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ELECTRICAL TRANSFORMER

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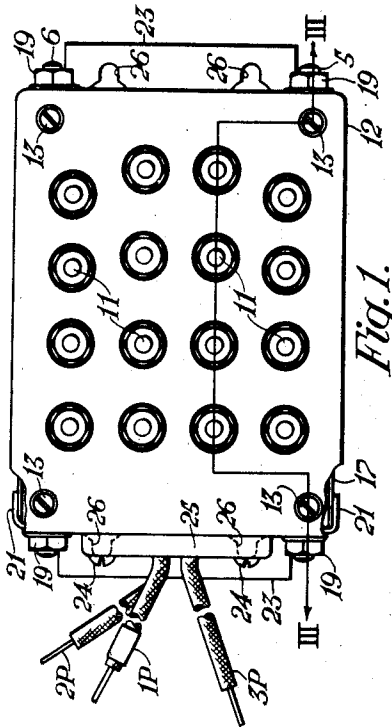


Fig. 1.

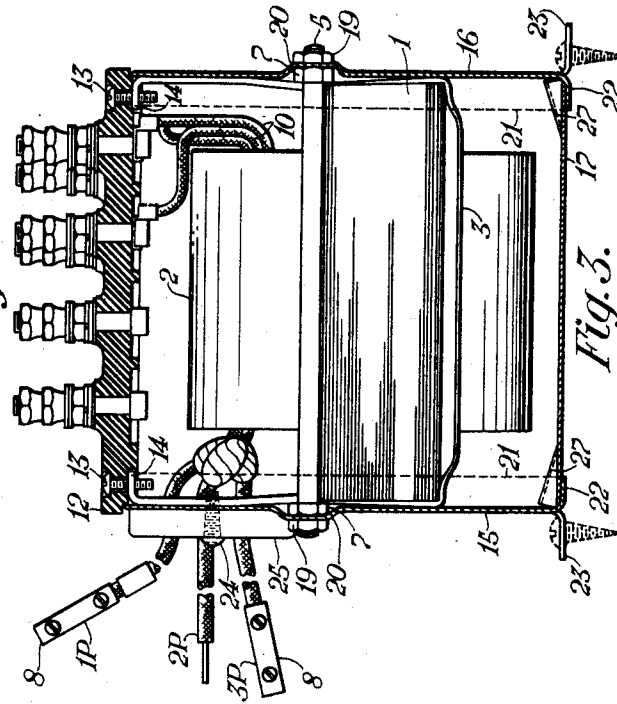


Fig. 3.

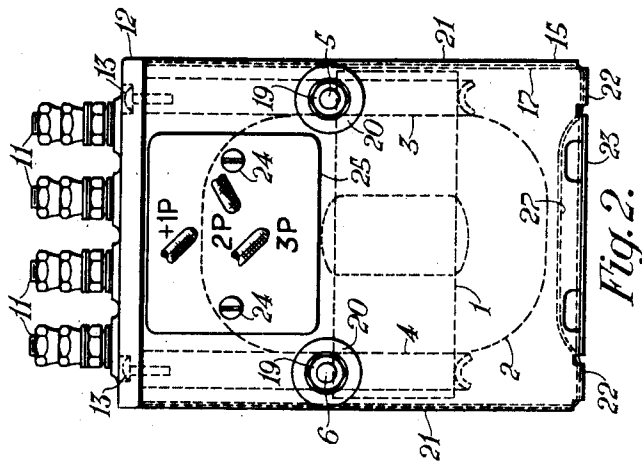


Fig. 2.

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ELECTRICAL TRANSFORMER

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2 Claims. (Cl. 175—361)

Our invention relates to electrical transformers, and particularly to electrical transformers which are suitable for, although in no way limited to, use in railway signaling systems.

