(No Model.)

2 Sheets—Sheet 1.

F. S. CULVER.

ELECTRICAL TRANSFORMER.

No. 528,925. Patented Nov. 13, 1894.

FIG. 1

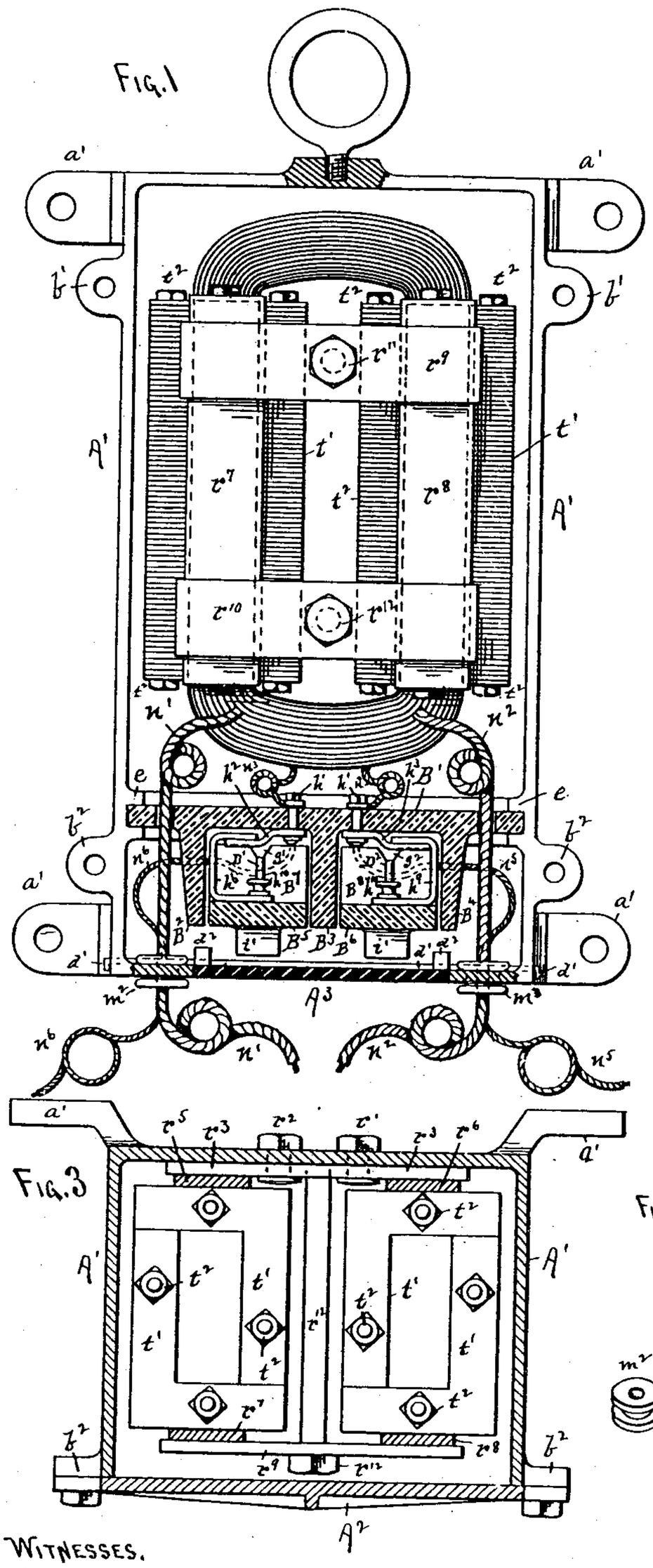

FIG. 2

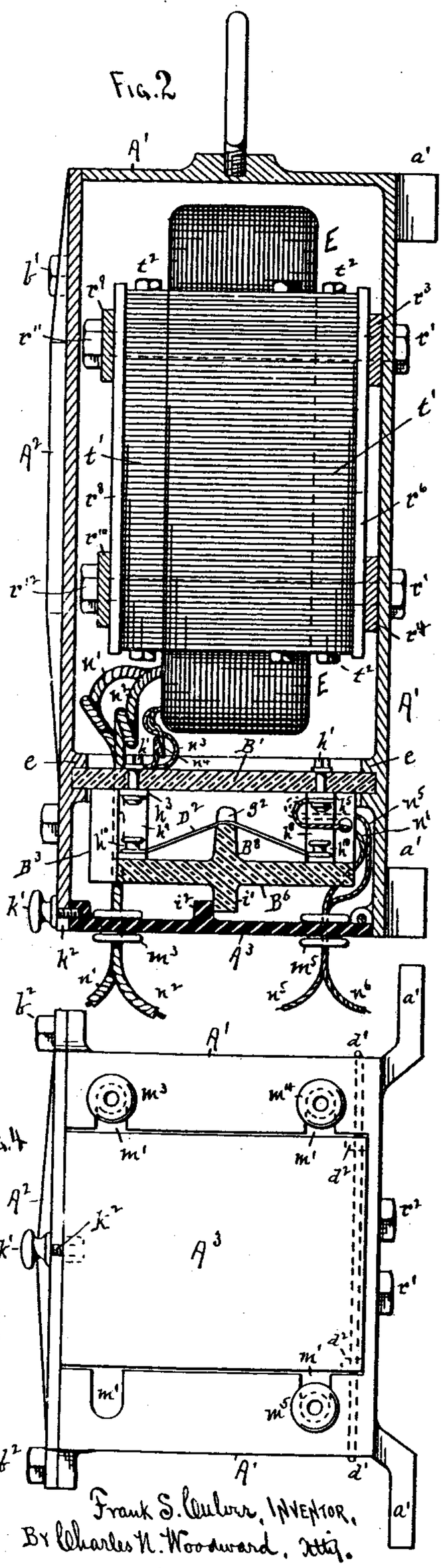

FIG. 3

FIG. 4

WITNESSES.

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J. V. Lamb

Frank S. Culver, INVENTOR.

By Charles N. Woodward, Atty.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 5

