Sept. 26, 1944. E. J. ZELT 2,359,186

ELECTRIC APPARATUS

Filed Dec. 30, 1941

Fig. 1.

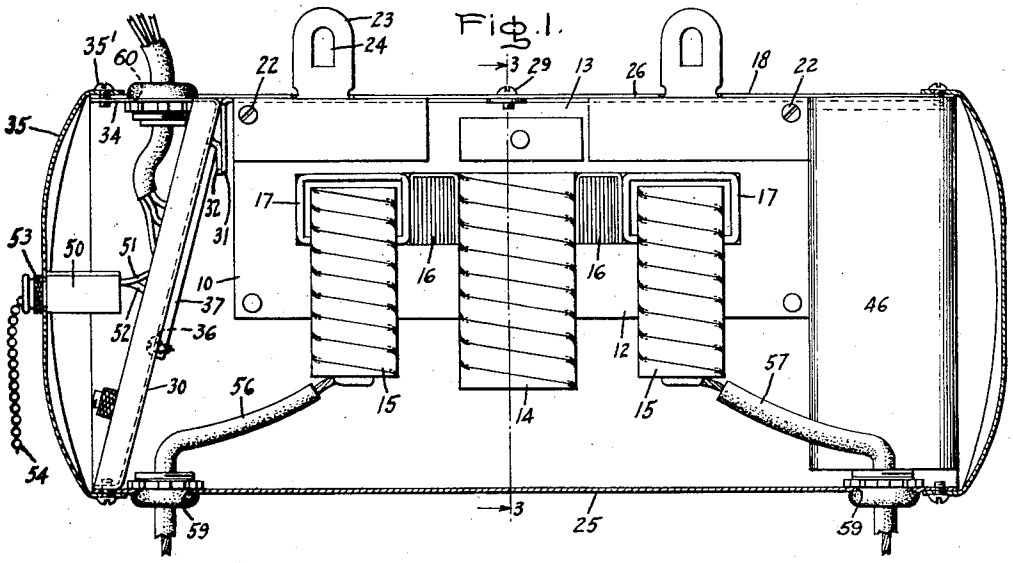


Fig. 2.

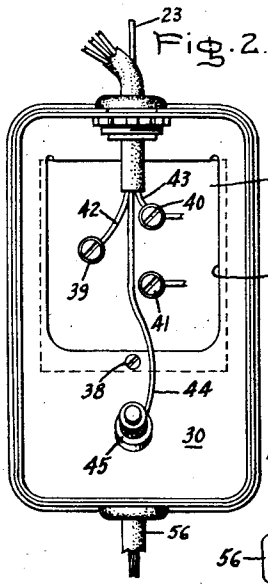


Fig. 5.

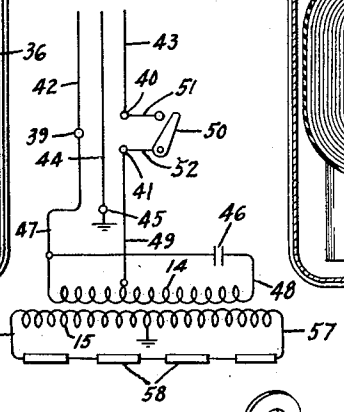


Fig. 3.

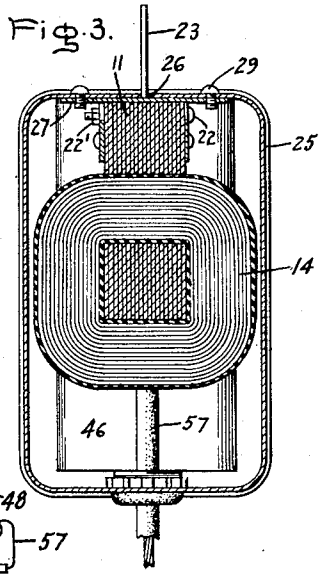
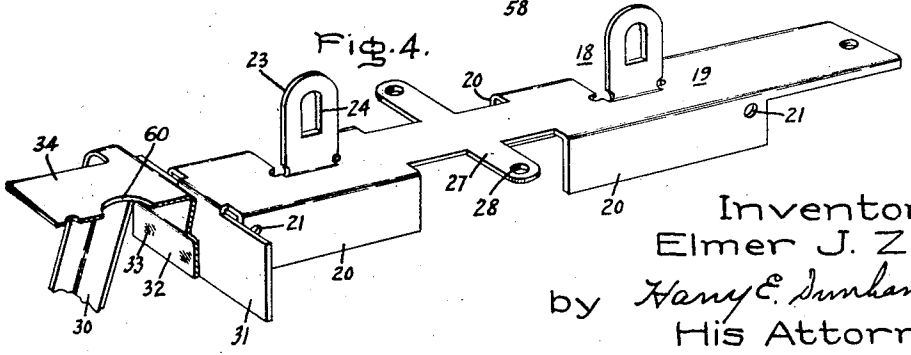


Fig. 4.



