H. F. SELINGER.

TRANSFORMER.

APPLICATION FILED MAY 21, 1908.

916,792. Patented Mar. 30, 1909

2 SHEETS—SHEET 1.

Fig. 1.

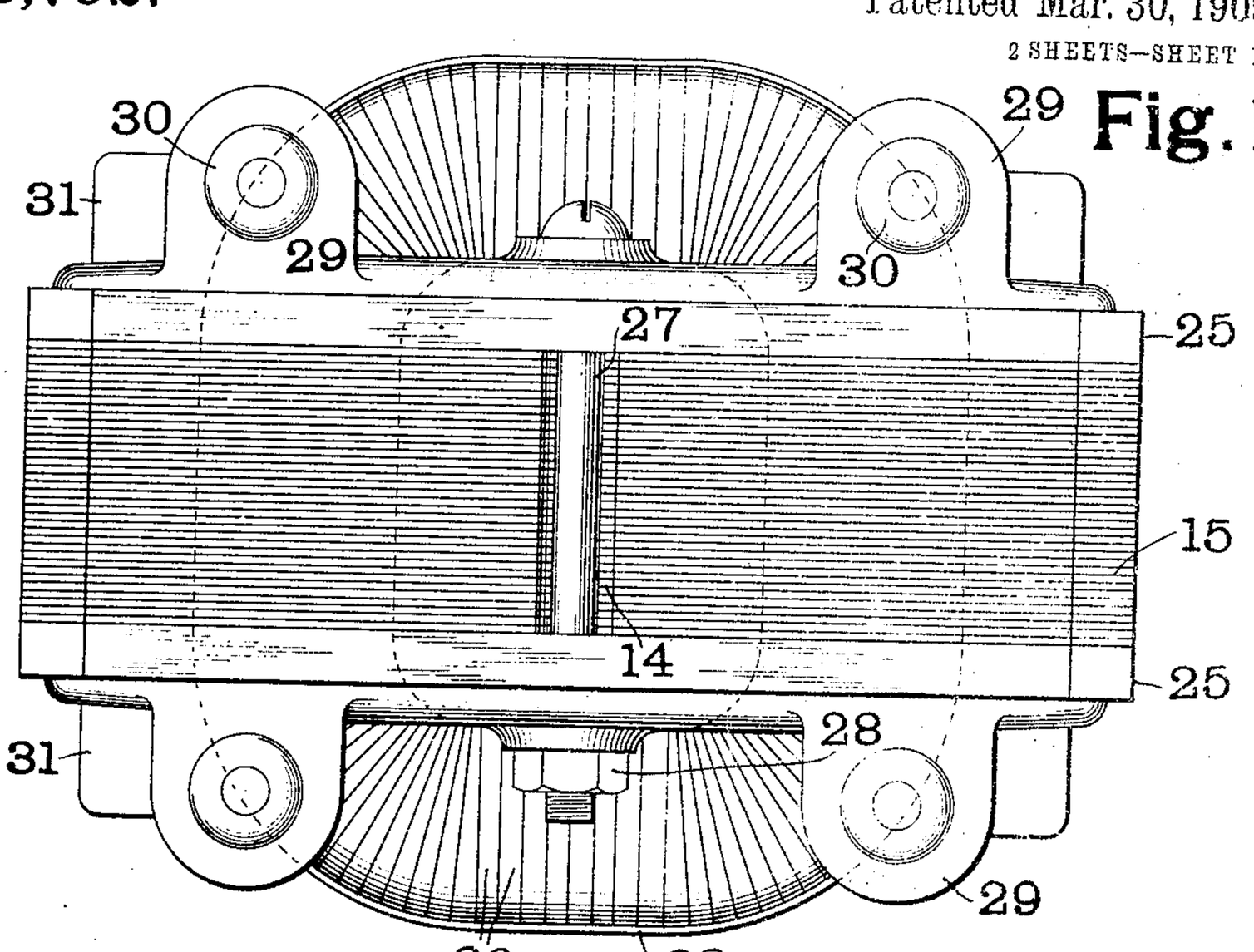
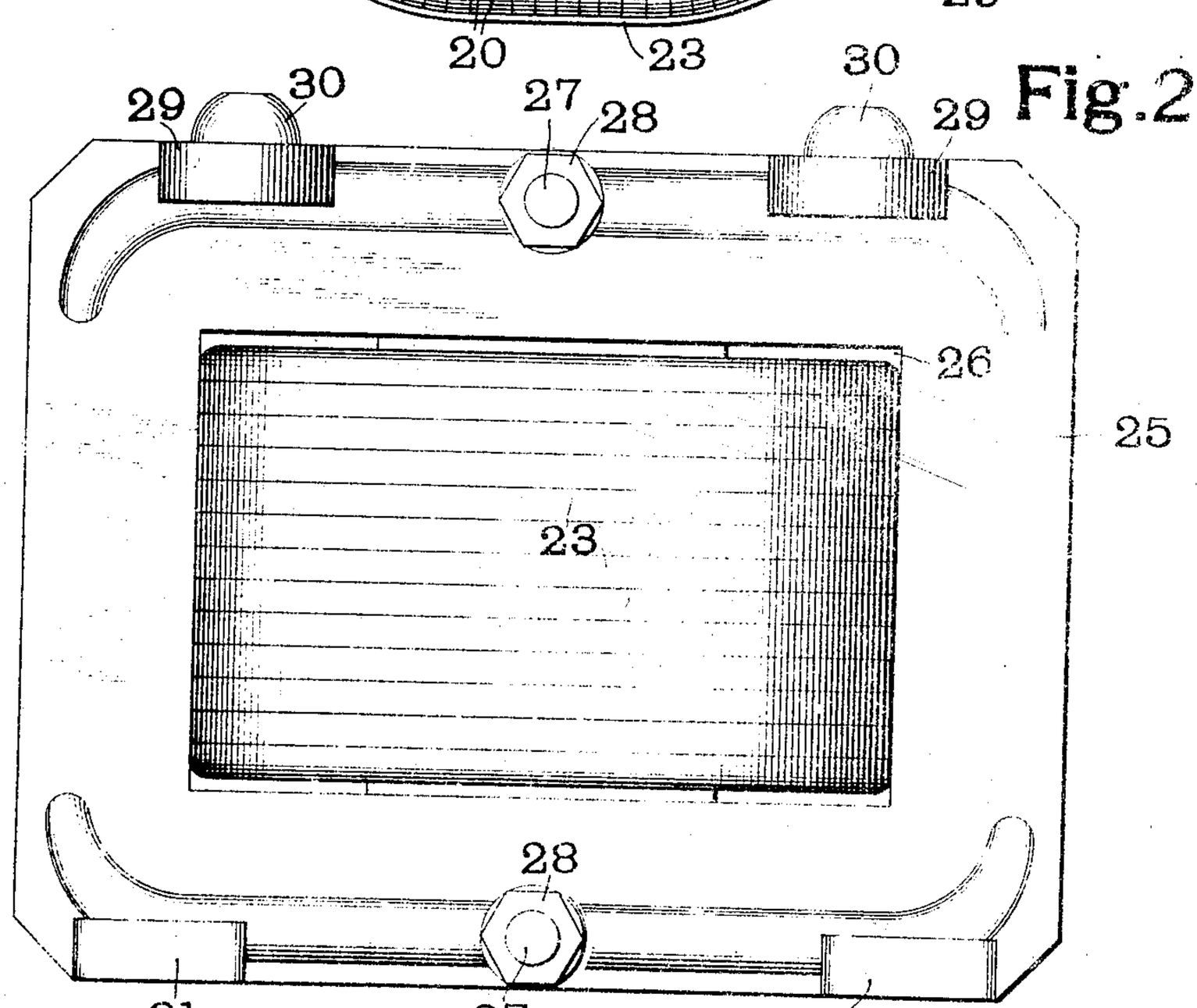


