

W. C. FISH.
MAGNETIC CORE FOR ELECTRIC APPARATUS.
APPLICATION FILED JAN. 12, 1907.

952,105.

Patented Mar. 15, 1910
2 SHEETS—SHEET 1.

Fig. 1.

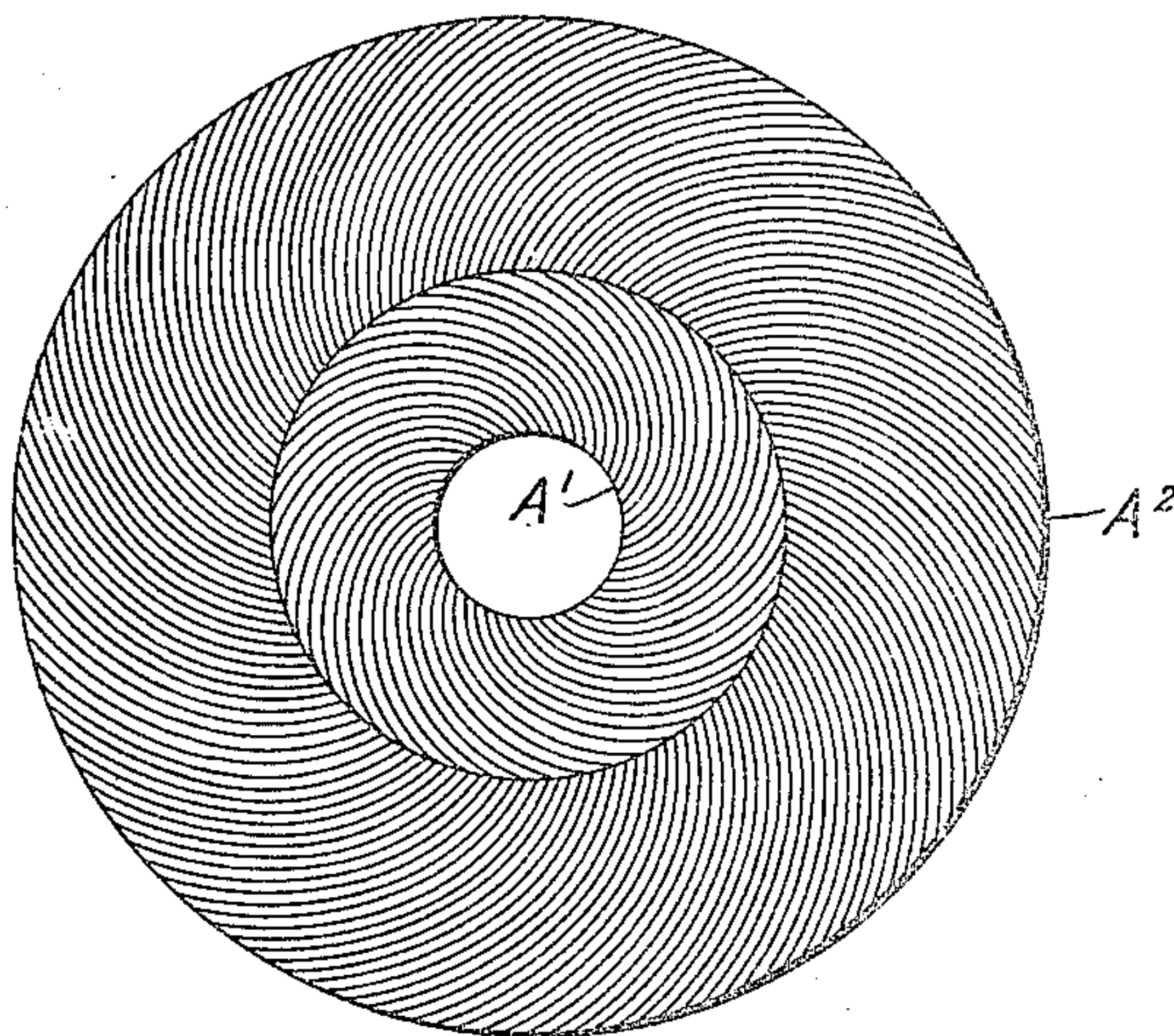


Fig. 2.