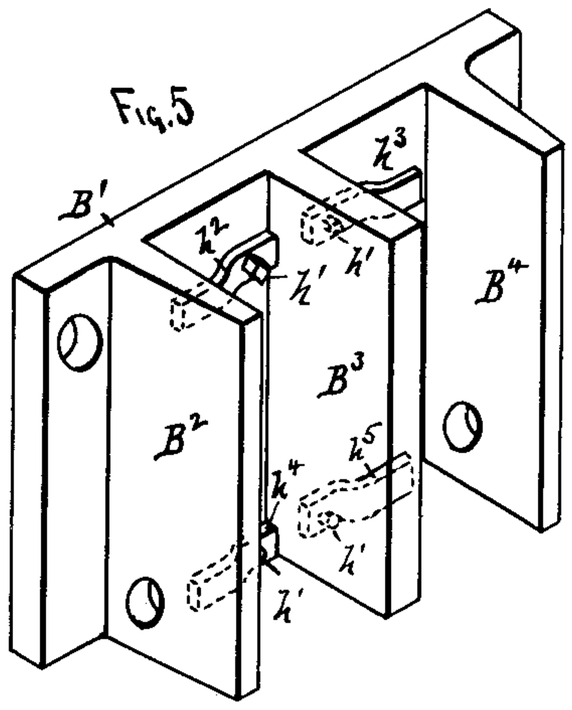


Fig. 6

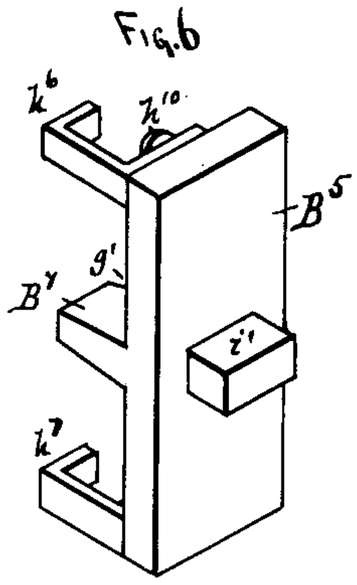


Fig. 7

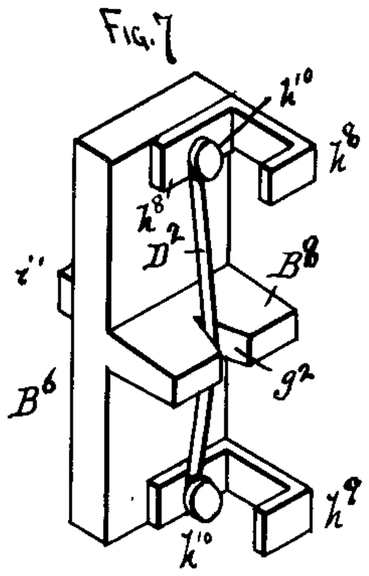


Fig. 8

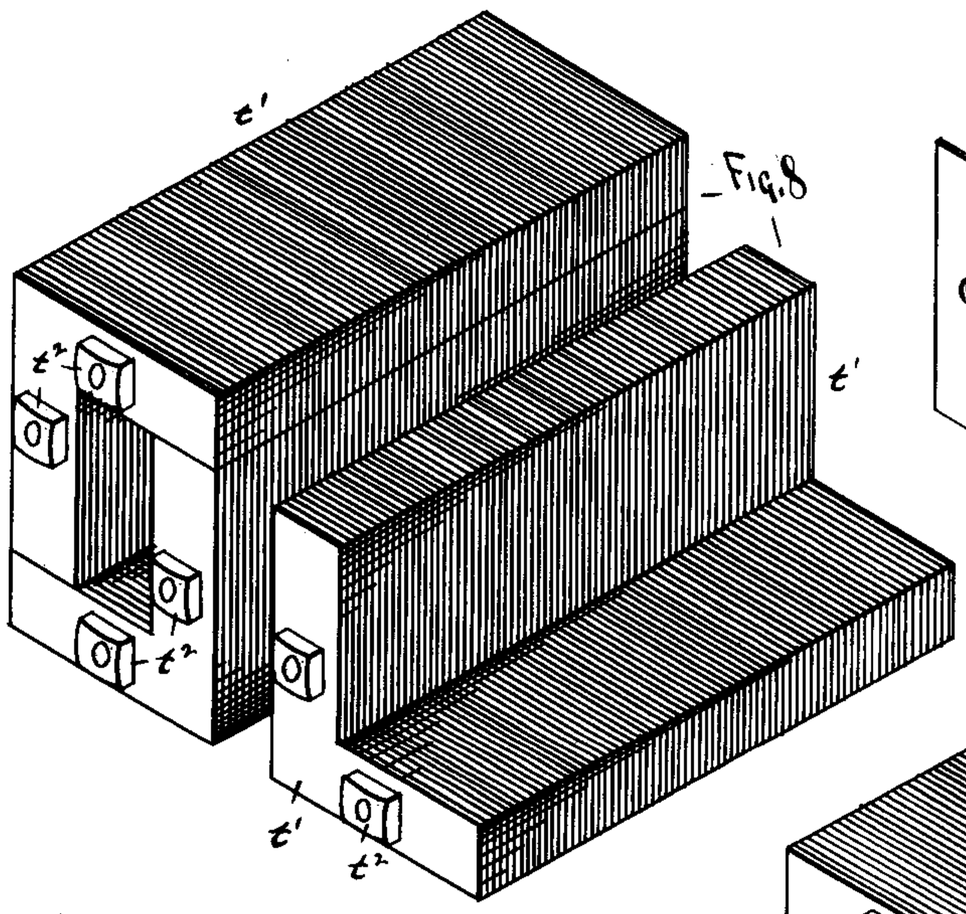


Fig. 10

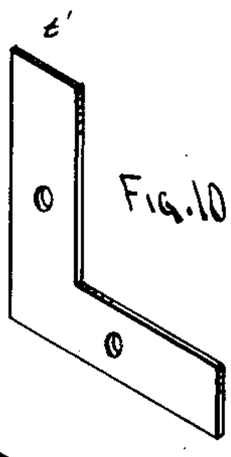
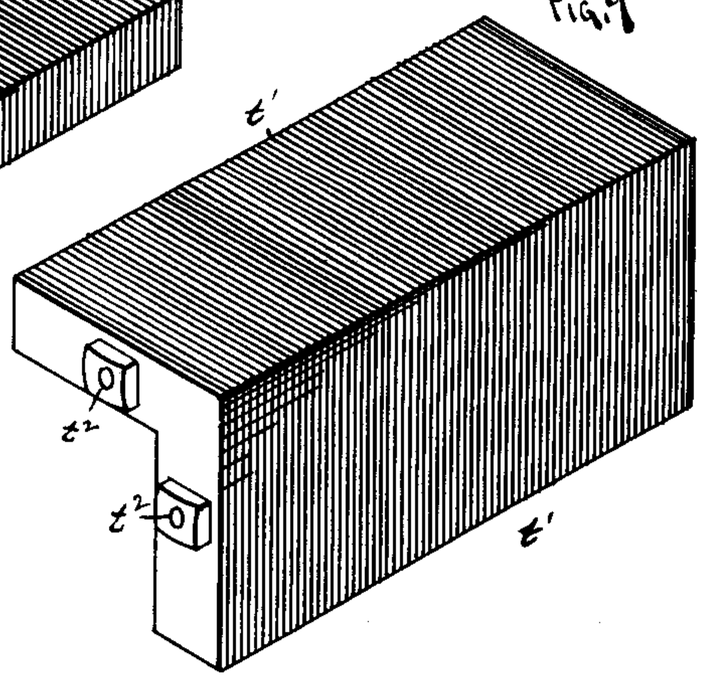


Fig. 9



WITNESSES.
N. S. Wakeman
J. A. Lamb

Frank S. Culver, INVENTOR.
By Charles N. Woodward Atty.

UNITED STATES PATENT OFFICE.

FRANK S. CULVER, OF EAU CLAIRE, WISCONSIN.

ELECTRICAL TRANSFORMER.

SPECIFICATION forming part of Letters Patent No. 528,925, dated November 13, 1894.

Application filed December 19, 1893. Serial No. 494,058. (No model.)

To all whom it may concern:

Be it known that I, FRANK S. CULVER, a citizen of the United States, residing at Eau Claire, in the county of Eau Claire and State of Wisconsin, have invented certain new and useful Improvements in Transformers, of which the following is a specification.