Fig. 2.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 3.

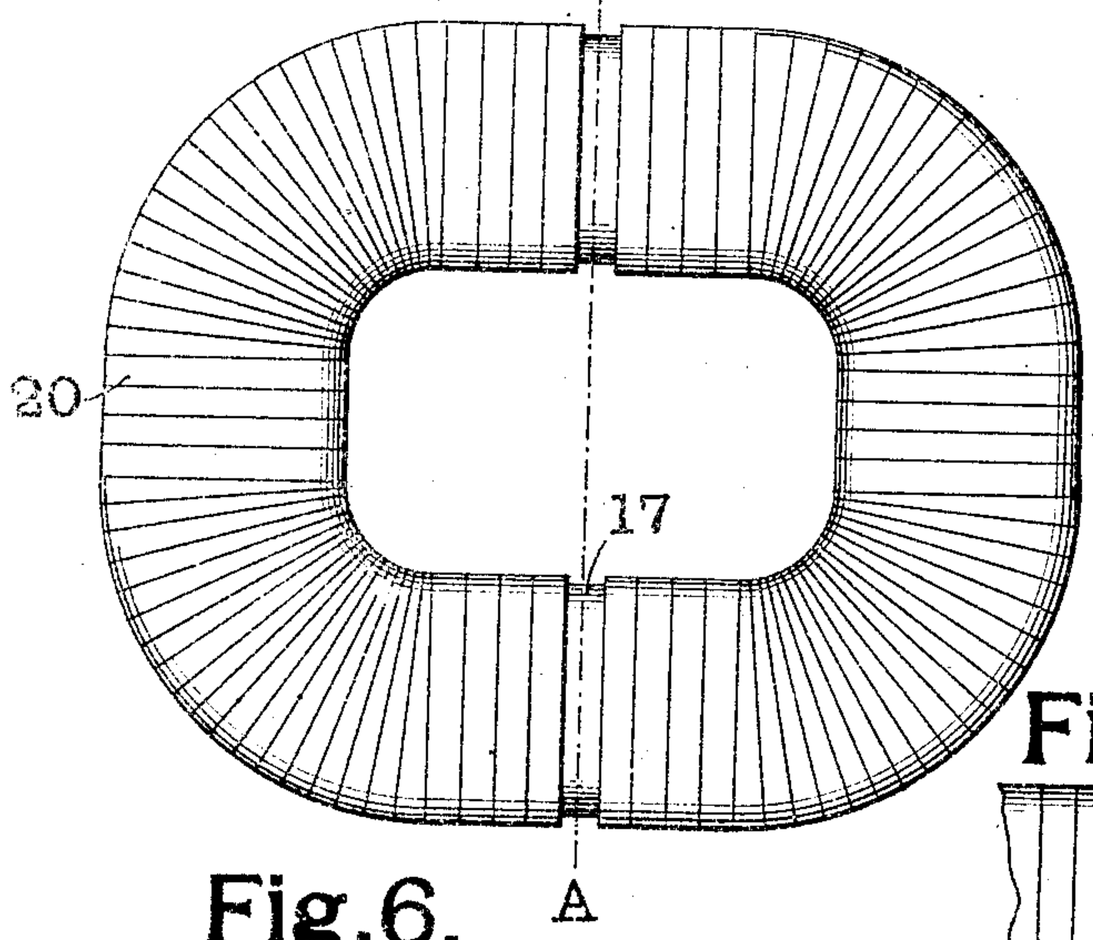


Fig. 4.

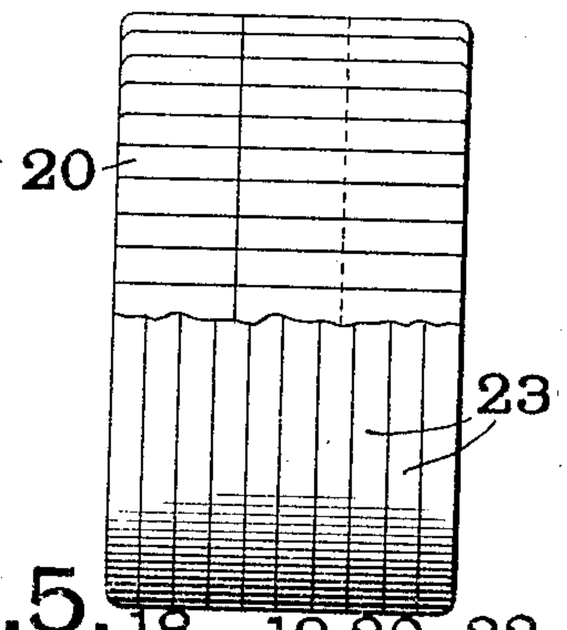


Fig. 5.

