

No. 826,283.

PATENTED JULY 17, 1906.

L. M. SCHMIDT.  
TRANSFORMER.

APPLICATION FILED AUG. 7, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

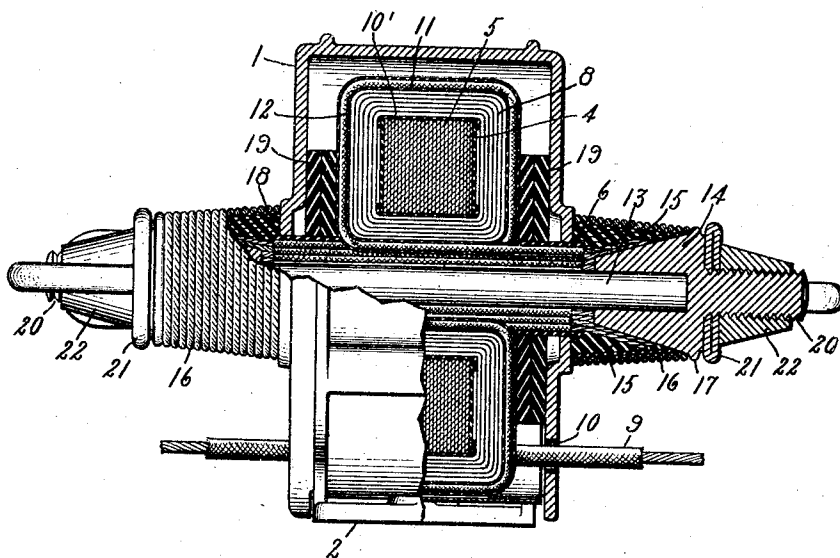
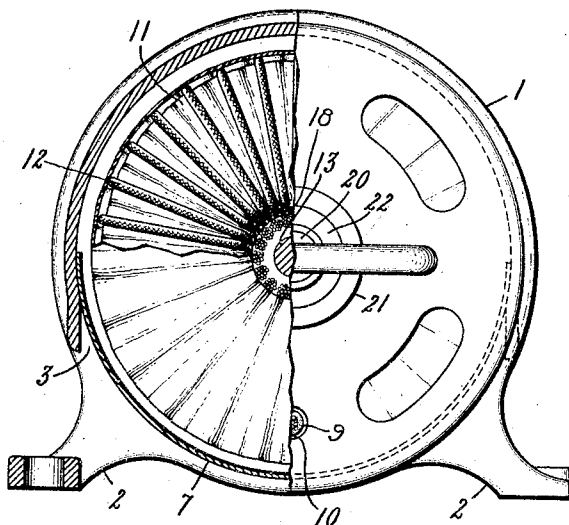


Fig. 2.



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Att'y.

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2 SHEETS—SHEET 2.

Fig. 3.