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Patented Sept. 26, 1944 2,359,186

UNITED STATES PATENT OFFICE

2,359,186

ELECTRIC APPARATUS

Elmer J. Zelt, Fort Wayne, Ind., assignor to General Electric Company, a corporation of New York

Application December 30, 1941, Serial No. 424,936

9 Claims. (Cl. 175—356)

My invention relates to electric apparatus and to a supporting arrangement and enclosing housing therefor, and although not limited thereto it has particular application to transformers for operating luminous tubes.

Transformers for operating luminous tubes usually employ a low voltage winding adapted to be connected to a source of supply and a high voltage winding adapted to be connected to the luminous tube, the windings being magnetically associated through a core of such a construction that the desired high voltage to ionize the included gas will be provided. The transformer also has such characteristics that the current will be limited to a predetermined value after the tube has been energized or become luminous. Since such transformers are employed to energize luminous tubes which are used in a variety of places and applications, it is desirable that the transformer not only have the proper electrical characteristics but also be compact in design and have such structure that the mounting thereof in various locations will be facilitated.

It is, therefore, an object of my invention to provide a transformer of the above-mentioned type with improved structure which will be compact in design, economical to manufacture, and which will have such structure as to facilitate its being suspended from a support.

Another object of my invention is to provide an electric apparatus having a magnetic core with an improved structure for mounting the apparatus to a support and for attaching an enclosing housing around the core structure.

A further object of my invention is to provide an electric apparatus having core and coils with an improved junction box construction.

A still further object of my invention is to provide an electric apparatus with an improved core and coil support and mounting arrangement.

Further objects and advantages of my invention will become apparent from the following description referring to the accompanying drawing, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

In the drawing, Fig. 1 is a side view of a transformer with a portion of the enclosing housing removed, which is provided with an embodiment of my invention; Fig. 2 is an end view of the transformer construction illustrated in Fig. 1 showing a portion of the junction box construction; Fig. 3 is a sectional side elevation taken along the lines 3—3 of Fig. 1; Fig. 4 is a perspective view of a portion of the combination mounting bracket and coil and core support employed in the transformer construction illustrated in Fig. 1, and Fig. 5 diagrammatically illustrates the transformer of Fig. 1 connected to energize luminous tubes.

In the arrangements illustrated in the drawing, I have provided an improved electric apparatus construction including a bracket which it attached to the core the bracket having integral lugs through which the electric apparatus may be suspended from the support. Although the various features of my invention find efficient application to transformers for energizing luminous tubes, it is to be understood that my improved structure may be employed in any other suitable electric apparatus. The bracket also has depending flanges extending over edges of the core through which a suitable attaching arrangement, such as a bolt, may pass for relatively tightly attaching the bracket to the core. A split enclosing housing for the transformer core and coils is also provided and which is attached to the bracket through outwardly extending ears. A partition is provided integral with one end of the bracket and which cooperates with the housing and with a removable end thereof to form a junction box. An insulating terminal board is carried by the partition so that connections may be made from the terminals to the parts of the apparatus. Lines adapted to be connected to a source of power may then be removably connected to certain of the terminals and a switch may also be provided which is connected to some of the terminals and which is carried by the removable end of the housing.

Referring more particularly to Fig. 1 of the drawing, I have illustrated a transformer structure which includes a core 10 which is made up of a plurality of stacked laminations 11, as may be seen in Fig. 3. The core may be of a conventional structure with a winding leg 12 and a yoke portion 13, and a low voltage winding 14 and high voltage windings 15 are provided surrounding the winding leg 12. Conventional shunts 16 may be provided on either side of the low voltage winding 14 so as to provide a path through which the primary flux may pass when the secondary coils begin to pass current which occurs after the luminous tube to which the coils are connected becomes luminous. The secondary windings 15 are spaced in their respec-

tive windows by U shaped spacers 17, this spacer construction being described and claimed in a copending application S. N. 331,146, Marsh, filed April 23, 1940, which issued on February 16, 1943, as Patent 2,311,450, and which is assigned to the same assignee as this present invention.

