C. H. THORDARSON.

TRANSFORMER MOUNTING.

APPLICATION FILED JAN. 6, 1919.

1,335,803. **Patented Apr. 6, 1920.**

Fig. 1.

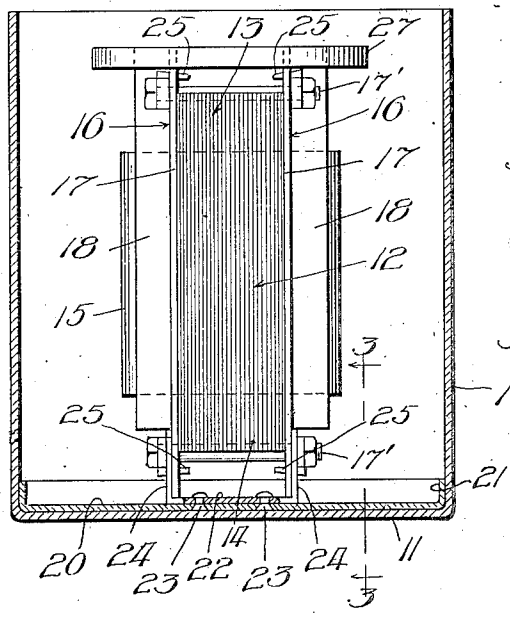


Fig. 4.

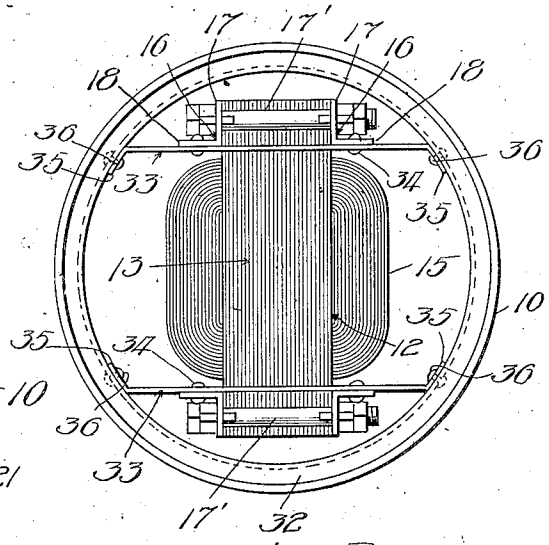


Fig. 5.

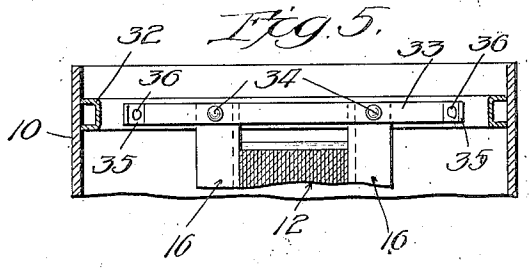


Fig. 2.

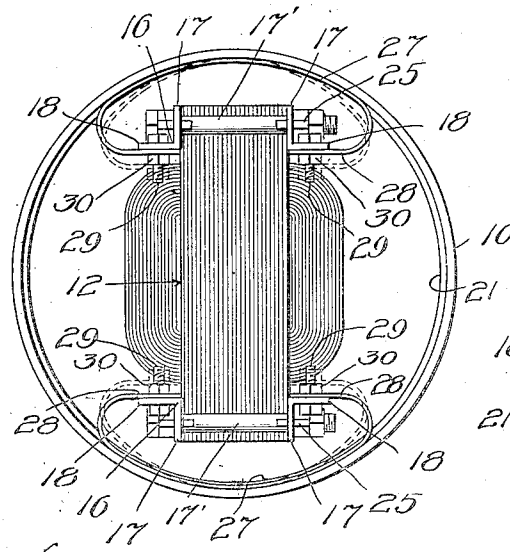
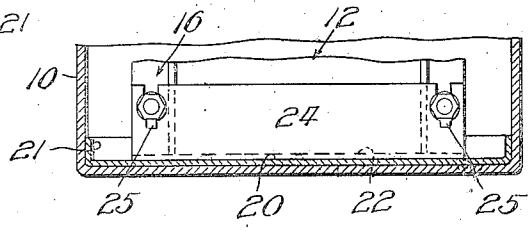


Fig. 3.



Witness:

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UNITED STATES PATENT OFFICE.

CHESTER H. THORDARSON, OF CHICAGO, ILLINOIS.

TRANSFORMER-MOUNTING.

1,335,803. Specification of Letters Patent. Patented Apr. 6, 1920.

