Oct. 25, 1932. C. H. THORDARSON 1,884,385

ELECTRICAL APPARATUS AND METHOD OF MAKING TERMINAL STRIPS THEREFOR

Filed May 29, 1930

Fig. 1.

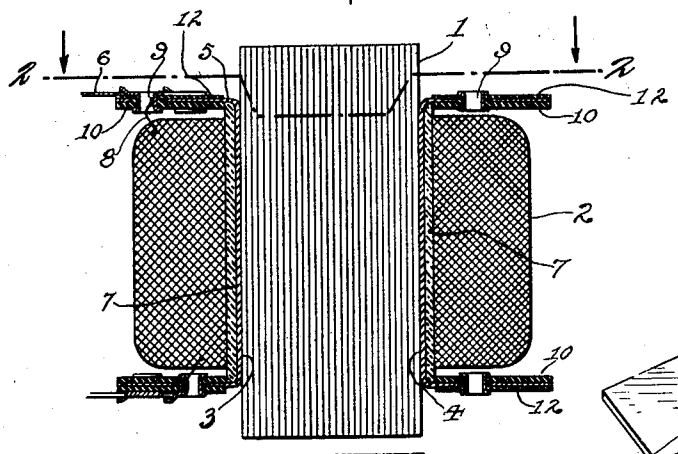


Fig. 3.

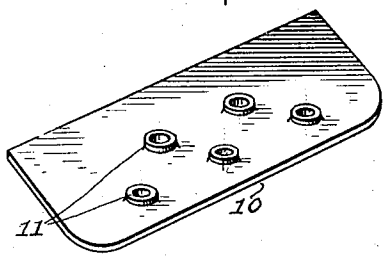


Fig. 2.

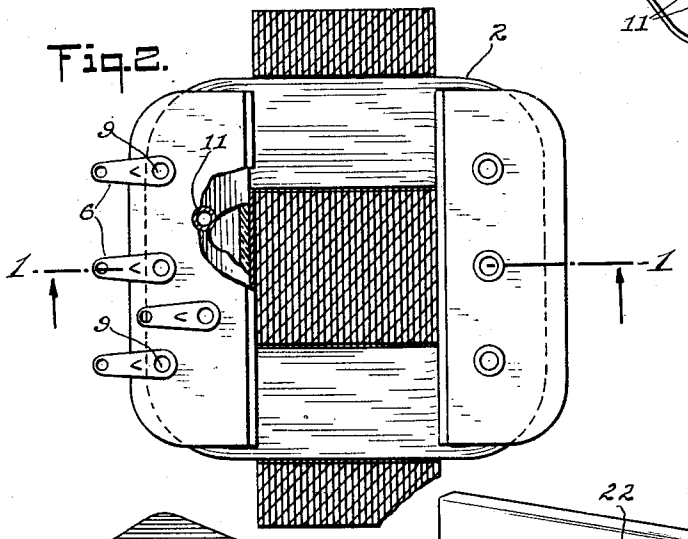
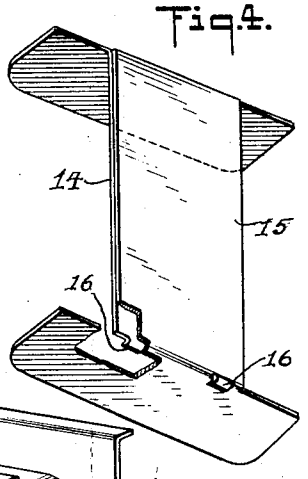


Fig. 4.



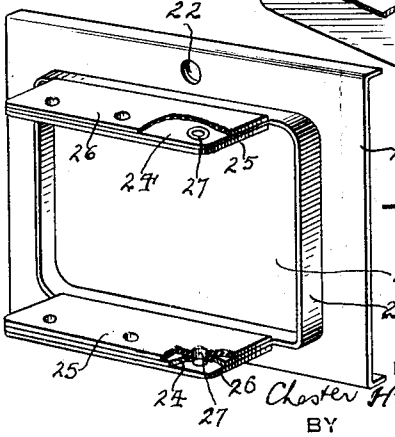


Fig. 5.