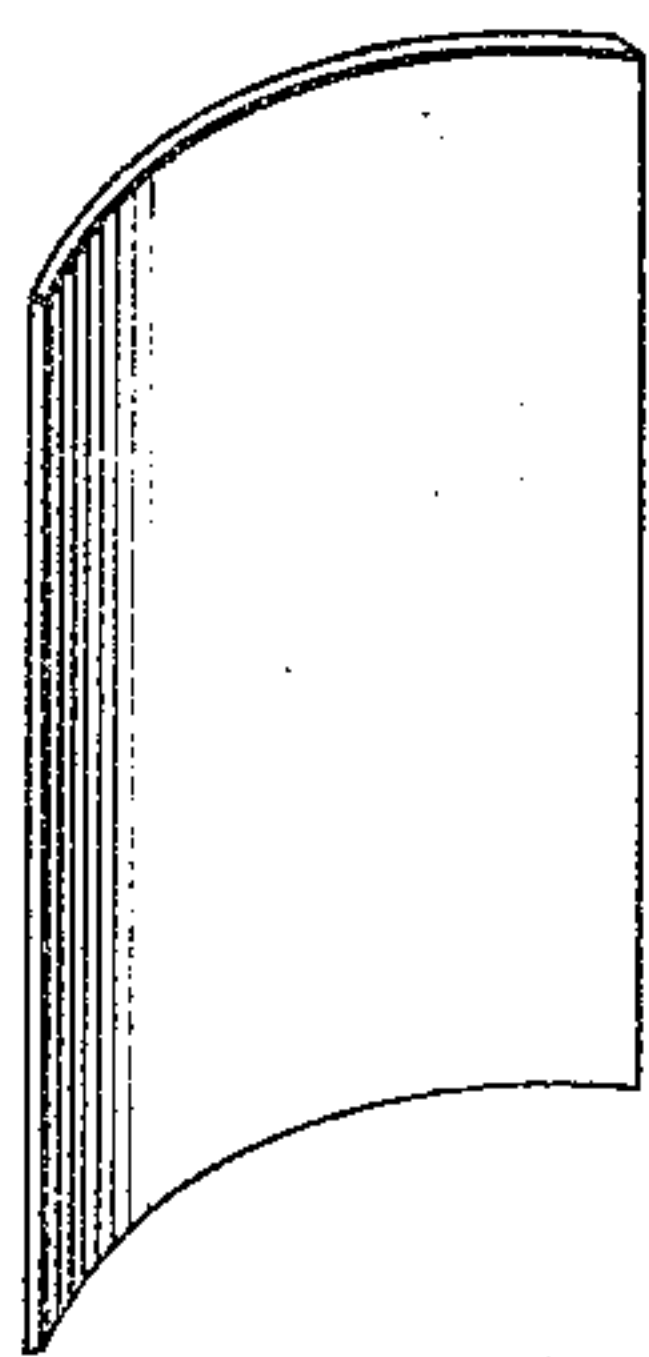


Fig. 3.