Application filed January 6, 1919. Serial No. 269,802.

To all whom it may concern:

Be it known that I, CHESTER H. THORDARSON, a citizen of the United States, and a resident of Chicago, in the county of Cook, in the State of Illinois, have invented certain new and useful Improvements in Transformer-Mountings; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in electrical transformers, and refers more specifically to an improved mounting by which the transformer elements are mounted within a containing casing or vessel, the latter to contain also a cooling medium such as oil, by which the transformer elements are maintained suitably cool during the operation thereof.

Among the objects of the invention is to provide an exceedingly simple and effective method for mounting the transformer elements, including the core and windings in the casing in such manner as to prevent lateral movement or vibration of the transformer elements in the casing, and which also permits the transformer elements to be readily removed from and placed into the casing.

Another and subsidiary object of the invention is to provide a novel means for supporting the transformer elements in the bottom of the casing, whereby the transformer elements are reliably supported in said casing without the necessity of riveting, bolting, or otherwise fastening the parts to the wall of the casing.

Another and a subsidiary object of the invention is to provide a novel means for bracing the upper part of the transformer core on the casing wall, and by means which prevent relative vibration of the transformer elements and casing, and which also permit the transformer elements to be readily removed from and placed into the casing.

Other objects of the invention are to further improve and simplify transformer mountings of the class described, and the invention consists in the combination and arrangement of the parts shown in the drawings and described in the specification, and is pointed out in the appended claims.

It will be understood that the invention is not limited to any particular type of transformer structure. The structure herein shown is generally similar to that shown in my prior application for U. S. Letters Patent, Serial No. 75,969, filed February 3, 1916.

In the drawings,—

Figure 1 is a vertical section of a transformer and casing embodying my improvements.

Fig. 2 is a plan view of said parts.

Fig. 3 is a detail section on the line 3—3 of Fig. 1.

Fig. 4 is a plan view of a transformer and its casing showing a modification of the mounting.

Fig. 5 is a detail axial section thereof.

As shown in the drawings, 10 designates the casing which may be of any particular cross section desired to adapt it to the transformer section. As herein shown it is cylindric. It has a bottom wall 11, preferably made integral with the cylindrical wall and the casing may be closed at its top in any suitable or preferred manner.

The transformer structure mounted in said casing embraces in general terms a laminated core structure comprising upright or side members 12, top and bottom members 13, 14, respectively, and a core member which is surrounded by a winding 15 of any preferred type.

The laminæ of the core members are clamped between angle bars 16 by means of clamping bolts 17′ which extend through the webs 17 of the angle bars that lie flat against the laminated structure; the flagnes 18 of said angle bars extending outwardly from the laminated structure. The angle bars are located in pairs at each side of the laminated structure, and said angle bars extend at their upper and lower ends beyond said structure. The structure described constitutes in itself no part of the present invention and may be otherwise arranged.

20 designates a flanged plate that is made of a size to fit closely in the casing and is adapted to lie on the bottom wall 11 of the casing. The flange or rim 21 fits closely the cylindric or other cross section wall of the casing. 22 designates a confining member that is disposed diametrically across the flanged plate 20 and is permanently attached thereto in any suitable manner, as by the rivets 23. Said confining member as herein shown takes the form of a channel

bar with its web lying flat on the flanged plate 20 and attached thereto by the rivets 23 as stated. The flanges 24 of said channel bar lie against the outer faces of the web members 17 of the corner angle bars, and may be fixed thereto in any preferred manner. As herein shown, the flanged members 18 of said angle bars terminate at their lower ends short of the web members 17 thereof; and the flanges 24 of the channel bar may extend upwardly such distance alongside the lower ends of the web members 17 of the angle bars as to be apertured for engagement by the bolts 17′ and the wedges 25, provided in the structure set forth in my aforesaid application, Serial No. 75,969, for pressing the laminated core members together. The construction described provides means whereby the core structure is prevented from shifting in any direction toward the upright wall 10 of the casing.

Referring now to the means for bracing the upper end of the magnetic structure from the casing, one form of such bracing is shown in Figs. 1 and 2 and is made as follows:

27, 27 designate resilient looped members disposed on opposite sides of the core structure. The curved intermediate portions of said looped members are shaped to lie against the inner cylindric wall of the casing at diametrically opposite points. The said loop shaped bracing members are formed at their ends to provide arms 28 which are directed toward each other and are adapted to coöperate with the outstanding flanges 18 of the angle bar frame members 16. The inturned ends 28 of the bracing members are apertured to receive clamping bolts 29, which also pass through apertures in the upper ends of the flanges 18. Said bolts are threaded to receive nuts 30 which in this instance bear against the inner faces of the arms 28 of the bracing members; the heads of the bolts bearing against the outer faces of the flanges 18.

