(No Model.) 3 Sheets—Sheet 1.

F. K. FITCH.

ARMATURE CORE FOR DYNAMO ELECTRIC MACHINES.

No. 308,601. Patented Dec. 2, 1884.

Fig. 1.

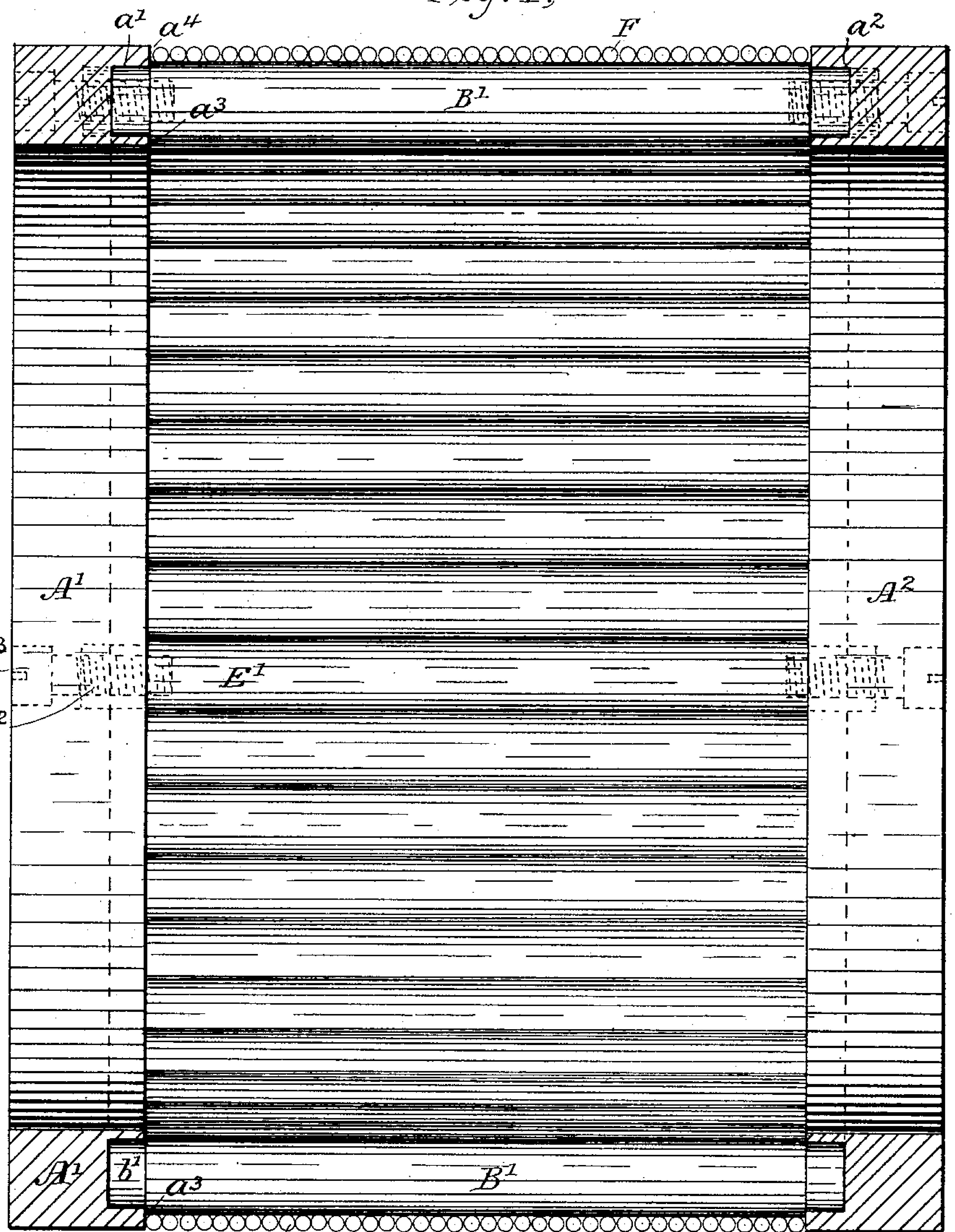


Fig. 3.

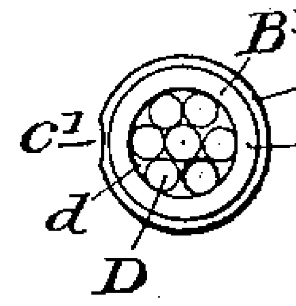


Fig. 2.