In order to provide an improved arrangement through which the core and coils may be supported and the transformer suspended from a support I provide an improved bracket 18, the construction of which will be seen more clearly in Fig. 4. This bracket includes a body portion 19 which extends along the outer edges of the yoke portion 13 and a plurality of depending flanges 20 which are integral with the body portion 19 and which extend over the sides of the yoke portion 13. In order to relatively rigidly attach the bracket 18 to the core, apertures 21 are provided in the flanges 20 and apertures are provided in the yoke portion in substantial registry with the apertures 21 so that suitable bolt means 22 may pass through the apertures. A conventional nut 22' may be screwed on to one end of the bolt 22 so as to tightly secure the bracket to the yoke portion of the core.

In order to provide an arrangement for supporting the transformer in any suitable position such as a suspended position, the bracket 18 is provided with lugs 23 which are integral with the body portion 19 and which extend therefrom in a direction opposite to that in which the flanges 20 extend. Suitable notches 24 may be provided in the lugs so that they may fit into suitable hooks on a support.

In order to enclose the electrical parts including the core and coils, a casing 25 is provided having a longitudinal slit 26. The casing 25 may be made of any suitable flexible material such as metal so that it may be opened up and slid over the core and coil structure and then closed to form a relatively tight casing therearound. Ears 27 extend outwardly from the body portion 19 of the bracket 18 through which the casing 25 may be attached to the bracket 18 in any suitable manner. The ears have apertures 28 and suitable screws 29 may be passed through apertures in the housing in substantial alignment with the apertures 28 for relatively tightly securing the housing 25 to the bracket 18.

So as to provide a junction box to facilitate the making of the electrical connections to the coils, a partition 30 is provided which is of such shape as to relatively closely fit with the adjacent inner surface of the casing 25, as will be seen in Figs. 1 and 2. An integral mounting flange 31 extends from an end of the bracket 18 and a flange 32 extends from the adjacent part of the partition 30. The partition 30 may then be made integral with the bracket 18 in any suitable manner, such as by welding the flanges 31 and 32 together, as at 33. The direction of the flange 32 with the relation to the body portion 30 of the partition is such that the partition 30 extends at an angle from the body portion 19 of the bracket 18 in order to form a box of a relatively triangular shaped cross section at the end of the housing 25. An extension 34 projects from the partition 30 and is parallel with the body portion 19 of the bracket 18.

In order to provide a removable cover for the junction box, the housing is provided with an end-bell 35 which relatively tightly encloses the adjacent end of the housing 25 and is attached thereto through screws 35'. The partition 30 is provided with an aperture 36 and a terminal board 37 is attached to the inner surface of the partition 30 over the aperture 36. This attachment may be made in any suitable manner such as by fitting one end of the board 37 of the terminal box between the flange 32 and the partition 30, as will be seen in Fig. 1. The other edge of the terminal board 37 may be supported through a screw 38. Any suitable number of terminals may be provided on the board 37 and in the arrangement illustrated in the drawing I have provided three terminals 39, 40, and 41. The terminals 39 and 40 are adapted to be connected to line conductors 42 and 43 which may be connected across any suitable source of supply. The remaining line conductor 44 may be grounded through a ground terminal 45, which is supported by the partition 30.

As will be seen in the diagram of Fig. 5, the line terminal 39 is connected to one side of the winding 14 and to one terminal of a condenser 46 through a conductor 47, the condenser being provided so as to improve the power factor of the transformer. The other terminal of the capacitor is connected through a conductor 48 to the low voltage winding 14, and another terminal of the winding 14 is connected to the terminal 41 through the conductor 49. A switch may be provided, if desired, which is connected across the terminals 40 and 41 for connecting and disconnecting the low voltage winding 14 across the line conductors 42 and 43. The switch 50 is connected to the terminals 40 and 41 through conductors 51 and 52 and is supported on the inner surface of the end-bell 35 through a nut 53. A pull cord 54 may be provided extending through an aperture in the nut for actuating the switch.

With the above described terminal junction box construction the cord and plug sets as well as the switch are readily removable without disturbing any of the remaining low voltage circuits. Also the cord and plug may be removed for conduit or armored cable installation and connections made directly to the terminals in the junction box. If the switch is not desired it can be readily removed from the circuit without disturbing any of the other elements in the low voltage circuit.

