

Dec. 17, 1946.

J. W. McELVAIN
ELECTRICAL APPARATUS

2,412,902

Filed June 30, 1944

2 Sheets-Sheet 1

Fig. 1.

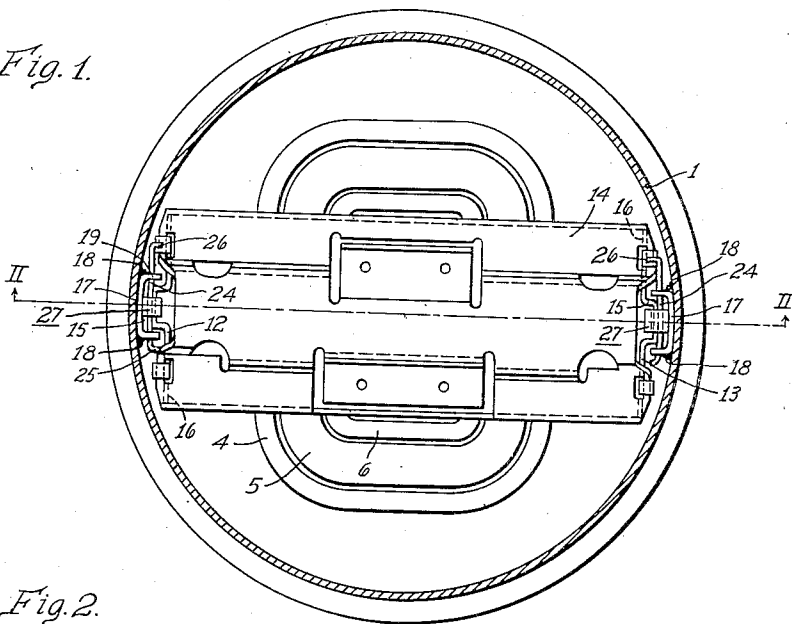


Fig. 2.

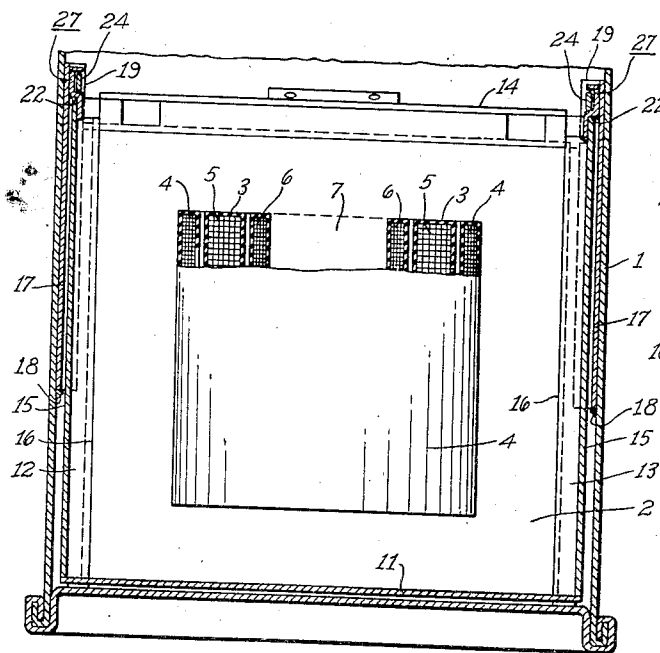
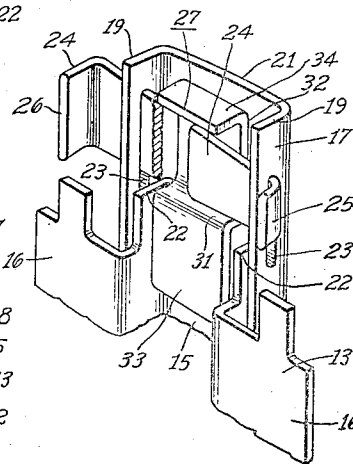


Fig. 3.



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Fig. 4.

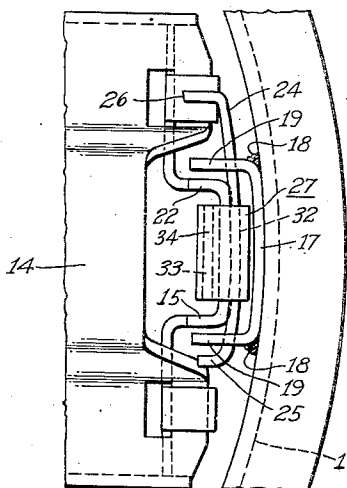


Fig. 5.