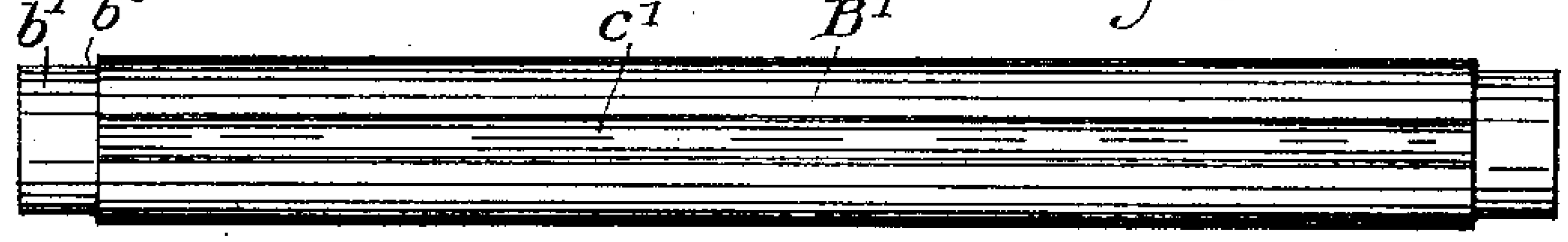
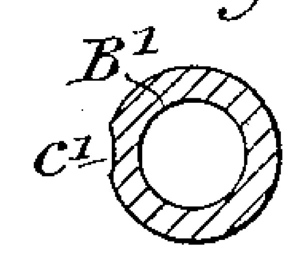


Fig. 4.



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(No Model.)

3 Sheets—Sheet 2.

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Fig. 5.