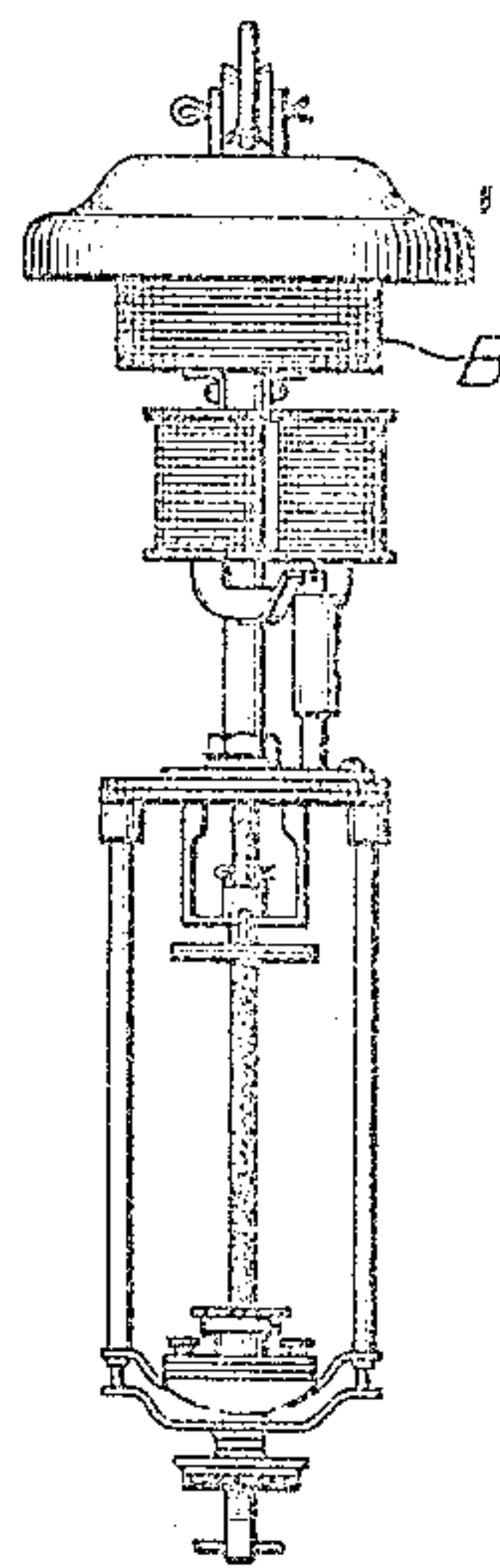
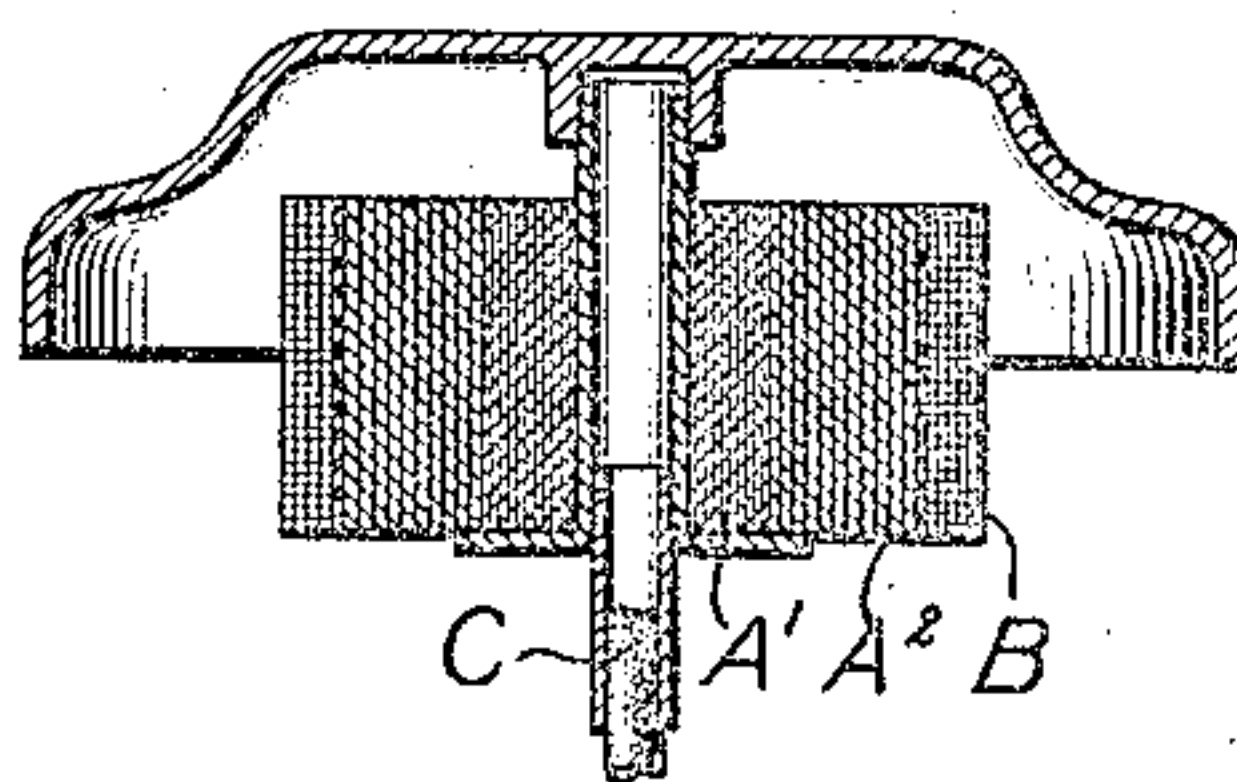