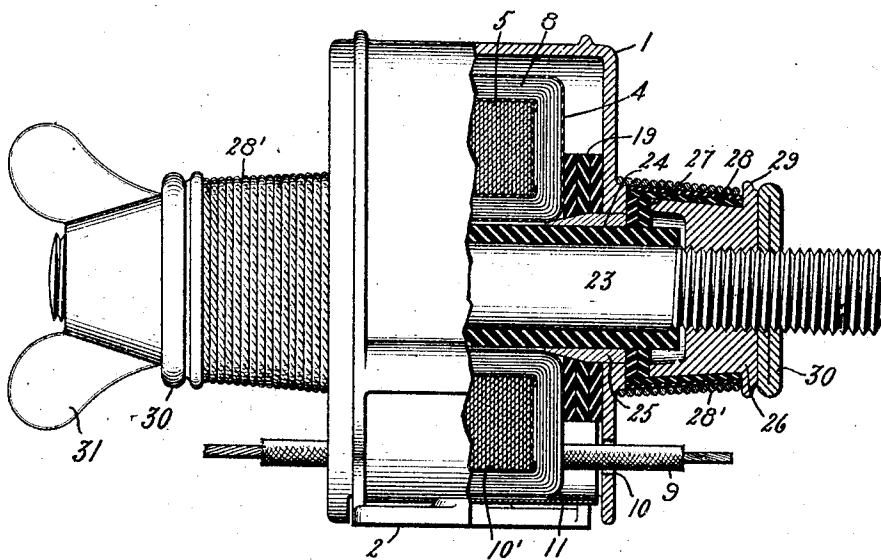
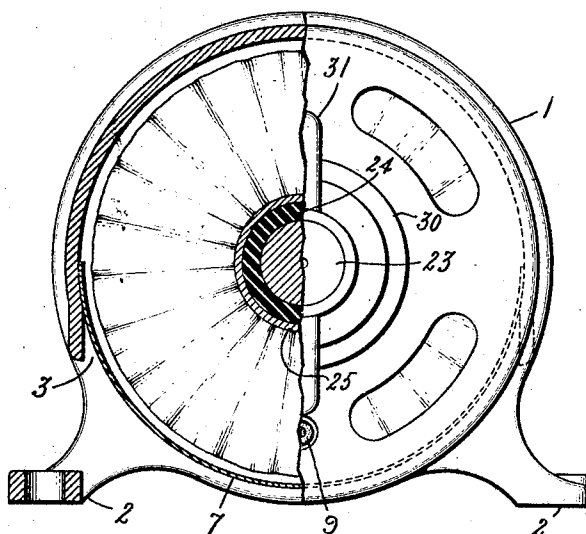


Fig. 4.



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# UNITED STATES PATENT OFFICE.

LOUIS M. SCHMIDT, OF LYNN, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

## TRANSFORMER.

No. 826,283.

Specification of Letters Patent.

Patented July 17, 1906.

Application filed August 7, 1905. Serial No. 273,000.

*To all whom it may concern:*

Be it known that I, LOUIS M. SCHMIDT, a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Transformers, of which the following is a specification.

My present invention relates to the construction of transformers, and more particularly to the construction of small transformers, such as the so-called "current-transformers" used in connection with measuring instruments, &c., as where it is desired to derive a secondary current bearing a definite relation to and usually much smaller than a varying primary current.

The object of my invention is to improve and simplify the mechanical and electrical features of such transformers.

The various features of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of my invention, however, reference may be had to the accompanying drawings and descriptive matter, in which I have illustrated and described forms in which my invention may be embodied.

Of the drawings, Figure 1 is a side elevation, partly broken away and in section, illustrating one form of transformer embodying my invention. Fig. 2 is an end elevation, partly broken away and in section, of the transformer shown in Fig. 1. Figs. 3 and 4 are views similar to Figs. 1 and 2, respectively, illustrating a slightly-modified form of construction.

In both of the forms of my invention illustrated the transformer proper is housed in a casing 1, preferably in the form of a cylindrical integral shell made of suitable material, such as cast-iron. The casing 1 may be provided with supporting-feet 2. An opening 3 is formed in the curved portion of the casing, through which the annular core 4 is inserted. The core 4 may be made up of annular punchings 5. After the core and any windings which may surround it are inserted in the casing a supporting member is passed through the center of the core, with its ends projecting through centrally-located openings 6, formed in the end walls of the casing. The opening 3 may be closed when desired by means of an arc-shaped slide 7, which may be

formed out of sheet-iron or the like. The slide 7 may be moved round against the inner surface of the cylindrical portion of the casing to permit access to the interior of the casing.

In the construction shown in Figs. 1 and 2 60 the windings on the core comprise an inner winding 8, which may consist of a comparatively large number of turns about the core and forms the secondary winding of the transformer. The terminals 9 of this winding are brought out through openings 10, 65 formed for the purpose in the end walls of the casing. The winding 8 is separated from the core by a layer of insulation 10'. The winding may also be surrounded by insulation 11. 70 The primary winding of the transformer in this form of my invention consists of a number of conductors 12, each of which makes one turn about the core. The ends of the conductors 12 are brought out through the 75 central aperture 6. In the assembled transformer the ends of the conductors 12 are arranged to form a substantially tubular shell. The supporting means proper for the core and its windings in this form of my invention 80 consists of a bar or rod 13, preferably formed of insulating material, which extends through the core and through the openings 6, being located within the conductors 12. The ends of the bar 13 engage in sockets formed for the 85 purpose in blocks 14, which form the primary terminals. As shown, the portion of each terminal adjacent the casing is in the form of a truncated cone.

