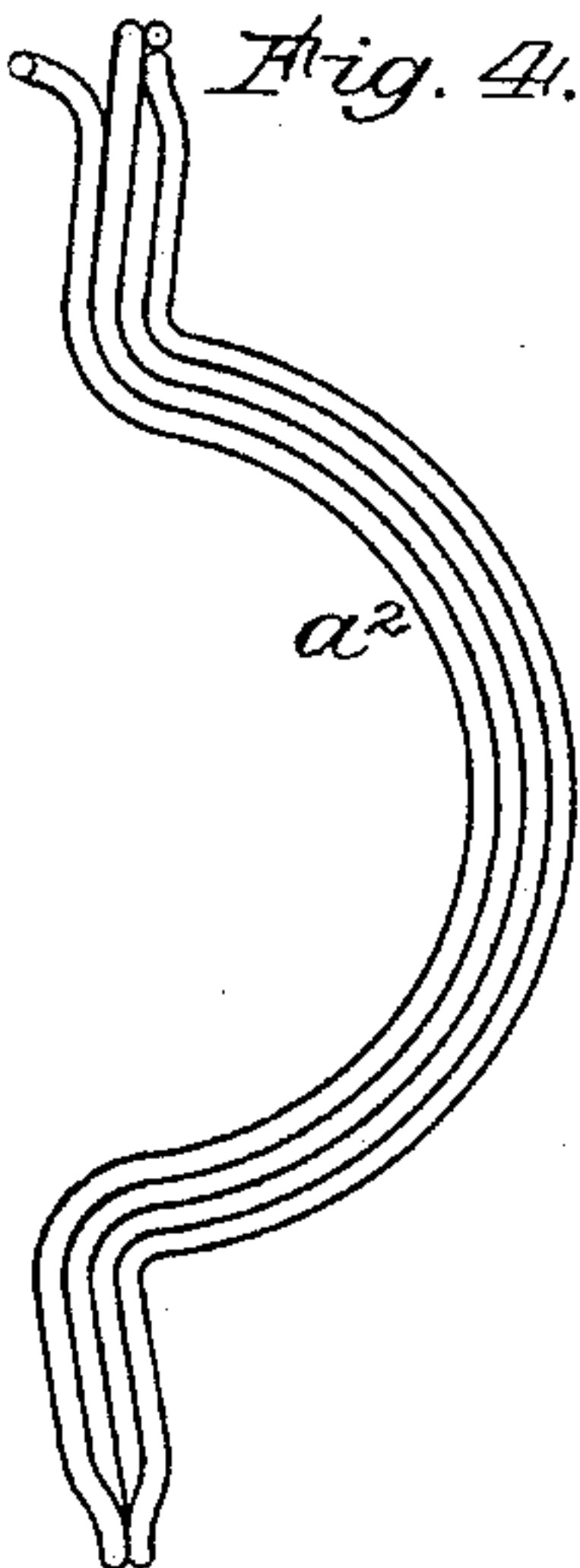
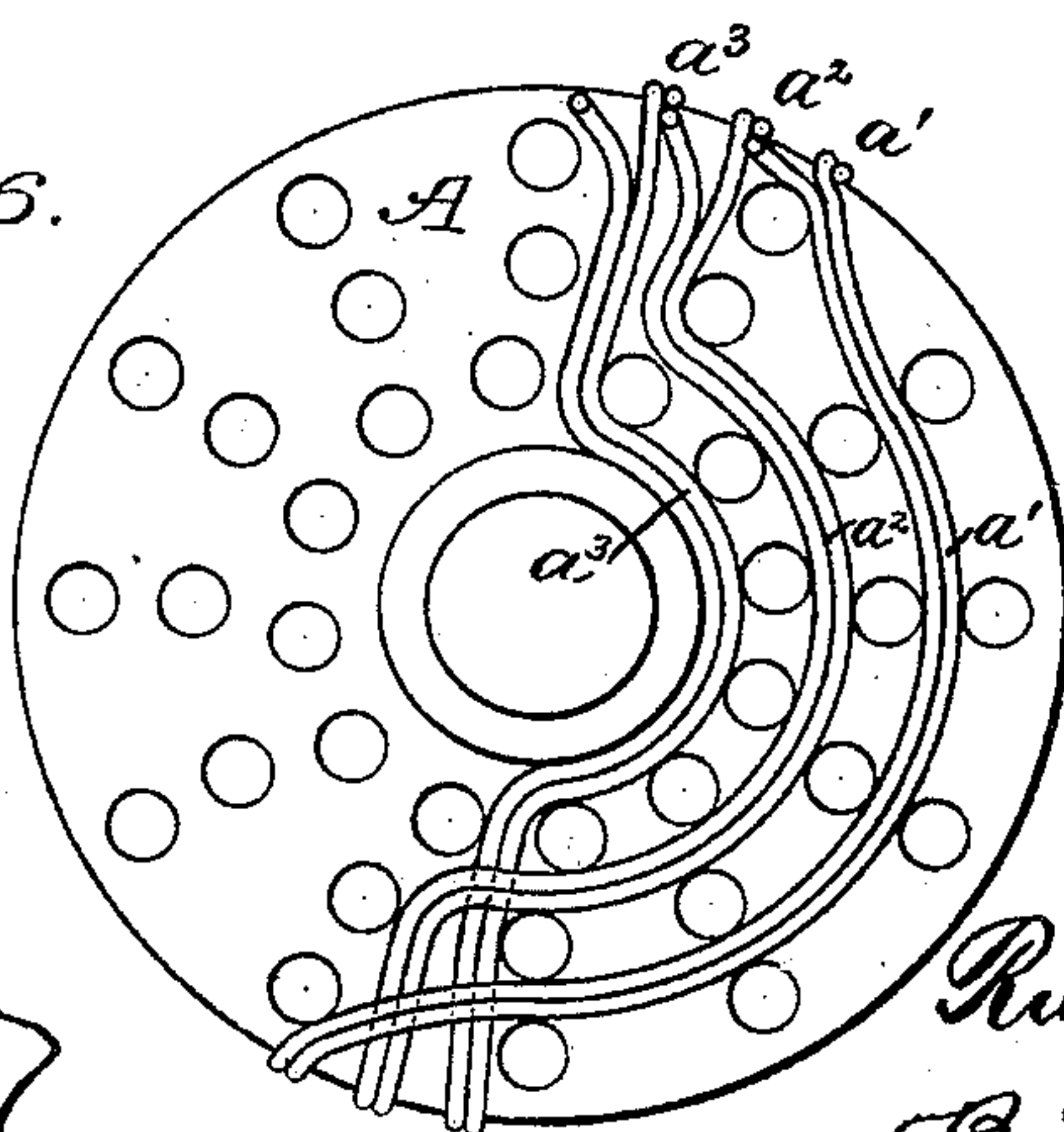