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

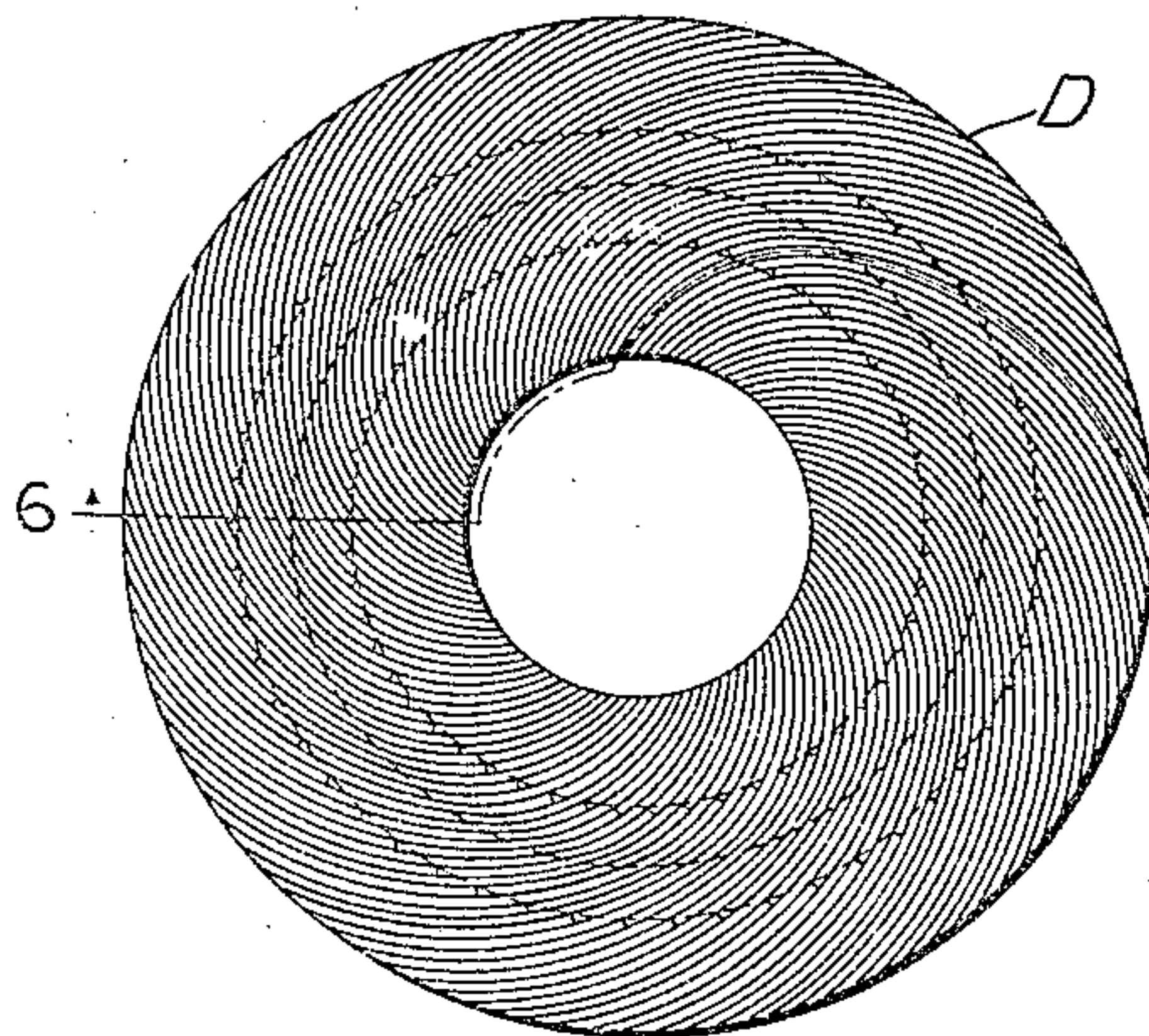


Fig. 7.

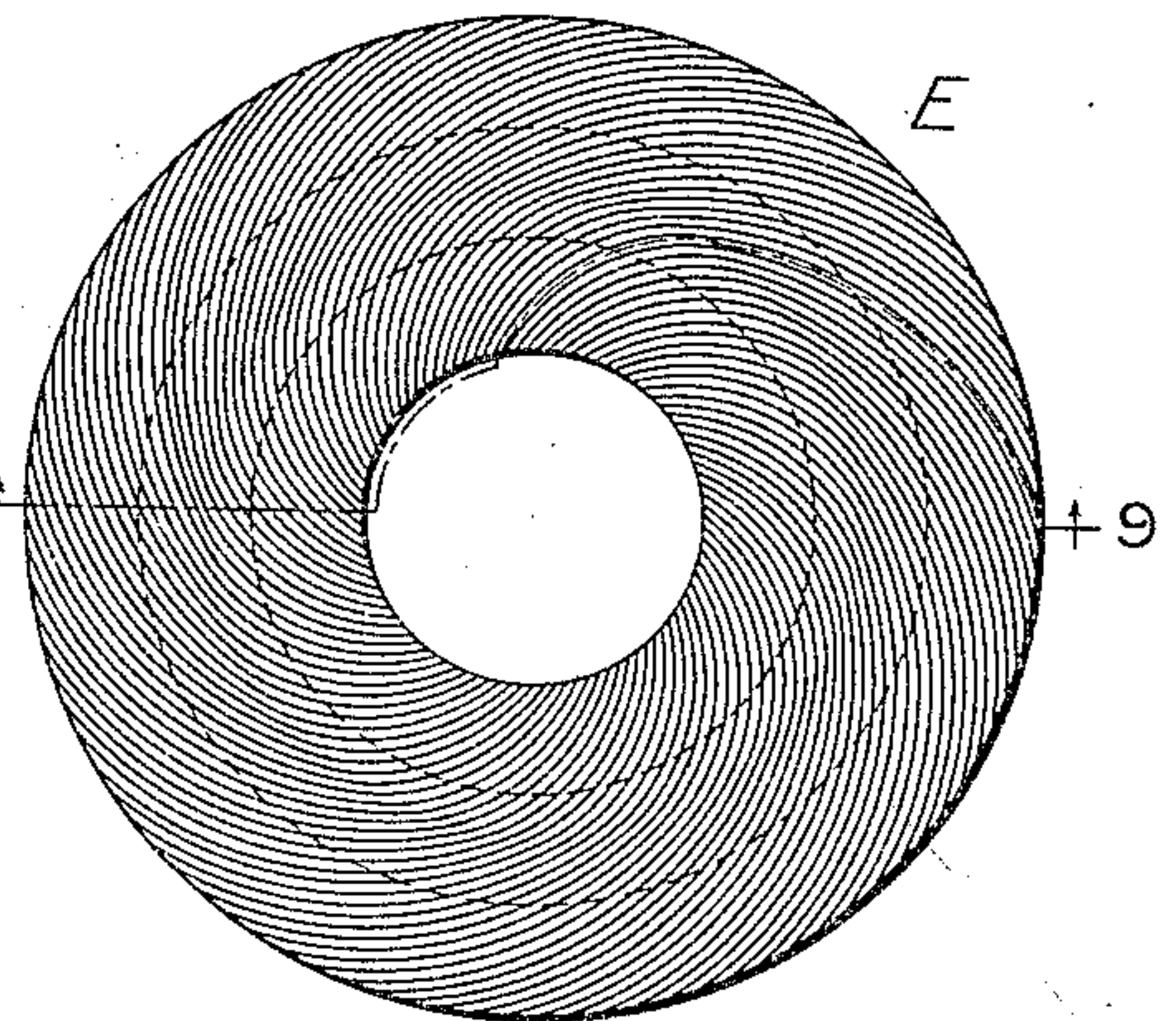


Fig. 6.