Transformers of the type referred to are frequently enclosed in a suitable sheet metal protective case or housing, and at least some of the external electrical connections with the transformer are made through the medium of terminal posts mounted on a terminal board forming part of the housing. The transformers are required to pass a rigid high voltage ground test, and to enable them to pass this test it is essential that the various leads which connect the transformer windings with the terminal posts should have not less than a predetermined minimum spacing from the other metal parts of the transformer assembly. As these transformers are now generally constructed, the terminal board is usually the last case part to be fastened in place, and since the leads have been previously attached to the terminal board it is difficult during this operation to prevent the leads from moving to positions where they are too close to the metal parts of the transformer to enable the transformer to pass the required ground test.

One object of our invention is to eliminate this difficulty by providing an improved transformer assembly in which the terminal board can be secured in its final fixed position relative to the transformer core and windings prior to the assembly of the other case parts, whereby the final position of the internal wiring can more readily be accurately located during assembly.

Another object of our invention is to provide an improved transformer assembly which is rigid, requires a minimum amount of space, and can be manufactured and assembled at a minimum cost.

A further object of our invention is to provide improved means whereby a transformer of the type described can be mounted on a vertical supporting member.

According to our invention, a terminal plate carrying the transformer terminal post is secured to the upper ends of a pair of substantially U-shaped brackets the bottom and two arms of which embrace the bottom and two ends, respectively, of the transformer core on opposite sides of the associated windings. The bracket arms are disposed in vertical slots formed in the core and are provided with aligned holes which receive the opposite ends of bolts disposed in contact with the upper side of the core, whereby the core laminations are securely clamped together

and the core is firmly fastened to the brackets. The assembly also comprises two sheet metal end plates which are secured to the opposite ends of said bolts, and a U-shaped central sheet metal closure member held in place by flanges provided on the end members and shoulders provided on the terminal board. The bottoms of the end members are bent outwardly at their central portions to form mounting flanges, and formed in these flanges and the contiguous portions of the end members are slots for the reception of the shanks and heads of the mounting screws or bolts. To facilitate the insertion of the screw or bolt heads into the slots the opposite ends of the central part of the U-shaped member are bent upwardly a sufficient amount to provide clearance for the screw or bolt heads.

Other objects and characteristic features of our invention will become apparent as the description proceeds.

We shall describe one form of electrical transformer embodying our invention, and shall then point out the novel features thereof in claims.

In the accompanying drawing, Fig. 1 is a top plan view showing one form of transformer assembly embodying our invention. Fig. 2 is a left-hand end view of the transformer assembly shown in Fig. 1. Fig. 3 is a vertical sectional view taken substantially on the line III—III of Fig. 1.

Similar reference characters refer to similar parts in each of the several views.

Referring to the drawing, the transformer here illustrated comprises a laminated shell type core 1 the middle leg of which is surrounded by a primary and one or more secondary windings designated collectively by the reference character 2. The core laminations are clamped together by means of two substantially U-shaped brackets 3 and 4, and two clamping bolts 5 and 6. The one bracket 3 embraces the bottom and two ends of the core at one side of the windings 2, and the other bracket 4 similarly embraces the bottom and two ends of the core at the other side of the windings 2. The upstanding arms of the brackets are disposed in vertical slots formed in the ends of the core, and are provided with aligned holes through which the ends of the clamping bolts pass. The clamping bolts embrace the upper side of the core, and are secured to the brackets by means of nuts 7 screwed onto the threaded ends of the bolts. To prevent the bottoms of the brackets from buckling when the nuts 7 are tightened, the bottoms of the brackets are crimped longitudinally in the manner shown.

The primary winding of the transformer is provided with one tap for voltage regulating purposes, and this tap and the two ends of the primary winding are connected with suitable leads 2P, 1P and 3P. These leads are carried outside of the transformer core through an insulating bushing 25, and two of the leads 1P and 3P are provided with set screw connectors 8 of conventional construction, whereby the primary winding may be conveniently connected to a suitable source of alternating current.