The appropriate ends of the conductors are 90 secured to the conical surface of the member 14 by soldering or in other suitable manner. The portion of the conductors 12 soldered to the terminals are of course bare and are surrounded by suitable insulation 15, which may 95 be in the form of layers of varnished cloth, tape, or the like. A layer of cord 16 extends between the bead 17 on each terminal member and the adjacent end of the casing. This cord, which is varnished, gives a finished 100 appearance to the transformer and increases the mechanical strength of the terminal portions. A shell of insulating material 18, which may be in the form of a hard-rubber or 105 paper tube, surrounds each set of ends of the conductors 12 and extends between the core and the outer wall of the adjacent end of the housing. The tubes 18 are surrounded by

insulation, which may be in the form of disks 19, of suitable material. The disks 19 extend between the end walls of the casing and the adjacent sides of the wound core and serve to position the latter.

In assembling the transformer ordinarily the core and the disks 19 are inserted in the casing simultaneously, the ends of the conductors 12 being then doubled back into the space afterward occupied by the bar 13. After the core is in place the ends are pulled out into substantially the position occupied by them in the completed article. The bar 13 and tubes 18 are then put into place and the ends of the conductors are secured to the terminal portions 14, after which the insulation 15 and the cords 16 are put in place. The outer ends of the terminals 14 are provided with threaded extensions 20. The terminals 21 of conductors connected to the windings 12 are clamped between the outer ends of the conical portions of the terminals and clamping-nuts 22 secured upon the extensions 20.

In the form of my invention shown in Figs. 3 and 4 the core having a primary winding 8 is inserted, with washers 19, in the manner described in connection with the construction shown in Figs. 1 and 2. In this form of my invention, however, the primary winding consists of a bar 23, of conducting material, which passes axially through the core and forms a supporting means for the core of the transformer. The bar 23 is surrounded by insulating material 24, which may be in the form of a tube extending axially through the core. In order to more firmly secure the parts in place, tubular members 25, which may be formed of wood or other suitable material, are provided, which extend between the outer surface of the end walls of the casing and the core. The members 25, which have their inner ends tapered, may be forced into place to firmly clamp the parts into position. On each of the ends of the bar 23, which are threaded, is screwed a terminal portion 26. Between the inner ends of the terminal portion 26 and the end wall of the casing is placed insulation, which may be in the form of disks 27, of suitable material. Insulation 28, which may comprise several layers of varnished cloth or the like and a layer of cord 28', extends between each end wall of the casing and a bead 29, formed on the adjacent terminal portion 26. The terminal portions 30 of the conductors connected to the ends of the bar 23 are clamped between the outer ends of the members 24 and clamping-nuts 31 screwed upon the ends of the bar 23.

Aside from the differences pointed out the construction shown in Figs. 1 and 2 and 3 and 4, respectively, are substantially identical. In each case the construction is extremely simple and satisfactory. The core and the winding of the transformer are pro-

tected from mechanical injury by the casing. The ends of the core and winding are separated from the end walls of the casing or housing by the washers in a very satisfactory manner, and as the periphery of the core and its winding are separated from the casing by an air-space it will be observed that the core and its winding are very effectively insulated from the casing. At the same time the apparatus is not bulky and presents a neat appearance.

It will be obvious to all those skilled in the art that changes may be made in the form of embodiments disclosed without departing from the spirit of my invention, and I do not wish the claims hereinafter made to be limited to the particular embodiments disclosed more than is made necessary by the state of the art.