Fig. 6.



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UNITED STATES PATENT OFFICE.

RUDOLF EICKEMEYER, OF YONKERS, NEW YORK.

WINDING FOR DRUM-ARMATURES IN DYNAMO-MACHINES.

SPECIFICATION forming part of Letters Patent No. 525,697, dated September 11, 1894.

Application filed March 9, 1892. Serial No. 424,290. (No model.)

To all whom it may concern:

Be it known that I, RUDOLF EICKEMEYER, of Yonkers, in the county of Westchester and State of New York, have invented a new and useful Improvement in Windings for Drum-Armatures in Dynamo-Machines, of which the following is a specification.

The invention relates to a cylindrical armature wound with wire, and has especial reference to an armature in which the periphery is covered with several thicknesses of wire, although the most important details of construction within and forming essential and controlling parts of the invention are applicable to an armature in which the covering upon the periphery consists of a single thickness of wire.

The invention consists in covering the armature drum with a wire winding in divisions, each of which is made up of a group of two or more individual members or coils, each having a long side and a short side lying along the periphery of the drum in two or more layers, and inclined ends lying across the heads of said drum in flattened webs of a single thickness of wire, said long and said short sides of the individual coils in each division or group being separated on the periphery of said drum by spaces which receive respectively the short and long sides of other similar individual coils belonging to other similar groups, and said long sides in each group being arranged on the periphery of the drum in the reverse order of the short sides of the same group.

The invention consists, further, as stated above, in details of construction which are hereinafter fully set forth.

In the drawings: Figure 1, illustrates in end view a bipolar drum armature provided with my novel winding, each coil having four turns or convolutions, in two layers on the face of the armature. Fig. 2, illustrates the core of the armature in end view, with a single division of winding or a group of three members thereon. Fig. 3, in plan view and section illustrates one of said members or coils. Fig. 4, illustrates the same coil in end view. Fig. 5, illustrates the invention as applied to a multipolar armature. Fig. 6, illustrates in end view an armature core with several coils thereon, each having but two turns for covering the face of the armature in one layer.

The description may be and is in great measure confined to the figure illustrating the application of the winding so as to cover the periphery of the drum with a single thickness of wire (see particularly Fig. 6); but so far as may be, the same letters of reference are used to designate like parts throughout the entire description and drawings, whether a winding of one thickness on the face of the armature, or of two thicknesses (as in Figs. 1 to 5 inclusive) is under consideration.

In all the figures, A is the drum, and in all the figures each group or division of coils is designated by a letter appropriated to it as a whole while numerals attached to said letter designate the different individual members or coils in the group. Thus in Fig. 1, a' , a^2 , a^3 , indicate the three individual coils of the a division or group; b' , b^2 , b^3 , indicate the three individual coils of the b division or group, &c. It will be observed, that while the several divisions are counterparts of each other, that is, for example, while the a group of coils as a whole, is like the b group as a whole, the individual coils of each group differ among themselves; that is, the coil a' is unlike either the coil a^2 or coil a^3 , while coils a^2 and a^3 also differ, yet all the individual coils bearing the same numeral are alike, that is, coils a' , b' , c' , are alike, and so are coils a^2 , b^2 , and c^2 , as well as coils a^3 , b^3 , and c^3 .