This invention relates to that class of electrical apparatus known as "transformers," and consists in the construction, combination, and arrangement of parts, as hereinafter shown and described, and specifically pointed out in the claims.

In the drawings, Figure 1 is a sectional front elevation. Fig. 2 is a sectional side elevation. Fig. 3 is a cross sectional view on the line $x\ x$ of Fig. 1. Fig. 4 is a bottom plan view. Fig. 5 is a perspective view of the upper or main portion of the contact plate or frame, and Fig. 6 is a perspective view of one of the removable contact blocks, viewed from the outside, and Fig. 7 is a perspective view of the other block viewed from the inside. Fig. 8 is a perspective view of three sections of the "core," and Fig. 9 is a perspective view of the remaining section of the "core," detached. Fig. 10 is a perspective view of one of the "punchings" or pieces of sheet iron of which the "core" is constructed.

A′ is the casing, preferably of cast iron, and adapted to be connected to the post, building or other locality by lugs a'.

A^2 is the cover or front of the casing, secured in place by bolts $b'\ b'$, as shown, and A^3 is a door hinged to the casing A′, by pin d' passing through lugs d^2 on the door, as shown.

Supported by ribs e on the interior of the casing A′, near the lower portion, is a plate B′ of porcelain or other suitable non-conducting material, forming a diaphragm or partition across the interior of the casing. Depending from the under side of this plate B′ are three partitions $B^2\ B^3\ B^4$, forming two separate compartments adapted to receive two blocks B^5 B^6, also of porcelain or other suitable non-conducting material, each of the blocks $B^5\ B^6$ having a cross wall or lug $B^7\ B^8$, and each cross wall having a notch or cavity $g'\ g'$, as shown.