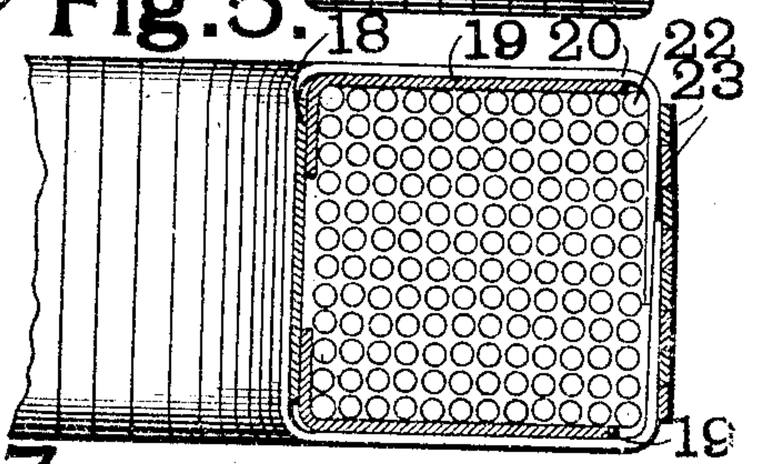


Fig. 6.

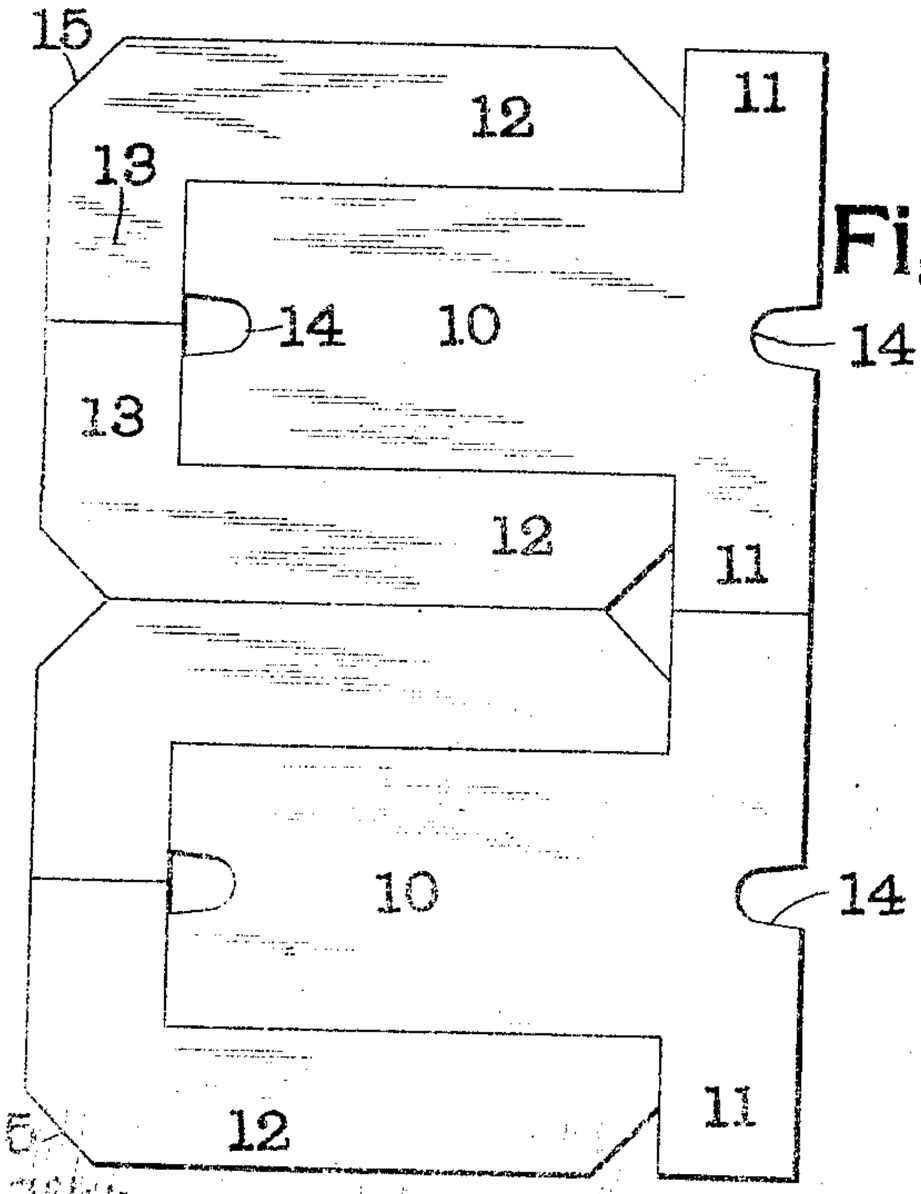
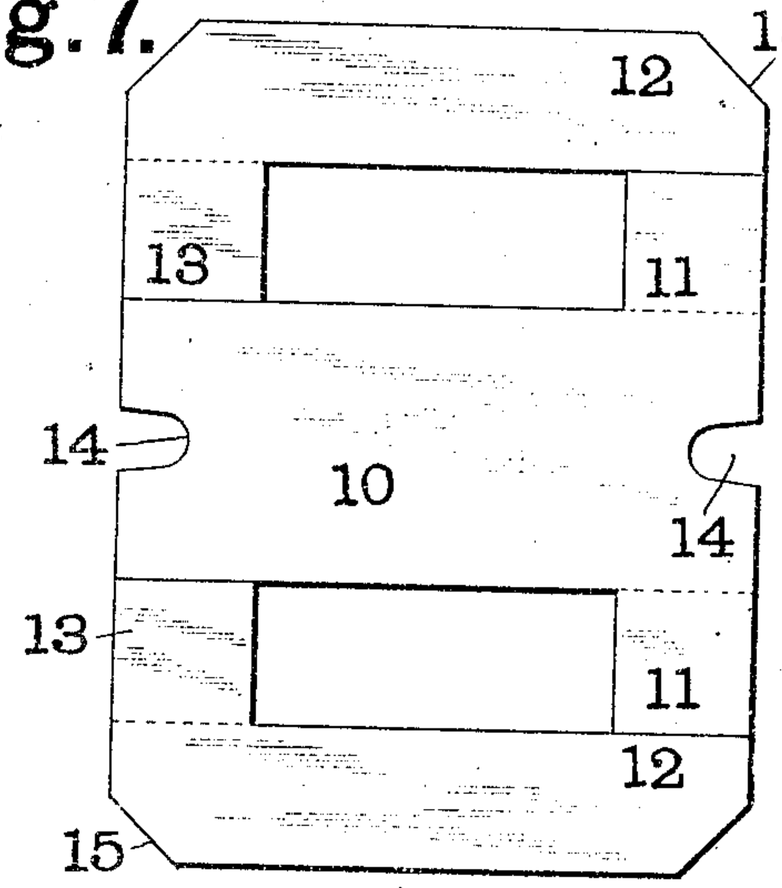


Fig. 7.



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UNITED STATES PATENT OFFICE.

HUGO F. SELINGER, OF ST. LOUIS, MISSOURI, ASSIGNOR TO WAGNER ELECTRIC MANUFACTURING COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

TRANSFORMER.

No. 916,792. Specification of Letters Patent. Patented March 30, 1909.

Application filed May 21, 1908. Serial No. 434,052

To all whom it may concern:

Be it known that I, HUGO F. SELINGER, a citizen of the United States, residing at the city of St. Louis, State of Missouri, have invented a certain new and useful Transformer, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to transformers, and is particularly adapted to use in connection with small sized transformers known as potential transformers and used in connection with switch board instruments. My invention, however, is not confined to such type of transformers.

The object of my invention is to reduce the internal losses of the transformer by using the shortest possible mean length of turn in the winding and utilizing the space which is usually wasted by being filled with insulation. To this end I so construct the core and the insulation between the core and the winding that the winding may be applied directly to the core in place of being first wound upon a form and then transferred to the core.