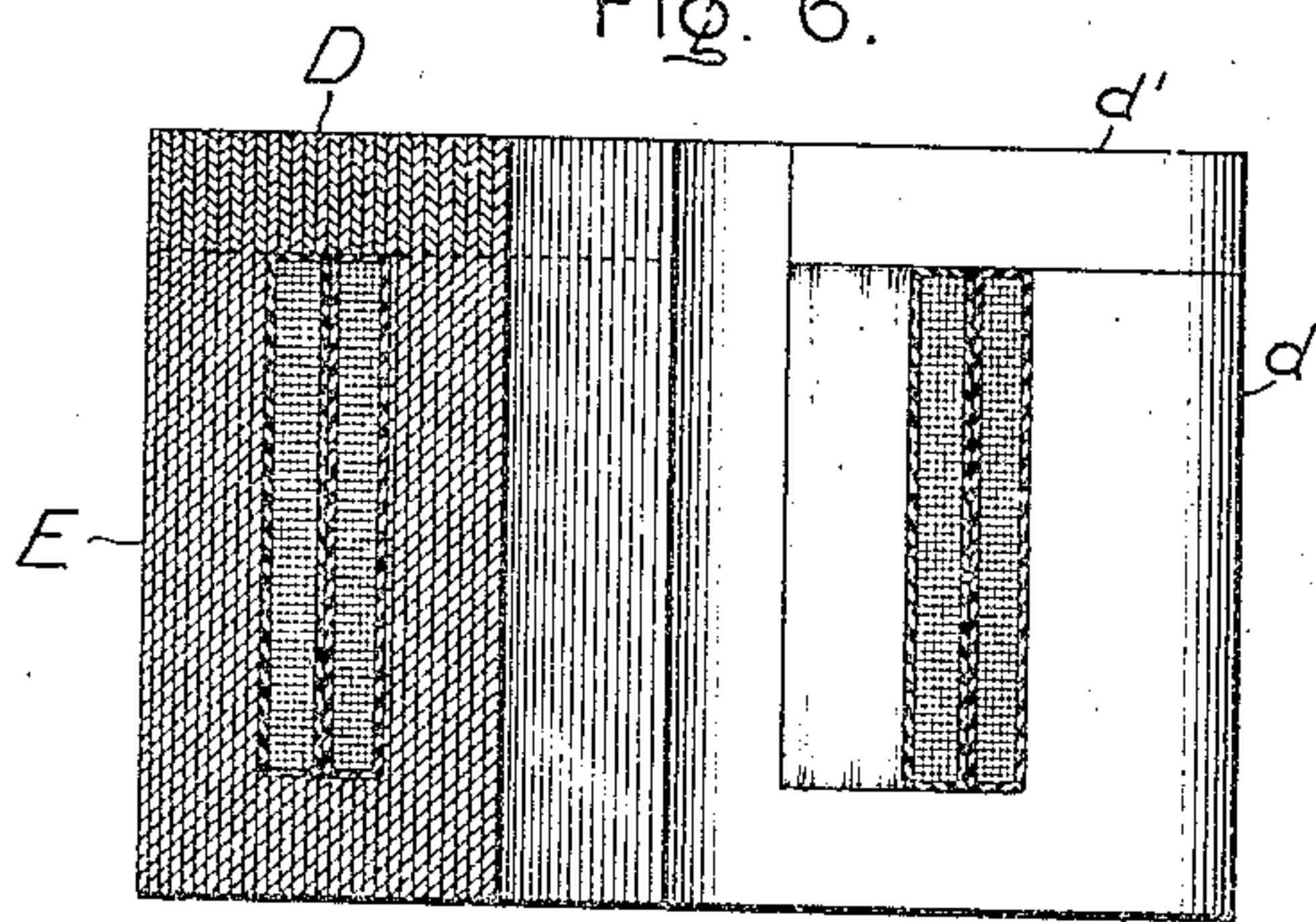


Fig. 8.