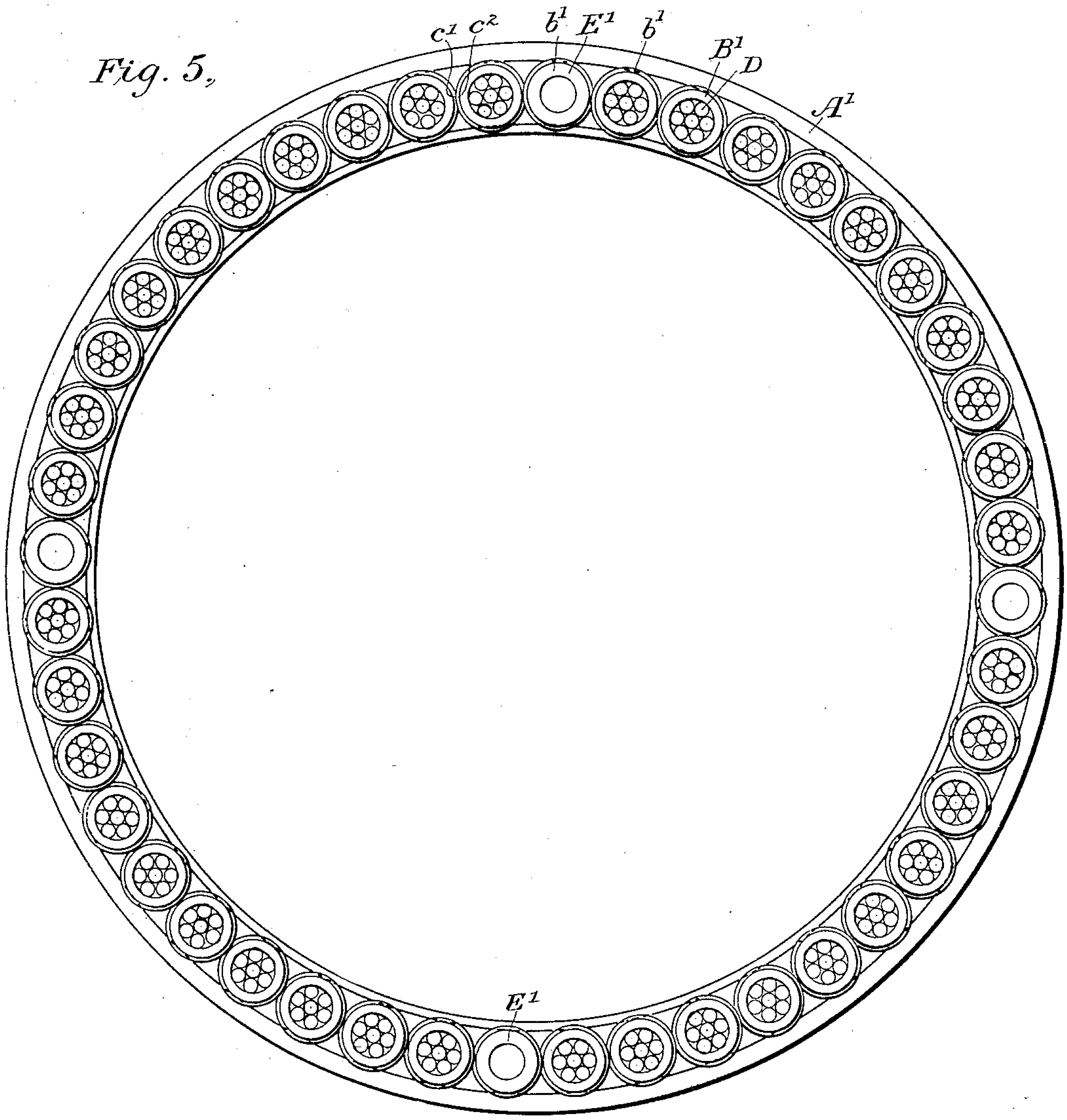

Fig. 7.

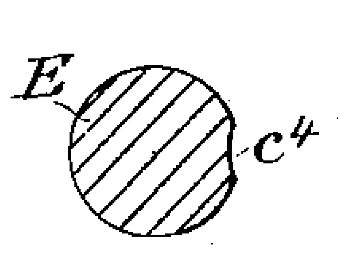

Fig. 6.