As will also be seen in the diagram of Fig. 5, conductors 56 and 57 are respectively connected from the secondary winding 15 to any suitable load such as luminous tubes 58, and apertures 59 and 60 are provided in the housing for accommodating the load and line leads, respectively.

In view of the foregoing, it will be seen that I have provided an improved construction for supporting the core and coils and mounting the transformer to a support. This combination mounting bracket and coil support is also employed for supporting the enclosing cover and a partition which cooperates with the cover to provide a separate junction box. The junction box is also provided with a terminal board so that the electrical connections may be made in a simple manner.

Modifications of the particular arrangement which I have disclosed embodying my invention will occur to those skilled in the art, so that I do not desire my invention to be limited to the particular arrangement set forth and I intend in the appended claims to cover all modifications which do not depart from the spirit and 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 core having a plurality of laminations, a bracket extending along an outer edge of said core, integral flanges extending from said bracket adjacent sides of said core, means cooperating with said flanges for attaching said bracket to said core, and integral means extending from said bracket for mounting said apparatus to a support.

2. In an electric apparatus, a core having a plurality of laminations, a bracket extending along an outer edge of said core, integral flanges extending from said bracket adjacent sides of said core, means cooperating with said flanges for attaching said bracket to said core, a housing, means for attaching said housing to said bracket, and integral means extending from said bracket for suspending said apparatus from a support.

3. In an electric apparatus, a core having a plurality of laminations, a bracket extending over edges of said laminations and having depending flanges adjacent sides thereof, means cooperating with said flanges and said laminations for attaching said bracket to said core, and integral lugs extending from said bracket in a direction substantially opposite to that of said flanges for suspending said apparatus from a support.

4. In an electric apparatus, a core having a plurality of laminations, a bracket, integral flanges extending from said bracket, means cooperating with said flanges for attaching said bracket to said core, a housing enclosing said core, means for attaching said housing to said bracket, partition means integral with said bracket and cooperating with said housing to form a junction box, and means extending from said bracket for mounting said apparatus to a support.

5. In an electric apparatus, a core having a plurality of laminations, a bracket, integral flanges extending from said bracket, means cooperating with said flanges for attaching said bracket to said core, a housing enclosing said core, means for attaching said housing to said bracket, partition means integral with said bracket and cooperating with said housing to form a junction box, said partition means having an aperture, a terminal board, means for attaching said terminal board to said partition means in said aperture, and means extending from said bracket for mounting said apparatus to a support.

6. In an electric apparatus, a core having a plurality of laminations, a bracket extending over edges of said laminations and having depending flanges adjacent sides thereof, means cooperating with said flanges and said laminations for attaching said bracket to said core, a housing enclosing said core, a mounting flange extending from said bracket adjacent one end of said core, partition means, means for attaching said partition means to said mounting flange, said partition means cooperating with said housing to form a junction box, a terminal board, means including a flange extending from said partition means for mounting said terminal board on said partition means, and means extending from said bracket for mounting said apparatus to a support.

7. In an electric apparatus, a core having a winding leg and a yoke portion, a coil surrounding said winding leg, a bracket extending over edges of said yoke portion, means cooperating with said bracket and said yoke portion for attaching said bracket to said core, a housing enclosing said core and coil and having a removable end portion, partition means integral with said bracket and cooperating with said housing and removable end portion to form a junction box, a terminal board having terminals adapted to be connected to the coil, and means attaching said terminal board to said partition means.

8. In an electric apparatus, a core having a winding leg and yoke portion, a coil surrounding said winding leg, a bracket extending over edges of said yoke portion, means cooperating with said bracket and said yoke portion for attaching said bracket to said core, a housing enclosing said core and coil and having a removable end portion, partition means integral with said bracket and cooperating with said housing and said removable end portion to form a junction box, a terminal board having terminals, means attaching said terminal board to said partition means, said housing having apertures for receiving line leads and load leads.

9. In an electric apparatus, a core having a plurality of laminations, bracket means attached to said core for clamping said laminations together, a housing with a longitudinal slit enclosing said core, means for attaching said housing to said bracket means, partition means supported by said bracket means and cooperating with said housing to form a junction box, and means integral with said bracket means and extending through the slit in said housing for mounting said apparatus to a support.

ELMER J. ZELT.