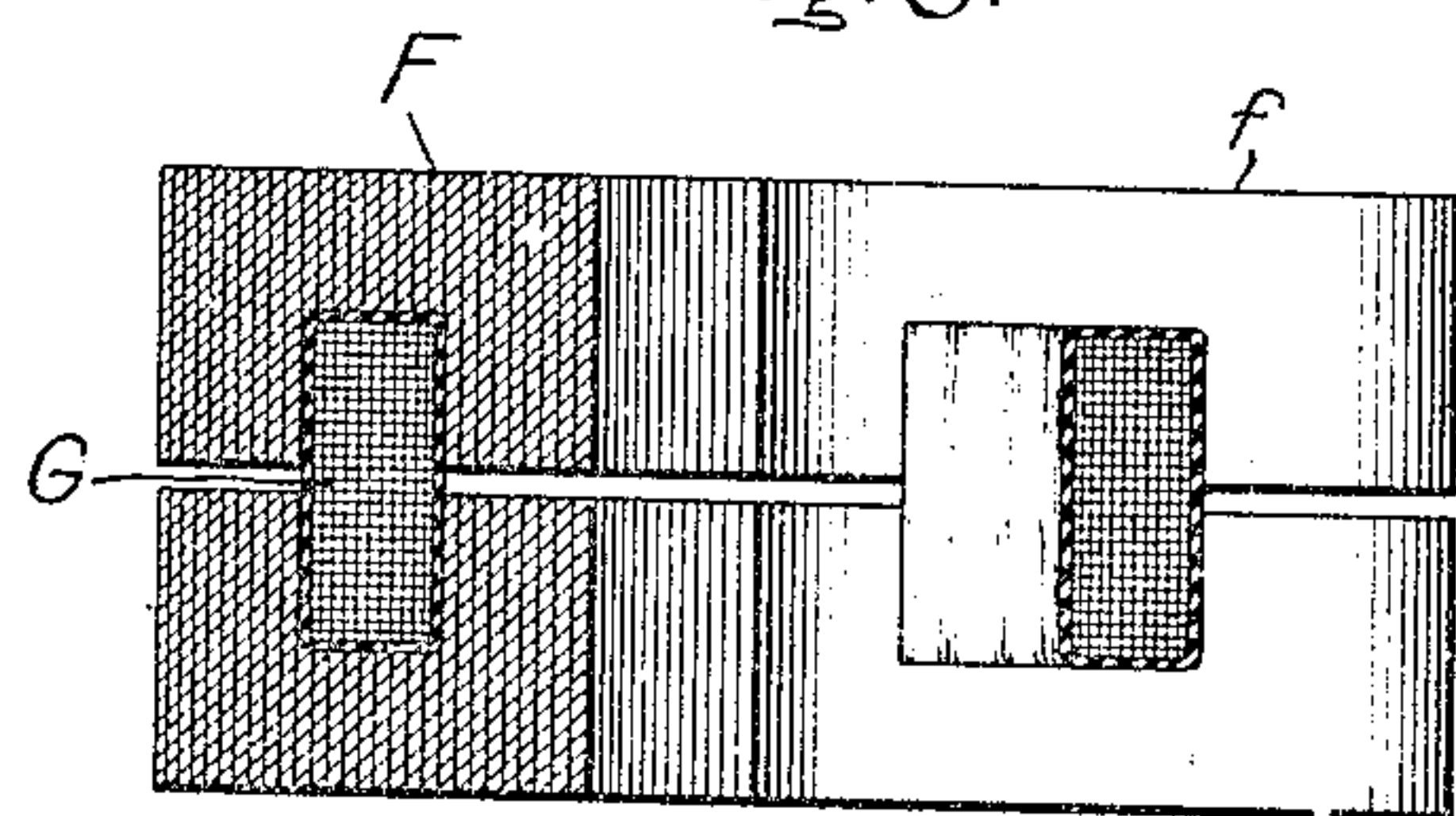


Fig. 9.