The transformer case or housing also comprises two end plates 15 and 16, and a U-shaped central closure member 17. The end plates are of pressed sheet metal and are secured to the opposite ends of the clamping bolts 5 and 6 by means of nuts 19. The central closure member is also of pressed sheet metal. Formed in each end plate at the points where the bolts pass through the end plates are outwardly pressed bosses 20 which receive the nuts 7 to enable the overall length of the case to be kept to a minimum and also to enable the end plates 15 and 16 to rest against the brackets 3 and 4 which aids in providing a rigid assembly. Each end plate is also provided with an inturned flange 21 at each side which overlaps the adjacent edge of the closure member 17, and which, together with two other laterally spaced inturned flanges 22 formed on the bottom of each end plate on opposite sides of an outturned flange 23, serves to secure the central closure member in place. The two end members and the two sides of the central closure member rest at the inner sides of their upper ends against shoulders provided on the terminal plate to assist in positioning these members relative to the core and terminal plate.

The previously referred to insulating bushing 25 through which the primary leads 1P, 2P and 3P are brought outside of the transformer case is secured to the end plate 15 by means of screws 24 in the manner shown.

The outturned flanges 23 provided on the end members serve as mounting lugs and are provided with key slots 26 for the reception of suitable mounting screws or bolts. It is occasionally desirable to mount the transformer on a vertical support in such manner that it can be readily removed without the necessity for completely removing the mounting screws or bolts, and to this end the slots 26 are extended upwardly into the end members far enough to clear the bolt heads, and the contiguous portions of the central closure member are bent upwardly at 27 a sufficient distance to permit the screw or bolt heads to be readily inserted into the slots to the positions in which the shanks of the bolts are disposed in the reduced outer ends of the slots.

In assembling the transformer, after the laminations are stacked and the brackets 3 and 4 and bolts 5 and 6 are secured to the core, the various secondary leads are secured to the terminal posts of the terminal plate, and the terminal plate is then secured to the brackets. The central closure member 17 is next placed in position, and the two end plates are then placed over the ends of the bolts 5 and 6 and secured in place by means of the nuts 19.

One advantage of a transformer assembly constructed in the manner just described is that since the central closure member 17 and the two end members 15 and 16 are the last parts to be secured in place, it is possible just prior to secur-

ing them in place to inspect the final positions which the various leads will occupy to see whether these positions are such that the transformer will pass the high voltage ground test, and if these positions are not correct, it is a relatively easy matter to adjust them. After this adjustment has been made, there is no necessity for moving the leads during the assembly of the remainder of the case parts, and it is very unlikely that the positions of the leads will subsequently change. It will be seen, therefore, that our invention greatly facilitates the assembly of the transformer.

Another advantage of a transformer assembly constructed in accordance with our invention is that it provides a very rigid structure which, due to duplication of parts, requires very few dies for manufacture, and consequently is inexpensive to manufacture.

Although we have herein shown and described only one form of electrical transformer embodying our invention, it is understood that various changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of our invention.

Having thus described our invention, what we claim is:

1. A transformer assembly comprising a laminated core and windings, two U-shaped brackets engaging the bottom and two ends of said core on opposite sides of said windings and secured to said core by means of bolts engaging the top of said core and projecting beyond the ends of said core, said bolts and said brackets serving to clamp the laminations of said core together, an insulating terminal board secured to the upper ends of said brackets and carrying terminal members connected by means of leads with at least one of the transformer windings, end plates secured to the opposite ends of said bolts and provided at each side and the bottom with flanges, and a central U-shaped closure member secured in place by means of said flanges.

2. A transformer assembly comprising a shell type laminated core the central leg of which carries the necessary windings, U-shaped brackets engaging the bottom and two ends of said core on opposite sides of said windings, bolts engaging the top of said core on opposite sides of said windings and extending at their ends through holes provided in said brackets and carrying nuts which clamp the core laminations together and secure said brackets to said core, an insulating terminal board secured to said brackets and carrying terminal members connected by means of leads with at least one of the transformer windings, end plates secured to said bolts and provided with bosses which receive said nuts to reduce the overall length of the assembly to a minimum, said end plates being provided at their sides and bottom with inturned annular flanges and engaging at their upper ends shoulders provided on said terminal board, and a U-shaped closure member surrounding said core and windings between said end plates and fitting within and secured in place by the flanges on said end plates, said closure member cooperating at its upper ends with shoulders provided on said terminal board to assist in positioning said closure member.

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