The said bracing members are so shaped that when not under restraint the ends 28 thereof are spaced from the flanges 18, as indicated in dotted lines in Fig. 2. Clamping pressure exerted by the nuts 30, however, serve to force said ends against the flanges 18, and in so forcing the ends of the bracing members outwardly cause the intermediate curved portions of said bracing members to conform to the inner cylindrical wall of the casing along a length of the bracing member greater than the original contact of the bracing member with said wall, as indicated by the full and dotted lines in Fig. 2. The said bracing member is made of a flat strip of any suitable resilient metal, and its resiliency is sufficiently permanent to maintain a cushioning bracing effect between the upper end of the magnetic structure and the casing wall.

With the construction described, it will be apparent that the core structure with the lower supporting plate 20 and the brace members 27 thereto attached may be readily lowered into the casing and that, by reason of the close fit of the flange or rim 21 of the lower supporting plate 20 with the casing wall and of the adjustment of the cushioning or resilient looped members 27, the magnetic structure is held reliably in the casing without danger of the parts vibrating relatively to the casing. To release the core structure, it is only necessary to back off the nuts 30 so as to permit the loop shaped bracing or cushioning members 27 to slide freely out of the casing.

The cushioning or resilient brace for the upper end of the core structure is more specially adapted to transformers of relatively small dimensions. For the larger sizes of transformers, it may be necessary to provide a more rugged bracing connection between the upper end of the core structure and the shell. In Figs. 4 and 5 is shown a bracing structure which is well adapted to the larger transformers.

As shown in said figures, 32 designates a ring adapted to fit within the cylindric shell of the casing. As herein shown, it is of channel cross section with its flanges abutting edgewise against the casing wall. 33, 33 designate bars which extend transversely across the casing at right angles to the upper member 13 of the core structure. Said bars are fixedly attached, as by means of rivets 34, to the outstanding flanges 18 of the corner angles 16. Beyond the points of attachment of the brace bars 33 to said angle bars, said brace bars are provided with terminal portions 35 which are shaped to fit the inner face of the ring 32 and are fixedly attached thereto as by means of rivets 36. The bracing ring 32 may or may not be flanged as shown, and the brace bars 33 may be constructed to afford a resilient bracing effect between the core structure and the shell wall. If said ring and the bracing bars be made rigid, the ring may be dimensioned to fit somewhat loosely in the upper end of the shell and wedges may be driven between the ring and the shell.

It will be understood that the transformer mounting herein shown may assume other structural forms without departure from the spirit and scope of the invention, and that the invention is not limited to the structural details particularly illustrated and described, except as to claims wherein the details are specifically enumerated.

I claim as my invention,—

1. The combination with a transformer casing having a closed end and transformer elements therein, of a supporting member

for the transformer elements of a diameter to engage the upright casing wall and resting on said closed end and fitting closely against said casing wall to hold it from shifting laterally relatively to the casing wall, said supporting member being freely movable into and out of the casing, and means to fix the transformer elements to said supporting member.

2. The combination with a transformer casing having a closed end and transformer elements therein, of a flanged supporting plate for the transformer elements resting on said closed end, with its flange of substantially the diameter of the casing and closely fitting the wall of the casing, and means to fix the transformer elements to said supporting plate to prevent lateral shifting of said elements relatively to said plate.

3. The combination with a transformer casing having a closed end and a transformer structure therein, of a supporting plate for said structure resting on said closed end, said plate being of the same cross section as the casing and fitting at its margin against the casing wall and removable from the casing, and a transformer retaining member fixed to said plate and removable with said transformer structure and plate from the casing.

4. The combination with a transformer casing having a closed end and a transformer structure therein, of a supporting plate for said structure resting on said closed end and fitting at its margin against the casing wall, and a channel member fixed to said plate with its upright flanges fitted against and interlocked to the transformer structure.

5. The combination with a transformer casing having a closed end and a transformer structure therein embracing a laminated core frame and clamping bars for confining the laminæ of the core frame, said bars extending beyond the core frame, of a supporting plate for the transformer structure resting on the closed end and fitting closely in the casing, and a channel member fixed to said plate, with its flanges overlapping the ends of said clamping bars.