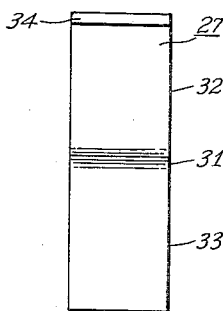


Fig. 6.

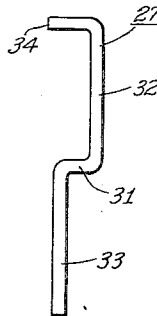


Fig. 7.

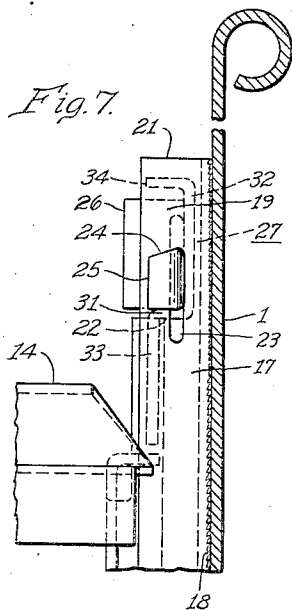
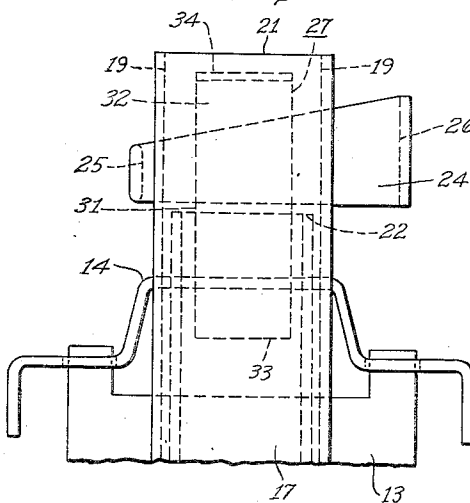


Fig. 8.



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UNITED STATES PATENT OFFICE

2,412,902

ELECTRICAL APPARATUS

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Application June 30, 1944, Serial No. 543,012

6 Claims. (Cl. 175—361)

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My invention relates to electrical induction apparatus, and more particularly to means for centering the apparatus in the tank or casing in which it is mounted, and retaining it therein.

It is an object of the invention to provide means for centering electrical induction apparatus, such as transformers, in the enclosing casing or tank in which it operates and in retaining the apparatus therein, that is simple in construction, inexpensive to manufacture, and efficient in use.

More particularly, it is an object of the invention to provide channel members within the transformer tank and attached to the wall thereof having flange portions extending inwardly from the tank wall, and cooperating with guiding surfaces on the apparatus for guiding and positioning the apparatus while the apparatus is being lowered into the tank, and in providing readily removable locking means at the upper ends of the channel members for retaining the apparatus in the tank.

It is a further object of the invention to provide locking means for retaining the apparatus in the tank comprising a key or locking member extending through openings in the flanges of an outer channel member attached to the tank wall, and a positioning member or clip associated with the key for ensuring that an inner channel member or rib associated with the apparatus may not slip out from under the locking member.

Other objects and advantages of the invention will be apparent from the following description of a preferred embodiment of the invention, reference being had to the accompanying drawings, in which:

Figure 1 is a plan view of a transformer positioned within a casing or tank provided with the guiding and retaining means of the invention, showing the casing or tank wall in section.

Fig. 2 is a vertical section, taken on the line II—II of Fig. 1.

Fig. 3 is a perspective view of a guiding and retainer assembly showing the locking member and positioning member in place.

Fig. 4 is a plan view of a portion of the tank wall and apparatus showing the positioning member and locking member in place.

Figs. 5 and 6 are front and side views, respectively, of the positioning member or clip.

Fig. 7 is a vertical view, partly in section, showing the structure shown in Fig. 4.

Fig. 8 is an elevational view of the structure shown in Fig. 4 looking toward the center of the tank and with the tank wall removed.