Attached by binding posts or nuts h' to the under side of the plate B′ in the ends of the compartments formed by the partitions B^2 $B^3\ B^4$, are contact plates $h^2\ h^3\ h^4\ h^5$, while upon the blocks $B^5\ B^6$ are corresponding contacts $h^6\ h^7\ h^8\ h^9$, adapted to engage by their outer ends beneath the ends of the contacts $h^2\ h^3\ h^4\ h^5$, so that the blocks $B^5\ B^6$ are supported thereby in place beneath the plate B′, as shown in Fig. 1. The blocks $B^5\ B^6$ are shorter than the width of the plate B′, as shown in Fig. 2, so that when inserted the contacts $h^6\ h^7\ h^8\ h^9$ will pass the contacts $h^2\ h^3\ h^4\ h^5$, and slip behind them, as in Fig. 1. By this simple arrangement the blocks $B^5\ B^6$ can be readily connected to and disconnected from the plate B′. The contacts $h^6\ h^7\ h^8\ h^9$ are provided with binding posts h^{10} which serve to connect the ends of "fuse" strips D′ D^2, one for each of the blocks $B^5\ B^6$, as shown, the fuse strip D′ passing through the notch g' in its passage between the contacts $h^6\ h^7$, and the fuse strip D^2 passing through the notch g^2 in its passage between the contacts $h^8\ h^9$. The walls $B^7\ B^8$ thus form barriers between the contacts $h^6\ h^7$, and $h^8\ h^9$ respectively, to break the effect of the "arc" between the contacts, as hereinafter described.

The blocks $B^5\ B^6$ are provided with thumb lugs i' to assist in their removal and insertion, and the door A^3 is formed with lugs i^2 adapted to rest against these thumb lugs on the blocks $B^5\ B^6$, when the door is closed, to support them in place and prevent accidental removal.

The door A^3 is formed with a screw knob k', adapted to enter a cavity k^2 in the lower edge of the front or cover A^2, when the door A^3 is closed, to form a means for securing the door when closed.

Formed in the bottom of the casing A′, at the sides of the door opening, are open slots m' adapted to receive the insulators $m^2\ m^3\ m^4$ m^5, for the terminal wires, the insulators being formed with channels to fit the sides of the slots, so that they are irremovable when the door is closed, while at the same time they can be very easily removed or replaced when the door is open.

Within the casing A′ above the plate B′ are secured the transformer "coil" and its "core," which are formed and arranged as follows: The coil E is made in the usual manner, of larger and smaller sizes of wire, the larger or secondary wires $n'\ n^2$ passing from the coil downward through the holes in the plate B′,

and thence through the insulators m^2 m^3 out to the circuit in the building, or other locality to be "wired." The primary wires n^3 n^4 from the "coil" are connected to two of the contacts h^2 h^3, while the corresponding primary wires n^5 n^6 from the street main pass in through the insulators m^4 m^5, and are connected to the other two contacts h^4 h^5, as shown. By this arrangement the fuse strips D′ D² form portions of the circuit of the "primary" wires, one fuse being in the ingoing and one in the out going primary wire. The "cores" are formed of plates t' of sheet iron or steel punched out in the "L" form shown in Fig. 10, and clamped together by bolts t^2, with paper or other insulating material between each pair of plates or punchings, enough of the "punchings" being used to form the proper length of core, as shown in Figs. 8 and 9. The "core" is secured to the casing in a peculiar and novel manner so that wooden or other suitable non-conducting strips are interposed between it and the casing, and so connected and attached as to permit of the easy removal or insertion of the core and coil.