6. The combination with a transformer casing having a closed end and a transformer structure therein embracing a laminated core frame and clamping bars for confining the laminæ of the core frame, said bars extending beyond the core frame, of a supporting plate for the transformer structure resting on said closed end and fitting closely in the casing, and a channel member fixed to said plate with its flanges overlapping the ends of said clamping bars, with means for locking said flanges of the channel member to said clamping bars to prevent shifting of the core structure.

7. The combination with a transformer casing having a closed end and a transformer structure therein embracing a laminated core frame and clamping bars for confining the laminæ of the core frame, said bars extending beyond the core frame, of a supporting plate for the transformer structure resting on said closed end and fitting closely in the casing, and a channel member fixed to said plate, with its flanges overlapping the extended ends of said clamping bars, means for locking said flanges of the channel member to said clamping bars to prevent shifting of the core structure, and bracing means between the end of the transformer structure remote from said plate and the wall of the casing.

8. The combination with a transformer casing having a closed end and transformer elements therein, of a supporting member for the transformer elements resting on said closed end and fitting closely against the casing wall to hold the transformer elements from shifting laterally and freely movable into and out of the casing, and resilient bracing means interposed between the transformer structure and the casing wall remote from the closed end of the casing.

9. The combination with a transformer casing having a closed end and a transformer structure therein embracing a laminated core frame and clamping bars for confining the laminæ of the core frame, said bars extending beyond the core frame at both ends thereof, of a supporting plate for the transformer structure resting on said closed end and fitting closely the casing wall, a channel member fixed to said plate, with its flanges overlapping the extended ends of said clamping bars, and bracing means attached to said clamping bars and coacting with the casing wall remote from said closed end.

10. The combination with a transformer casing having a closed end and a transformer structure therein embracing a laminated core frame and clamping bars for confining the laminæ of the core frame, said bars extending beyond both ends of the core frame, of a supporting plate for the transformer structure resting on said closed end and fitting closely the casing wall, a channel member fixed to said plate, with its flanges overlapping the ends of said clamping bars at one end of the core frame, and resilient bracing means between the other ends of said clamping bars and the casing wall.

11. The combination with a transformer casing having a closed end and a transformer structure therein embracing a laminated core frame and clamping bars for confining the laminæ of the core frame and extending beyond both ends of said frame, of a supporting plate for the transformer structure resting on said closed end and fit-

ting closely the casing wall, a channel member fixed to said plate, with its flanges overlapping the ends of said clamping bars, and bracing means between the other ends of said clamping bars and the casing wall embracing loop-shaped resilient members, the curved portions of which engage the casing wall and having portions overlapping the extended ends of the clamping bars, with clamping means for forcing said ends toward the clamping bars and thereby forcing the closed portions of the loops outwardly against the casing wall.

12. The combination with a transformer casing and a transformer structure therein, of means for supporting the transformer structure at one end thereof in said casing, and resilient bracing means between the other end of the transformer structure and the casing wall.

13. The combination with a transformer casing having a closed end and a transformer structure supported therein and having means to support it on said closed end and to hold it centrally in the casing, of bracing means between the transformer structure and the casing wall near the end of the latter remote from said closed end, embracing curved members which conform to the curvature of the casing wall.

14. The combination with a transformer casing and a transformer structure therein, embracing a laminated core and clamping bars fitted to the sides of the core, with clamping means acting thereon to hold the laminæ of the core together, said clamping bars extending beyond the core, and resilient bracing means between the clamping bars and the casing wall.

15. The combination with a transformer casing and a transformer structure therein, embracing a laminated core and clamping bars fitted to the sides of the core, with clamping means acting thereon to hold the laminæ of the core together, said clamping bars extending beyond the core, and resilient bracing means fastened to the extended ends of the clamping bars and coacting with the casing wall.

16. The combination with a transformer casing and a transformer structure therein embracing a laminated core and clamping bars fitted to the sides of the core, with clamping means acting thereon to hold the laminæ of the core together, said clamping bars extending beyond the core, C-shaped resilient brace members having their closed curved portions engaged with the casing wall and with their ends overlapping said clamping bars, and clamping bolts extending through said ends and said clamping members.

17. The combination with a casing and a transformer structure therein, of a C-shaped, resilient bracing member having its ends clamped to the core structure and with its intermediate curved portion engaging the casing wall.

18. The combination with a casing and a transformer structure therein, of a C-shaped, resilient bracing member having its intermediate curved portion lying against the casing wall, and clamping means to fasten the ends of the bracing member to said transformer structure.

In witness whereof, I claim the foregoing as my invention, I hereunto append my signature at Chicago, Illinois, this 3rd day of January, 1919.

CHESTER H. THORDARSON.