Each individual coil a' , a^2 , a^3 , b' , b^2 , &c., has a long side, and a short side, and inclined ends; or, in other words, they all have a general "keystone" contour, substantially such as is described in my pending application, Serial No. 276,990, filed June 13, 1888. (See patent April 26, 1892, No. 473,618.) Each individual coil is wound on a former of general "keystone" contour, substantially as is described in said application, Serial No. 276,990, whereby the different divisions overlies and underlies other divisions on the heads of the armature drum, and thereafter the coil is bent edgewise upon another former substantially as disclosed in my pending application, Serial No. 363,810, filed September 3, 1890, (see patent September 20, 1892, No. 482,825,) to give it the shape in which, substantially within its own inclined planes, (*i. e.*, the inclines of the "keystone" contour,) it is to cross the heads of the armature drum.

Looking at the heads of the armature drum, and the ends of the coils thereon, the coils

having the numeral 1, that is coils a' , b' , c' , &c., present, near the periphery of the drum, or near their long and short sides, short radial portions, connected by a long curved portion; the coils having the numeral 2, that is coils a^2 , b^2 , c^2 , have longer radial portions, and shorter curved portions; while the radial portions of the coils numbered 3, are still longer, or the longest of all, and their curved portions are the shortest of all. The curved portions are substantially parallel with the edge or periphery of the core.

The coils having been wound and shaped as described, are put upon the armature drum by successive divisions following the one, two, three order of the individual coils; that is, beginning with coil a' it is put upon the drum so as to occupy substantially the position shown; then the long side is lifted up and up, and the short side of coil a^2 is passed through it, and said coil a^2 is then made to occupy substantially the position shown; and then the long sides of coil a' and a^2 having been lifted up slightly from the drum, the short side of the coil a^3 is passed under them near the drum and through their long sides, and then made to occupy the position shown. In their final positions, the ends of the three coils of the a group occupy at most the space of two thicknesses of wire on the ends of the drum or core, the ends of the coil a^2 lying under coil a' , and coil a^3 lying under both of the coils a^2 and a' . Next, the short side of the coil b' is passed between the drum and the coils of the a group and through the long sides of all the coils of the a group. Then the short side of the coil b^2 is passed under and through the long sides of all the coils on the drum, and placed upon the drum. Then in the same manner the coil b^3 when it will be found that the coil b^2 underlies the coil b' , and that the coil b^3 underlies both coils b^2 and b' , as with the coils of the a group, and that the whole b group of coils underlies the whole a group. This process of lifting up the long sides of coils, and passing the short sides of new coils under and through the coils lifted up is continued, until the entire armature drum is covered. Locking pins p , p , p , are then inserted in holes already made in the heads of the drum to hold the winding in place.

As has been pointed out, the coil a^2 passes under the coil a' , and the coil a^3 passes under the coils a^2 and a' , &c., which brings the coils of each group in reverse order upon the two sides of the periphery of the drum as looked at endwise, so that as the armature revolves they approach the poles of the field magnets in the proper consecutive order one, two, three, &c., on both sides.

Each coil occupies a space equal to two thicknesses of wire on each end of the armature, and underlies several other divisions. Washers may be placed upon the pins to keep the coils of one layer from contact with the coils of adjacent layers, as disclosed in

my said prior application, Serial No. 363,810. Each coil has its appropriate commutator connections or terminals.

In each of the coils illustrated in Figs. 1 to 5, inclusive, there are four convolutions or turns of insulated wire, arranged at their long and short sides so that the wire is in two layers on the face of the armature drum or core, but at the two inclined ends of each coil the several convolutions of wire are arranged side by side in a web of one thickness, which lies flatwise with relation to the ends of the drum or core.

A description in detail of the application of the one layer covering upon the face or periphery of the core as shown in Fig. 6, is deemed unnecessary. The wire of each individual coil wound to occupy one layer on the drum is (as in the two layer coils) spread into a single web at the inclined ends, and the coil is then mounted on the drum as already described.

In my winding, the individual coils of a division or group vary slightly in length, but this is immaterial whether applied to the armature of a bipolar machine, or to the armature of a multipolar machine, provided the number of groups in the bipolar machine is even, or in the multipolar machine is a multiple of the number of poles, since in all cases the aggregate resistance on both sides of the commutator brushes will remain the same.

I claim—

1. The combination with the armature drum, of a winding composed of divisions, each of which is made up of a group of two or more independent or individual coils, each having a long side and a short side lying along the periphery of the drum in two or more layers, and inclined ends lying across the heads of said drum in a flattened web, said long and said short sides of the individual coils in each said group being separated upon the periphery of said drum by spaces which receive respectively the short and long sides of other similar groups, and the long sides in each group being arranged on the periphery of the drum in the reverse order of the short sides, substantially as described.

2. The combination with the armature drum, of a group of independent or individual coils, each of which has a long and a short side lying along the periphery of the said drum, and inclined ends lying across the ends of said drum, the several inclined ends of the several members of the said group at either end of said drum crossing that end of the drum in two radial lines connected by a line substantially parallel to the periphery or edge of the core, and the said several members being separated on the periphery of the drum, substantially as described.

RUDOLF EICKEMEYER.

Witnesses:

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RUDOLF EICKEMEYER, Jr.