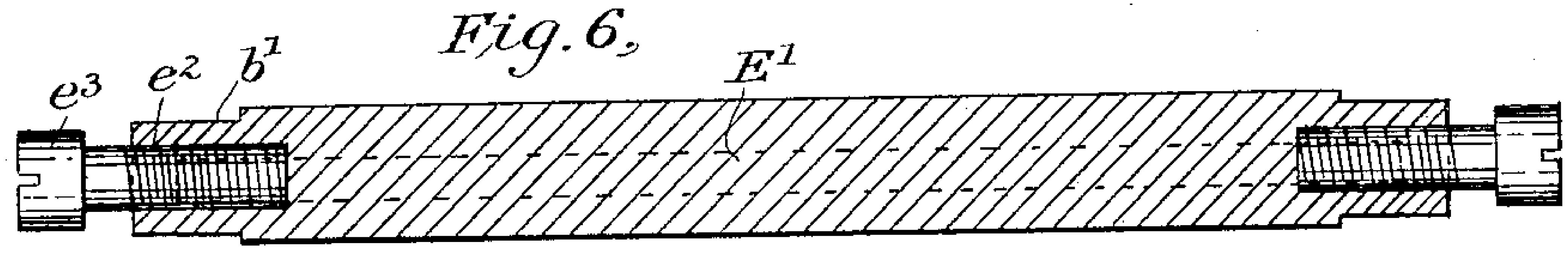

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Fig. 8,

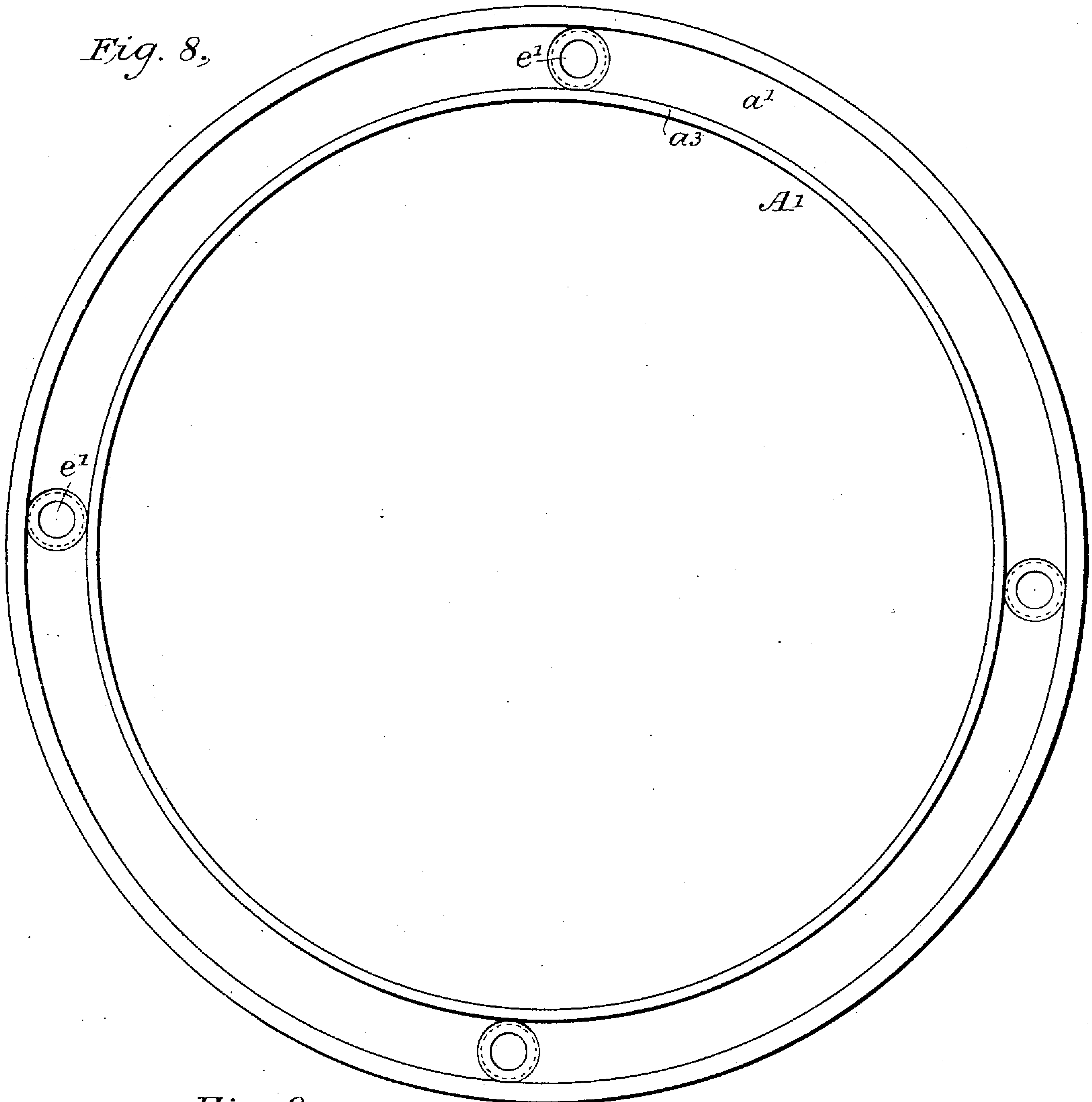
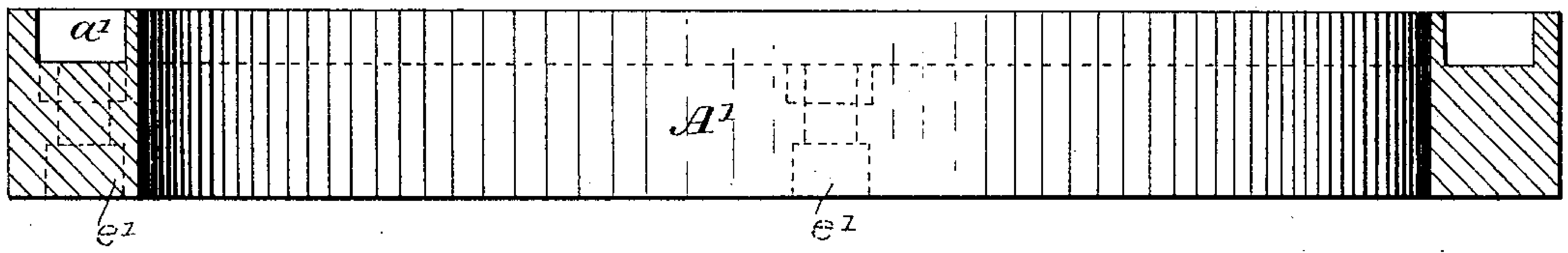


Fig. 9,



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UNITED STATES PATENT OFFICE.