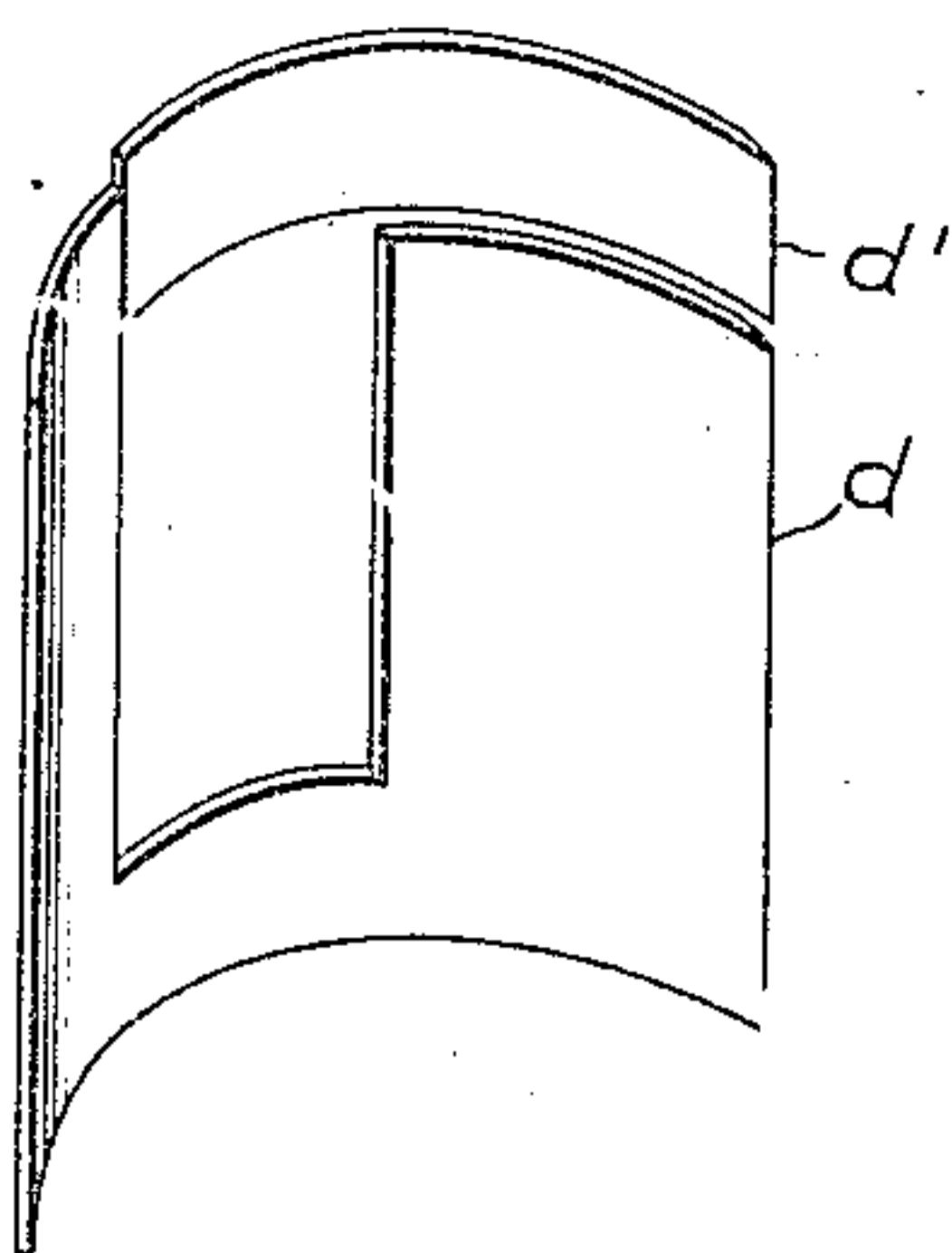
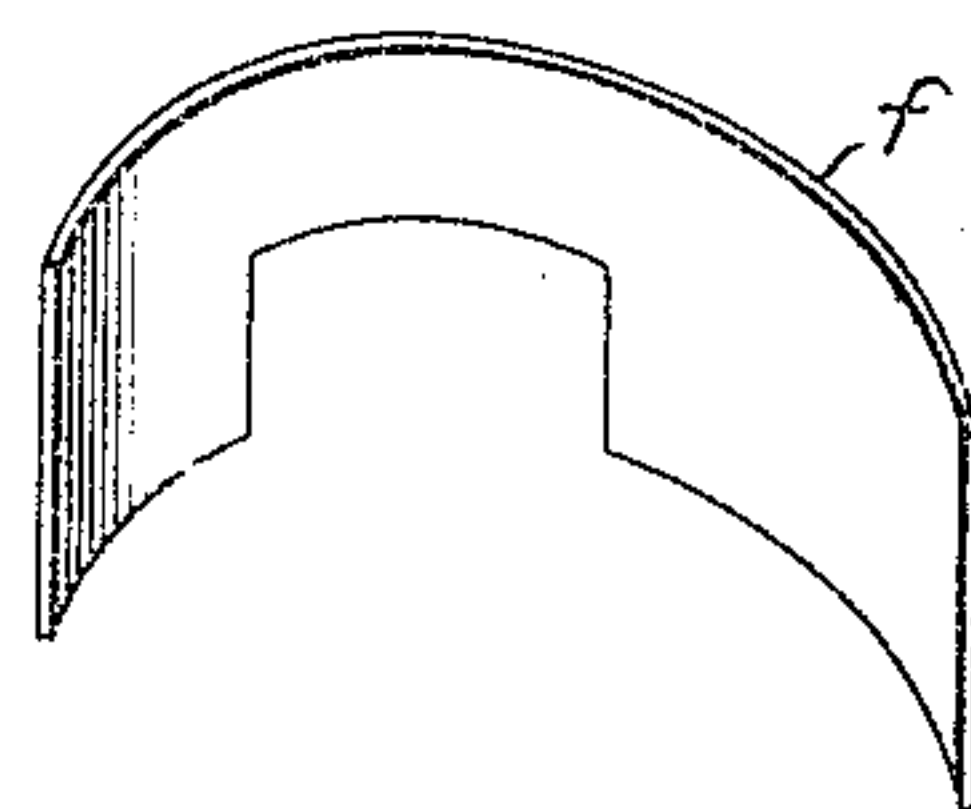


Fig. 10.



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UNITED STATES PATENT OFFICE.

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MAGNETIC CORE FOR ELECTRIC APPARATUS.

952,105.

Specification of Letters Patent. Patented Mar. 13, 1910.

Application filed January 12, 1907. Serial No. 351,968.

To all whom it may concern:

Be it known that I, WALTER C. FISH, a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Magnetic Cores for Electric Apparatus, of which the following is a specification.