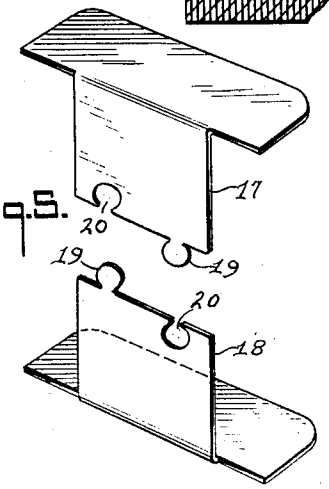


Fig. 6.

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UNITED STATES PATENT OFFICE

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ELECTRICAL APPARATUS AND METHOD OF MAKING TERMINAL STRIPS THEREFOR

Application filed May 29, 1930. Serial No. 456,868.

This invention relates to electrical apparatus and in particular to methods and means for effecting electrical connections in transformers, repeating coils, inductances, etc.

An object of the invention relates to an inductance coil, or a transformer wherein the electrical connections or "taps" are made and the lead wires therefore fastened in a novel manner. In achieving this object it is proposed to mount the connecting lugs or tabs for the lead-in wires, on a member which is substantially rigidly mounted with respect to the core or other similar part of the device.

Another object is to provide a transformer, inductance coil or strip which is securely fastened to the core or other similar part of the device. As a result of this object, when the device is assembled, the terminal board is in effect unitary with the core and windings and vibrations of the latter do not cause relative displacements between the core and the terminal board.

A further object of the invention is to provide a novel method of assembling a transformer, repeater coil, inductance coil, etc. and rigidly retaining the terminal strip in proper position.

A further object relates to a method of manufacturing terminal boards or strips capable of use in any form of electrical apparatus.

Another object is to provide a novel form of terminal board or strip capable of use in any form of electrical apparatus.

A feature of the invention relates to the manner of insulatingly mounting connecting tabs or prongs on a metallic terminal board or strip.

Another feature relates to the method of insulatingly attaching terminal lugs or prongs to a metallic terminal board or strip whereby the lugs or prongs remain fast permanently and are not loosened due to the heat applied in soldering connecting wires thereto. In achieving this latter feature it has been found that if a facing of bakelite or other similar material is applied to one space of the metallic board and a strip of impressionable material such as fibre or the like is applied to the other face of the board that the terminal lugs in the form of eyelets may be employed, and that the heat incident to soldering wires to these lugs does not cause the eyelets or lugs to become loose.

Accordingly another feature of the invention relates to a terminal board or strip capable of general use in electrical apparatus, said board comprising a layer of metal, a facing on one side of bakelite or other similar material, and a facing of impressionable material such as fibre on the other side.

Other features and advantages not specifically enumerated will be apparent after a consideration of the following detailed description and the appended claims.

While the invention will be described and embodied in connection with certain specific forms of apparatus, it is understood that the invention in its broad aspects is capable of use in any situation where connections are to be made to a terminal board.

Referring to the drawing;

Fig. 1 shows a sectional view in elevation of a transformer embodying features of the invention;

Fig. 2 is a top plan view, partly in section, of the device represented in Fig. 1;

Fig. 3 is a detail view of one of the facings for the terminal strip shown in Figs. 1 and 2;

Fig. 4 is a detail view showing one manner of positioning the terminal strips for assembly;

Fig. 5 shows a modified manner of uniting the terminal strips;

Fig. 6 shows another manner of mounting the terminal strips.

Referring more particularly to Figs. 1 and 2 of the drawing the numeral 1 represents a laminated core of any shape and structure well known in the transformer art. Surrounding one leg of the laminated core is a winding 2. For the purpose of description it will be assumed that the core is built up of E-shaped laminations in the usual manner and that the winding 2 surrounds the central leg of the E-shaped core.