FREDERICK K. FITCH, OF NEW YORK, N. Y., ASSIGNOR TO THE FITCH ELECTRIC LIGHTING AND CONSTRUCTION COMPANY, OF SAME PLACE.

ARMATURE-CORE FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 308,601, dated December 2, 1884.

Application filed February 4, 1884. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK K. FITCH, a citizen of the United States, residing in New York, in the county and State of New York, have invented certain new and useful Improvements in Armatures for Dynamo-Electric Machines, of which the following is a specification.

My invention relates to the construction of armatures of dynamo-electric generators.

The object of the invention is to provide an armature which shall be simple and economical in its construction, which shall contain the required amount of inductive material in a form best adapted to produce the necessary magnetic changes for inducing the desired electric currents, and which shall at the same time be capable of becoming magnetized and demagnetized with great rapidity, and which shall not be overheated by reason of such magnetic changes.

The invention consists, generally, in constructing the magnetic or inductive portion of the armature in the form of an annular series of soft-iron tubes, which are supported at their respective extremities in two parallel soft-iron rings, and each of which contains a number of soft-iron rods or wires. The tubes are fitted at their respective extremities into suitable apertures formed in the rings, and a suitable number of soft-iron bars are placed at intervals in the annular series of tubes for binding the two rings together, thereby holding the tubes, together with the contained soft-iron rods, in position. The tubes themselves are for the purpose of fitting them more tightly together, preferably each constructed with a longitudinal groove adapted to fit over the touching surface of one of the adjacent tubes, and to thereby not only bring the mass of metal constituting the tubes into greater proximity, but also to thus prevent any undesirable movement of the same.

For the purpose of adding a still greater amount of inductive material to the armature, one or more soft-iron wires, which are preferably naked, may be wrapped circumferentially about the outer surfaces of the tubes, thereby filling any space which may be left between the projecting peripheries of the two end rings. The inductive portion of the armature being constructed in this form, it is designed to wind the same with insulated conductors in any suitable well-known manner, preferably, however, according to the method of winding employed in the so-called "Gramme armature."

Any suitable means may be employed for supporting the armature upon an axis capable of revolving the same within the field of force of suitable field-magnets.

In the accompanying drawings, which illustrate my invention, Figure 1 is a vertical transverse section of the armature. Fig. 2 is a detail view of one of the soft-iron tubes. Fig. 3 is an end view of one of the tubes, showing the soft-iron rods within the same; and Fig. 4 is a cross-section of the tube itself. Fig. 5 is an end view of the armature, one of the rings being removed; and Figs. 6 and 7 are respectively a longitudinal and a cross section of the bars employed for binding the rings in position. Figs. 8 and 9 are respectively an elevation and a cross-section of one of the end rings of the armature.

Referring to these figures, A′ and A² represent the two end rings employed for supporting the various parts of the armature. These rings are of soft iron, and they are each constructed with a smooth outer surface, but with an annular groove, as shown at a' a^2, respectively, upon their inner surfaces. Into these grooves the ends of a series of cylindrical soft-iron tubes, B′, are designed to enter. The tubes B′ are preferably constructed in the manner more clearly shown in Fig. 2, with their ends cut away or turned down, as shown at b', sufficiently to allow them to enter the grooves a. The shoulders b^2 thus formed upon the tubes fit against the corresponding shoulders, a^3, upon the inner surfaces of the rings A.

The tubes B are each constructed with a longitudinal concave channel or groove, c', which extends along its entire length. Into these grooves or channels it is designed that one side of an adjacent tube shall be fitted when they are placed in position between the two rings A′ and A². The concave grooves or channels c' are preferably cut into the tubes to such a depth that the bottoms of the same are flush with the ends of the tubes, which are cut away for the purpose of fitting into the rings. When the tubes B are placed in position between the rings A, they occupy the relative positions indicated in Fig. 5, in which a portion, c^2, of each tube is shown as fitting into a corresponding groove, c', formed in the adjacent tube.

It is evident that instead of turning the ends of the tubes B so that they are of a circular cross-section they may simply be cut away on the outer and on the inner surfaces sufficiently to allow them to fit into the annular grooves a, formed in the rings A, in which case the groove c' should be extended the entire length of each tube.