In the accompanying drawings which illustrate one form of transformer made in accordance with my invention, Figure 1 is a top plan view of the complete transformer, Fig. 2 is a side elevation, Fig. 3 is a view showing the manner of forming the cells for insulating the winding from the core, Fig. 4 is an end view of one of the cells, the outer wrapping being partially broken away, Fig. 5 is a cross-section through the winding and insulation, Fig. 6 is a view showing the manner of stamping out the laminæ forming the core and Fig. 7 is a view showing one of the laminæ in position.

Like marks of reference refer to similar parts in the several views of the drawings.

Referring first to Figs. 6 and 7. Each lamina of the core consists of a T-shaped member and two L-shaped members stamped out of sheet metal. The T-shaped member consists of a body portion 10 forming the inner part of the core around which the winding is placed and two short arms 11 projecting therefrom at right angles. Each of the L-shaped members consists of a long arm 12 and a short arm 13. The T-shaped member 10 is provided at each end with notches 14 and the corners of the L-shaped members 12 are preferably chamfered, as shown at 15. In the complete transformer the members forming the laminæ are assembled as shown in Fig. 7, the inner sides of the long arms of the member 12 abutting against the outer ends of the short arms 11 of the T-shaped members and the short arms 13 of the L-shaped members abutting against the body portion 10 of the T-shaped members. In assembling the parts, the laminæ are alternately disposed as indicated by dotted lines in Fig. 7. Every second lamina may be thus alternately disposed or the laminæ may be arranged in groups of two or more and the groups alternately disposed. In building up the core, the L-shaped members 12 are not placed in position but only the T-shaped members 10 so that the resulting structure is H-shaped in order that it may receive the insulating cells which will be hereinafter described.

In forming the insulating cells for insulating the winding from the core, a suitable form such as shown at 17 in Fig. 3 may be used. To this form is first applied a sheet covering of textile material which covers the inner side of the faces of the form but not the periphery. In the drawings I have shown this as formed of three separate sheets, one sheet 18 being applied to the inner side and two sheets 19 to the faces, these sheets 19 being made to overlap the sheet 18 as shown in Fig. 5. After these sheets have been placed in position and secured in any suitable manner, strips 20 of suitable textile material are wrapped around the form as best shown in Fig. 3, the sheets 18 and 19 being first coated with a suitable adhesive material, preferably shellac varnish or other adhesive material which is also a good insulating material. After the insulating material is dried so as to firmly unite the sheets 18 and 19 to the strips 20 the periphery of the two cells thus formed is divided circumferentially so that the cells which are flexible may be removed from the core or form 17 upon which they are made. In order to facilitate this removal as well as the winding of the strips 20, the form may be made separable along the broken line A—A, Fig. 3. The form 17 is preferably somewhat larger in cross section than the coil to which the insulation is to be applied

so that the strips 20, when the cell is applied to the coil, may be slightly overlapped, as shown in Figs. 4 and 5.

After the T-shaped members 10 have been assembled as above described and the insulating cells formed, the insulating cells are applied around the central portion of the core formed by the bodies 10 of the T-shaped members and the whole structure thus formed is placed in a suitable lathe and the coil 22 wound directly in the insulating cells. This can be readily accomplished as the divided periphery of the cells can readily be bent in such position as not to interfere with the winding. After the winding of the coil is completed, the peripheral part of the cells is overlapped as shown in Fig. 5, and strips of textile material 23 are wound around the periphery at right angles to the strips 20 so as to unite the divided portion of the cells. After this is accomplished the L-shaped members 12 are placed in position so as to form removable yokes completing the core. In order to hold the core together, two face plates 25 are provided each of which corresponds in form to the shape of the completed core and has a central opening 26 to allow the winding to project through the plate. The plates 25 are clamped in position against the faces of the core by means of bolts 27 which pass through said plates and through the notches 14 formed in the T-shaped members of the core. The bolts 27 are engaged by nuts 28. The face plates 25 are provided with lugs 29 carrying insulating bushings 30 through which the wires leading to and from the winding 22 may be passed. The plates 25 are also provided with suitable feet 31 upon which the completed transformer rests.