My invention relates to electric apparatus employing laminated magnetic cores, and its object is to provide a novel and simple construction for securing a core of cylindrical form.

The difficulty that has been experienced heretofore in constructing a laminated core of cylindrical form in large sizes has led to the almost universal use of cores rectangular, or practically rectangular, in cross-section. With such a core, either the winding must be rectangular to conform to the cross-section of the core, or spaces must be left between the core and the winding. In either case, more copper is required than would have been necessary in a cylindrical winding with a closely fitting cylindrical core.

My invention consists in constructing the core out of magnetic laminae, each bent in the form of an involute. These may be closely packed together to form a core cylindrical in form. I prefer to make the laminae of only such a portion of the involute curve that when they are packed together, they will not entirely surround the longitudinal axis of the core,—that is to say that the angle subtended by two planes passing through this axis to the inner and the outer edges of a lamina will be less than 360 degrees. In case a practically solid core is required, the core may be constructed of a plurality of superposed concentric cylinders, each composed of laminae of involute cross-section.

My invention will best be understood by reference to the accompanying drawings, in which—

Figure 1 shows a plan view of a core constructed in accordance with my invention; Fig. 2 shows a perspective view of one of the laminae; Figs. 3 and 4 show a core and winding arranged in accordance with my invention, and applied as a reactive coil in an arc lamp; Fig. 5 shows a plan view of a transformer with closed magnetic circuit arranged in accordance with my invention;

Fig. 6 shows a cross-section on the line 6—6 of Fig. 5; Figs. 7 and 8 show similar views of a reactive coil with nearly closed magnetic circuit; and Figs. 9 and 10 show perspective views of single laminae for the transformer and reactive coil respectively.

In Fig. 1, A^1 and A^2 represent two superposed concentric cylinders, each of which is composed of magnetic laminae stamped in the form of an involute, as shown in Fig. 2. The laminae are closely packed together to produce the cylindrical core of Fig. 1. The purpose of employing two superposed cylinders is to secure a core nearly solid,—that is, a core with a small central opening. The ratio of the inside to the outside diameter of a cylinder that can be built up from a single set of laminae has a certain minimum value, so that if a central opening, smaller in proportion to the outer diameter of the core, is required, a plurality of cylinders must be employed in the construction of the core. The laminae in the two cores of Fig. 1 are shown arranged oppositely with respect to the right or left-hand direction of the involute. This is to give greater strength and rigidity to the core.

Since a core constructed in accordance with my invention necessarily has a central opening of appreciable size, unless an excessive number of superposed cylinders are employed in its construction, my invention is particularly advantageous in applications where a passage through the center of the core is desired. For instance,—in Figs. 3 and 4, I have shown my core construction applied to the reactive coil of an arc lamp, which it is desired should surround the carbon rod, in order to secure a compact construction. My core construction is particularly well adapted to such a purpose, since it provides the central opening required. In these figures B represents the winding of the reactance coil, which is cylindrical in form, closely fitting the core. C represents the carbon rod which passes through the central opening of the core. The construction of the arc lamp forms no part of my invention, and need not be described in detail.

In the preceding figures I have shown a core arranged for a coil with open magnetic circuit. In Figs. 5, 6 and 9 is shown a transformer construction with closed magnetic circuit, D representing the core, d and d' the individual laminae, and E the transformer

coils. The laminæ d are U-shaped each with one leg longer than the other, and laminæ having the inner leg longer are interleaved with laminæ having the outer leg longer, as shown in Figs. 5 and 6. A lamina d' completes the magnetic circuit of each lamina d .

In Figs. 7, 8 and 10 another modification is shown adapted for a reactive coil with nearly closed magnetic circuit, F representing the core, f an individual lamina, and G the winding. The construction will be understood from an inspection of the drawings.

In the structures of both Figs. 5 and 7, the central opening may be nearly filled if desired by a small cylinder fitting therein as in Fig. 1.

Other modifications will readily suggest themselves, and accordingly I do not desire to limit myself to the particular constructions shown but aim to cover in the appended claims all modifications within the scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. In an electric apparatus, a cylindrical winding, and a cylindrical magnetic core therefor composed of laminæ each bent in

the form of an involute and only surrounding a portion of the core axis.

2. In an electric apparatus, a cylindrical winding, and a core therefor composed of magnetic laminæ of a cross-section in the form of such a portion of an involute as not to entirely surround the longitudinal axis of the core closely packed to form a cylinder.

3. In an electric apparatus, a cylindrical winding, and a magnetic core therefor comprising a plurality of superposed concentric cylinders each composed of laminæ of involute cross-section.

4. In an electric apparatus, a cylindrical winding, and a magnetic core therefor comprising a plurality of superposed concentric cylinders each composed of laminæ of involute cross-section, the laminæ in adjacent cylinders being oppositely arranged with respect to the right or left-hand direction of the involute.

In witness whereof, I have hereunto set my hand this ninth day of January, 1907.

WALTER C. FISH.

Witnesses:

JOHN A. McMANUS, Jr.,
ALEX. F. MACDONALD.