Attached by bolts r' r^2 across the back of the interior of the casing A′, are two strips r^3 r^4, and then two other similar strips r^5 r^6 are laid across these fixed strips. Two of the core sections are then laid upon these strips r^5 r^6 and the coil E placed in position and the other two core sections placed in position around the other portion of the coil. Two other nonconducting strips r^7 r^8 are then placed upon the outer core sections lengthwise, and two binding strips r^9 r^{10} laid across them, and binding bolts r^{11} r^{12} passed down through the binding strips and screwed into the cross strips r^3 r^4, as shown, the whole coil and its core being thus simply and yet firmly secured in place in the casing. To remove the core and coil, it is only necessary to remove the two bolts r^{11} r^{12}, when the whole core and its coil may be readily removed for repairs or removal. By this manner of forming the "core" from the sections of "L" shaped "punchings," the core can be placed around the coil and adjusted to fit it closely, no matter what thickness of coil may be employed. Another great advantage gained by this construction is the ease with which the core can be removed from around the coil, as it is only necessary to remove the cover A³, the clamping bolts r^{11} r^{12}, and strips r^5 r^6 r^7 r^8, when the whole core and coil are easily separable for repairs or removal.

I claim a great advantage also in the manner of arranging the contacts and fuse supporting parts, as by the arrangement of the plate B′ and contact blocks B⁵ B⁶, each fuse D′ D² is inclosed entirely by the porcelain or other non-conducting material, so that no danger exists from the great heat arising from any sudden increase of current or pressure before the fuse is consumed. Then again by means of the central partition B³ each fuse is confined entirely within a separate compartment composed on all sides of non-conducting material, so that there is no danger from an "arc" being formed between the contacts in the separate compartments.

The "arc" formed between the ends of the wires at the contacts h^6 and h^7, or h^8 and h^9, is very powerful and intensely hot when the fuse melts, hence the advantage of the interposed non-conducting walls B⁷ B⁸ on the blocks B⁵ B⁶, which break the "arc" and prevent danger therefrom. The moment one or both of the fuses burn, the circuit is broken, and the fuse must be replaced before the current can be restored. To do this the door A³ is opened and the block B⁵ or B⁶ removed by slipping it endwise until the contacts are disconnected. This ability to remove the fuse blocks entirely from the casing and thereby entirely disconnecting them from the highly charged wires, is another important advantage, as it is a very dangerous operation to insert these fuse wires in the ordinary manner when the dynamos are running. With my simple arrangement however, no possible danger exists, as the fuse wires are wholly upon the blocks B⁵ B⁶, and they are entirely disconnected from the other parts when the fuses are inserted.

Having thus described my invention, what I claim as new is—

1. In an electrical transformer, a casing A′ having insulation strips r^3 r^4 secured therein, a coil E, a core formed of "L" shaped plates suitably clamped and inclosing said coil, and insulating strips, and holding bolts, whereby said coil and coil sections may be readily inserted into and removed from said casing, substantially as and for the purpose set forth.

2. In an electrical transformer, a casing, an insulated coil, a core formed of sections of "L" shaped plates suitably clamped and inclosing said coil, non-conducting strips and binding bolts by which said coil and its core are secured in said casing, substantially as and for the purpose set forth.

3. In an electrical transformer, a casing inclosing the coil and its cores, a non-conducting diaphragm B′ forming a division across the interior of the casing, and with partitions B² B³ and B⁴, and with contact clips h' h^2 h^3 h^4 suitably connected to the conductor wires of said coil, contact supporting blocks B⁵ B⁶ and with clips h^6 h^7 h^8 h^9, adapted to engage with the clips upon said diaphragm, and with fuse wires D′ D² connecting the clips upon said contact blocks, substantially as and for the purpose set forth.

4. In an electric transformer, a casing supporting the coil and its core, a non-conducting diaphragm plate having the contacts of the primary wires attached thereto, non-conducting contact blocks having contacts united by fuse wires and adapted to engage removably with the contacts on said diaphragm plate, and a door hinged in the bottom of said cas-

ing and adapted to support said contact blocks and secured by a screw knob, substantially as and for the purpose set forth.

5. In an electric transformer, a casing supporting the coil and its core and the contact blocks, a door hinged in the bottom of said casing, and with recesses opening into the opening of said door, and grooved insulator blocks for the conductor wires adapted to be inserted in said recesses and be held in place by said door when closed, substantially as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

FRANK S. CULVER.

Witnesses:
M. B. HUBBARD,
CHAS. C. HUNNER.