It will be seen that by my construction the winding 22 may be applied more closely to the central portion of the core than is possible where the coil is separately wound and afterward applied to the core and, moreover, the space in the core may be completely filled by the winding, thus not only reducing the mean length of the turns of the winding, but also securing a greater number of turns in the winding. In this manner the internal losses of the transformer are greatly reduced.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent of the United States, is:

1. In a transformer, the combination with a core, of a winding thereon, a flexible insulating cell for separating said winding and core, said insulating cell being parted at its periphery, and means for connecting the parted portion of said cell.

2. In a transformer, the combination with a core, of a winding thereon, a flexible insulating cell of textile material for separating said winding and core, said insulating cell being parted at its periphery, and means for connecting the parted portion of said cell.

3. In a transformer, the combination with a core, of a winding thereon, an insulating cell comprising strips of textile material for separating said winding and core, said insulating cell being parted at its periphery, and means for connecting the parted portion of said cell.

4. In a transformer, the combination with a core having removable yokes, of a winding on said core, an insulating cell separating said winding and core, said insulating cell being parted at its periphery, and means for connecting the parted portion of said cell.

5. In a transformer, the combination with a core having removable yokes, of a winding on said core, an insulating cell comprising strips of textile material for separating said winding and core, said insulating cell being parted at its periphery, and means for connecting the parted portion of said cell.

6. In a transformer, the combination with a core, of a winding thereon, an insulating cell comprising a sheet of textile material with strips of textile material wound thereon for separating said winding and core, said insulating cell being separated at its periphery, and means for connecting the parted portion of said cell.

7. In a transformer, the combination with a core having removable yokes, of a winding thereon, an insulating cell comprising a sheet of textile material and strips of textile material wound thereon for separating said winding and core, said insulating cell being parted at its periphery, and means for connecting the parted portion of said insulation.

8. In a transformer, the combination with a core, of a winding thereon, an insulating cell of flexible material for separating said winding and core, said cell being separated at its periphery, and strips of flexible material wound on said cell to connect the parted portion thereof.

9. In a transformer, the combination with a core having removable yokes, of a winding on said core, an insulating cell comprising strips of textile material for separating said winding and core, said insulating cell being parted at its periphery, and strips of textile material wound on said first named strips substantially at right angles thereto to connect the parted portion of said cell.

10. In a transformer, the combination with a core, of a winding thereon, an insulating cell comprising a sheet of textile material with strips of textile material wound thereon for separating said winding and core, said insulating cell being separated at its periphery, and strips of textile material wound on said first named strips substantially at right angles thereto to connect the parted portion of said cell.

11. In a transformer, the combination with a core having removable yokes, of a winding thereon, an insulating cell comprising a sheet of textile material and strips of textile material wound thereon for separating said winding and core, said insulating cell being separated at its periphery, and means for connecting the parted portion of said cell.

12. In a transformer, the combination with a laminated core having removable yokes and provided at its side with notches, of a winding for said core, an insulating cell for separating said core and winding, face plates for holding the laminæ of said core in position, and bolts seated in said notches and holding said face plates.

13. In a transformer, the combination with a core composed of alternately disposed T-shaped members and L-shaped members making lap joints therewith and forming removable yokes, of a winding on said core, an insulating cell separating said winding and core, said insulating cell being parted at its periphery, and means for connecting the parted portion of said cell.

14. In a transformer, the combination with a core comprised of alternately disposed T-shaped members and L-shaped members making lap joints therewith and forming removable yokes, of a winding on said core, an insulating cell comprising strips of textile material for separating said winding and core, said insulating cell being parted at its periphery, and means for connecting the parted portion of said insulation.

15. In a transformer, the combination with a core composed of alternately disposed T-shaped members and L-shaped members making lap joints therewith and forming removable yokes, of a winding on said core, an insulating cell comprising a sheet of insulating material and strips of textile material wound thereon for separating said winding and core, said insulating cell being separated at its periphery, and means for connecting the parted portion of said cell.

16. An insulating cell for transformers or the like comprising a wound tubular member of insulating material, said tubular member having a slit for admitting the conductors.

17. An insulating cell for transformers or the like comprising a tubular member spirally wound, of strips of insulating material, said strips being adhesively joined to form a single structure, and said tubular member having a slit to admit the conductors.

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

HUGO F. SELINGER. [L. S.]

Witnesses:

B. M. SCHLICHTING,

LUDWIG GUTMANN.