Positioned between the core 1 and the winding 2 are a pair of metallic terminal strips 3, 4, which have their ends bent over at right angles

as indicated by numeral 5 to provide a supporting backing for the terminal lugs 6. Positioned between the strips 3 and the surface of winding 2 are insulation strips 7 of cardboard, fibre, bakelite or other similar insulation materials. The thickness of the strips 7 is preferably such that the backing members 3, 4 are tightly wedged between the winding and core. In effect, therefore, the members 3, 4 are rigid with the core and winding, and if the core is subjected to vibration due to the alternating current, or due to accidental causes, the turned over portions 5 are not subjected to separate movement relative to the core, as is the case where the terminals are attached to a strip not rigidly united with the core. Consequently the lead-in wires are relieved from rubbing and undue vibrations.

Inasmuch as the members 3, 4 are of metal it is necessary to insulate the contact lugs 6 therefrom. While any prior art method of insulatingly attaching the lugs 6 to members 3 may be employed it is preferred to employ the method about to be described, which forms one of the important and novel features of the invention.

The turned over portions 5 are provided with a plurality of perforations to receive the eyelets 9 which carry the soldering lugs 6. In order to insulate the eyelets from the metal member 5, it is necessary to provide bushings for the perforations through which the eyelets pass. The common practice heretofore has been to provide individual bushings for each perforation. This procedure however has numerous disadvantages including the cost and inconvenience of separately assembling each bushing. Furthermore when separate bushings are employed they must be extremely accurately formed or otherwise they will be loose and not provide the proper insulation. It has been found that these and other disadvantages may be overcome by providing what may be termed a "gang-bushing". This bushing 10 is preferably in the form of a sheet of fibre as represented in Fig. 3 and is provided with a plurality of perforated annular bosses 11 disposed so that they register with the perforations in member 5. While any well known manner of forming these bosses may be employed it is preferred to form them in a single operation by placing the sheet 10 against the member 5 and subjecting it to sufficient pressure to cause the portions 11 to bulge or extrude through the perforations in member 5. At the same time a suitable tool may be employed to perforate and round-off the extruded portions to form the annular bosses.

The sheet of fibre 10 may be of sufficient thickness so that when the bosses are formed as above described they extend a distance through and beyond the plate 5, in which case the annular bosses may be flattened out in any suitable manner to provide an insulating surface on the opposite face of plate 5. It is preferred, however, to form the bosses 11 of the same depth as the thickness of member 5 and to provide a facing 12 of insulation such as bakelite on the opposite side of member 5.

While it has been proposed heretofore to provide terminal strips having eyelet lugs therein, it is well-known that the eyelets upon being heated to effect soldering of the lead-in wires become loose and remain loose. It has been found that when a bakelite strip is reenforced by the metal backing 5, and by the fibre facing 10, that the eyelets may be firmly flattened and permanently remain secure. This may be due partly to the fact that the fibre strip 10 is impressionable and to a certain extent elastic so that when the eyelets are flattened into position they form a seating in the surface of the fibre and are thus retained against relative movement.

While the bosses 11 on the strip 10 may be formed by pressure prior to assembly of the eyelets and bakelite strip 12, it will be understood that the assembly of both the strips 10 and 12 and the insertion of the eyelet lugs may be achieved in one or more operations. A terminal board constructed as above described having opposite fibre and bakelite facings and a metal backing or support has been found to be highly efficient and economical of manufacture and assembly and the lugs remain firmly fastened during the entire life of the device.

Inasmuch as the members 3, 4 are U-shaped the manner of assembling the device of Figs. 1 and 2 may be along the following lines. The annular coil 2 is first wound on any suitable machine, and then the insulating strips 7 are placed in position within and against the interior surface of the coil. If desired, a single insulating strip corresponding to the shape of the inner wall of the coil may be employed. Thus if the coil has been wound on a square or rectangular form, then a square or rectangular cylinder insulating member may be employed in place of the strips 7.

The metal members 3, 4 with the terminal boards attached thereto as above described, are then passed through the coil to assume the positions shown in Fig. 1. The laminations of the core 1 are then assembled in the usual manner, thus rigidly forcing the members 3, 4 against the coil and providing in effect a solid unitary connection between the core and the terminal boards. The lead-in wires 8 are then passed through the eyelets 9 and soldered to the respective lugs.