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

1. In a transformer, a core having an opening or passage formed in it, a casing for inclosing the core formed with openings in opposite walls, a support for the core extending through the opening or passage therein and supported in said casing or openings.

2. In a transformer, a core having an opening or passage formed in it, a housing for the transformer including a pair of walls between which the core is supported, each of said walls being formed with an opening and a support for the core which extends through the opening or passage therein and is supported in the openings in said housing-walls.

3. In a transformer, a casing comprising a cylindrical portion and end walls, said casing being formed with an opening in its cylindrical portion, and an opening in each end wall, a core inserted in the casing, through the opening in the cylindrical portion, and a support for the core extending through said end walls, a winding on the core, and terminals therefor which also extend through said openings in the end walls of the casing.

4. In a transformer, an annular core, an inclosing casing therefor, said casing having openings formed in opposite sides, and a support for the core passing through said opening and through said core, and insulating-washers between the ends of the core and adjacent casing-walls.

5. In a transformer, an annular core, a winding thereon, an inclosing casing therefor, said casing having openings formed in opposite walls, and a support for the core passing through said openings and through said core, insulation between the ends of the core and the adjacent casing-walls, the periphery of the core and winding thereon being separated from the adjacent portion of the casing by space.

6. In a transformer, an annular core, an inclosing casing therefor, cylindrical in outline, said casing having an opening formed in

its curved surface through which the core may be inserted, and openings formed centrally in its end walls, and a support for said core passing through said openings and through said core.

7. In a transformer, a hollow core, an inclosing shell or casing, formed with an opening through which said core may be inserted, and with other openings, a support for the core extending through said other openings and the core, and a slide located within the casing for closing the opening through which the core is inserted.

8. In a transformer, a ring-shaped core, a cylindrical shell or casing inclosing it, said casing being formed with an opening in its curved surface through which the core is inserted and with openings in its end walls through which a support for the core is passed and a curved slide for closing the first-mentioned opening located within the casing.

9. In a transformer, a core, a winding thereon, an inclosing shell or casing formed with an opening through which said core may be inserted, and with other openings, a support for the core passing through said other openings, and terminal members without said shell secured to said support, the ends of said winding passing through said other openings and being secured to said terminals.

10. In a transformer, a hollow core, windings thereon, an inclosing shell or casing formed with an opening through which said core may be inserted and with other openings, a support for said core passing through said other openings and through said hollow core, the ends of said support projecting out of said other openings, terminal members formed with sockets in which the ends of said support enter, the ends of said winding also extending through said openings and being secured to said terminal member.

11. In a transformer, a hollow core, windings thereof, an inclosing shell or casing formed with an opening through which said core may be inserted and with other openings, a support for said core passing through said

other openings and through said hollow core, the ends of said support projecting out of said other opening, terminal members formed with sockets in which the ends of said support enter, the ends of said winding also extending through said openings and being secured to said terminal member, and insulation surrounding said projecting ends of the winding.

12. In a transformer, a hollow core, windings thereon, an inclosing shell or casing formed with an opening through which said core may be inserted and with other openings, a support for said core passing through said other openings and through said hollow core, the ends of said support projecting out of said openings, terminal members formed with sockets in which the ends of said support enter, the ends of said winding also extending through said openings and being secured to said terminal members, and insulation surrounding each of said projecting ends of the winding, said insulation comprising a layer of cord.

13. In a transformer, a hollow core, a winding about said core, an inclosing shell or casing formed with an opening through which said core is inserted and with other openings, a support passing through said other openings and through said hollow core, terminal members formed with sockets into which one end of said support extends, each of said terminal members being formed with circumferentially-extending bead or shoulder, the ends of the winding passing through said other openings and being secured to said terminal members, and insulation surrounding each of the projecting ends of the winding comprising a layer of cord which extends between the wall of the casing and the shoulder on the adjacent terminal.

In witness whereof I have hereunto set my hand this 3d day of August, 1905.

LOUIS M. SCHMIDT.

Witnesses:

JOHN A. McMANUS, Jr.,

DUGALD McK. McKILLOP.