Within each tube B a number of cylindrical soft-iron rods, bars, or wires, D, are placed, and these are designed to fill the space within the same, leaving only narrow angular openings d. The rods D, however, may be of other form than cylindrical—as, for example, hexagonal or irregularly shaped; but for most purposes I prefer the form illustrated.

The rings A are also each provided with a suitable number of recesses or mortises, e', into which it is designed to fit the ends of corresponding bars or bolts, E', which serve to bind the two rings against the respective extremities of the series of tubes B. These bars are constructed in essentially the same manner as the tubes B as regards their outer surfaces, being provided with turned ends or tenons b' and longitudinal grooves c^4, similar to the ends or tenons b' and grooves c', and which serve a like purpose. The tenons at the ends of the bars E', however, are of greater length than the corresponding parts of the tubes, and they fit into the recesses e'. The distances between the projecting shoulders of both are, however, the same.

In the respective ends of each of the bars E' there are formed hollow screws e^2, into which fit corresponding screws, e^3. The screws e^3 are countersunk in the outer surfaces of the rings A, and by entering the ends of the rods serve to bind the same together. Any required number of bolts or rods E' may be employed for binding the parts in position.

When the tubes B have been thus placed in position between the two rings, with the rods D inclosed within them, and the whole has been bound together by the bars E' and screws e^3, the entire armature may be wrapped circumferentially with soft-iron wire, as shown at F. A sufficient quantity of wire may thus be placed upon the armature to fill whatever space may be left between the outer surfaces of the tubes and the projecting edges a^4 of the rings A. A greater amount of inductive material is thus embodied in the armature, and at the same time the entire armature is strengthened and made more rigid.

The rings A, as well as the tubes B and rods D and bolts E, are preferably annealed in a well-known manner.

When the inductive portion of the armature has been thus completed, it is designed to wind the same with insulated wire of suitable form in any convenient manner, preferably, however, according to the method employed in the so-called "Gramme ring." The armature, as already stated, is designed to be supported upon a suitable axis by means of drum heads or spiders, which are preferably of non-magnetic material, in any convenient and well-known manner.

I have found that an armature built up in this manner is not only cheap and simple in its construction, but is capable of rapid magnetic change—a feature which is especially desirable in the armatures of electric machines—and is provided with sufficient air-spaces to prevent it from heating, and at the same time it constitutes a practically solid and continuous soft-iron ring by reason of the closely-fitting joints formed by the curved or convex surfaces of the tubes fitting into the concave grooves or channels.

I claim as my invention—

1. An armature for dynamo-electric machines, consisting of two supporting-rings of soft iron, a series of soft-iron tubes supported at their respective extremities in said rings, and a number of soft-iron bars or rods contained in each of said tubes, substantially as described.

2. The combination, substantially as hereinbefore set forth, of two soft-iron rings, a series of tubes supported at their respective extremities in said rings, a number of soft-iron rods or bars within said tubes, and one or more bolts or bars for binding said rings together.

3. The combination, substantially as hereinbefore set forth, with two soft-iron rings and an annular series of soft-iron tubes supported thereby, of a coil of soft-iron wire wrapped circumferentially about said series of tubes.

4. The combination, substantially as hereinbefore set forth, of two soft-iron rings, an annular series of cylindrical soft-iron tubes supported thereby, soft-iron bars inclosed within said tubes, and a coil of soft-iron wire circumferentially surrounding said series of tubes.

5. The combination, substantially as hereinbefore set forth, of two soft-iron rings, a series of soft-iron tubes supported between said rings, in each of which tubes is formed a longitudinal groove or channel for receiving the side of an adjacent tube, substantially as described.

6. The combination, substantially as hereinbefore set forth, of two soft-iron rings, each of which rings is constructed with an annular groove, an annular series of soft-iron tubes, the respective ends of which are adapted to fit in said grooves, a series of bolts fitting within recesses formed at the bottoms of said grooves in each of said rings, and means, substantially such as described, for binding said rings upon said tubes through the agency of said bolts.

7. The combination, substantially as here-

inbefore set forth, of two soft-iron rings and a series of soft-iron tubes having tenons formed at their respective extremities, whereby they may be fitted within said grooves, and a quantity of soft iron independent of but contained within each of said tubes.

In testimony whereof I have hereunto subscribed my name this 2d day of February, A. D. 1884.

FREDERICK K. FITCH.

Witnesses:
CARRIE E. DAVIDSON,
CHARLES A. TERRY.