Instead of making the metal members 3, 4 for supporting the terminal strips in one piece, they may be made in two T-shaped pieces 14 and 15 as shown in Fig. 4. The edges of one or both of the pieces may be provided with lips 16 which register with slots in the opposite piece whereby the parts

may be locked together. With this arrangement it is obvious that the laminations may first be assembled and then the members 14 and 15 forced into position. This arrangement is also advantageous where the internal diameter of the coil is too small to enable the bent-over portions 5 of the members 3 (Fig. 1) to be passed through the coil. Other equivalent ways of forming and uniting the sections of the terminal strip supports may be employed. Thus as shown in Fig. 5 each support is made in two pieces 17 and 18 provided with cooperating lugs 19 and recesses 20 to lock the parts together.

Referring to Fig. 6 there is shown an alternative means for practising the invention. In this figure the numeral 21 represents one section of a casing of known construction, adapted to be positioned over an assembled coil, transformer, etc. and provided with oppositely disposed holes 22 to receive the usual locking bolts. The casing 21 is provided with a window 22′ adapted to fit over the winding, and the window is provided with a right-angled flange 23. The flanged portion is formed at opposite sides with enlarged projections 24, corresponding to the portions 5 of Figs. 1 and 2. Each of the projections 24 is provided with a facing 25 of fibre and a facing 26 of bakelite or the like, as hereinabove described, the fibre 25 being pressed to form the integral insulating bushings 27. The eyelets and contact lugs are not shown in this figure, but it is believed that the manner of assembly thereof will be apparent.

While specific materials have been described it will be understood that the invention is not limited thereto. Thus the bakelite and fibre facings for the terminal strip may be replaced by any similar insulating materials. Other changes and modifications will be apparent to those familiar with the art. Thus instead of employing eyelet terminals, other types of terminals or binding posts may be employed.

What is claimed is:

1. In apparatus of the class described the combination of a winding, a core for said winding, a terminal strip, and a clamping spacer member interposed between said winding and said terminal strip for preventing relative movement therebetween.

2. In apparatus of the class described the combination of a winding, a terminal strip for said winding, a spacer member for supporting said strip, and means for rigidly retaining said member against said winding.

3. In apparatus of the class described the combination of a winding, a core having a portion passing through said winding and a terminal supporting member also having a portion passing through said winding and clamped by said core and winding therewith.

4. Apparatus according to claim 3 in which the terminal supporting member is of rigid material having a portion lying flat against the core and winding, and a portion bent at an angle to provide a rigid support for a wire terminal.

5. In apparatus of the class described the combination of an annular winding, a terminal supporting member having a portion passing axially through said winding and another portion extending at an angle to the axis of the winding, and a gang terminal strip supported on said other portion.

6. Apparatus according to claim 3 in which the said member forms part of the casing for said core and winding.

7. A terminal board comprising a rigid metal base, a gang bushing of insulating material applied to one side of said base, and a strip of bakelite applied to the opposite side of said base.

8. A terminal board according to claim 7 in which said base and bakelite are perforated to correspond with said bushing, and a plurality of eyelet members passing through said perforations.

9. In apparatus of the class described a supporting base for a terminal strip comprising two similar rigid metal members adapted to be separably united to form a body and having a portion bent at an angle with respect to the body to provide a supporting surface for a terminal strip.

10. In apparatus of the class described, means for supporting a terminal strip comprising a pair of metal members each having a portion bent at an angle to provide a support for a terminal strip, said members having cooperating lugs and slots for fastening said members together.

11. Apparatus according to claim 10 in which said lugs and slots are positioned to lock said members in a substantially U-shaped formation.

12. In apparatus of the type described, a winding, a laminated core for said winding, a terminal strip having one of the faces of a portion thereof in contact with said core, and means interposed between said winding and the other face of said terminal strip portion for maintaining said coil, core and strip firmly in relative assembled relation.

In testimony whereof I have hereunto set my hand on this 21st day of May A. D., 1930.

CHESTER H. THORDARSON.