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The apparatus to be retained within the tank or casing may be a transformer having a core and coil assembly supported in an end frame. The end frame may correspond to that described and claimed in the copending application of A. D. Forbes for Electrical apparatus, Serial No. 345,081, filed July 12, 1940, and assigned to the same assignee as this application and is here illustrated as such.

Referring to the drawings, a circular tank 1 is shown containing a transformer having a core 2 of magnetic material provided with a pair of windows 3 for accommodating windings 4, 5, and 6 that are positioned about the winding leg 7 of the core structure and pass through windows 3 in the core structure. An end frame structure is shown about the core structure 2 and consists of a bottom member 11, two vertical side members 12 and 13 on opposite sides of the core structure, and a top member 14 joining the upper ends of the members 12 and 13. The four members 11, 12, 13 and 14 are connected together to form an end frame about the core structure 2.

The side or vertical frame members 12 and 13 are shown in Figs. 1 and 2 and the member 13 is likewise shown in Fig. 3 as each having a channel-shaped central portion 15 forming a vertical rib between flat outer portions 16. The flat portions 16 are positioned snugly against the edges of the core structure and the vertical rib or corrugations 15 is positioned adjacent the tank wall, there being one such rib comprising a pair of each of the vertical members 12 and 13. Guide members 17 are positioned within the transformer tank wall and welded thereto as shown at 18 in Fig. 1. The guide members 17 are channel-shaped and provided with two inwardly extending flanges 19 which extend away from the tank wall on opposite sides of the vertical ribs 15 on the end frame members 12 and 13 of the apparatus to be held in position in the tank. The channel-shaped rib 15 slides between the flanges 19 as the transformer is lowered into position in the tank to center the transformer structure in the tank while it is being lowered into place and to retain it centrally of the tank after being placed within the tank.

The guide members 17 are so positioned within the tank that the top edge 21 thereof is at an elevation substantially above the top edge 22 of the channel-shaped vertical rib portion 15 of the end frame members 12 and 13. Vertical slots 23 are positioned in the flanges 19 at such elevation that a locking member 24 shown as a wedge-shaped piece of flat metal may be inserted through

the slot members 23 at the upper end of the vertical rib member 15. The narrow end of the wedge-shaped locking member 24 may be bent over as shown at 25 after the member has been inserted through the slots 23 to prevent it from being accidentally removed from position. A holding lug 26 is shown on the larger or outer end of the wedge-shaped locking member 24 to which a tool may be attached to withdraw the locking member from the slots 23 after the end portion 25 has again been straightened.

The locking member 24 is shown broken away in Fig. 3 in order to more clearly show the positioning member or clip 27 in place in the assembly. The positioning or clip member 27 is shown in Figs. 5 and 6 and comprises a central or substantially horizontal mid-portion 31 with end or leg portions 32 and 33 extending upwardly and downwardly, respectively, from the opposite ends of the mid-portion 31. Also a holding lug at top 32 to hold while placing in position.

The positioning member or clip 27 is provided to prevent sufficient movement of the apparatus within the casing to permit the upper end of the rib portion 15 from being moved out from under the locking member 24 so that it might pass upwardly past the member 24 without being retained thereby. It will be understood that in the manufacture of electrical apparatus and tanks for containing them, a certain play or leeway in the dimensioning of the parts is necessary to provide for quick and easy assemblage, and it is possible that without the positioning member 27 the apparatus within the casing as shown in Figs. 1 and 2 may be moved sufficiently to the right or to the left as to unlock the rib 15 with respect to the member 24 at one side or the other of the tank. To prevent this from taking place, the positioning member 27 is provided. The middle portion 31 of the positioning member 27 is positioned on top of the inner channel portion of the end frame forming the rib 15, extending substantially horizontally between this portion of the end frame and the key wedge locking member 24. One end of the clip member 27 extends downwardly inside the inner channel member 15 comprising the vertical rib portion of the end frame. The other end of the positioning member 27 extends upwardly from the horizontal portion 31 between the key wedge locking member 24 and the outer channel member 17 that is attached to the tank wall.

As can be readily seen from the various illustrations of the structure shown, the amount of movement of the end frame member 13 is limited. The central portion 31 of the positioning member or adapter clip 27 always extends horizontally above the upper end of the inner channel or rib portion 15 of the end frame and below the key wedge locking member 24, and an attempt to move the apparatus sufficiently to disturb this condition will be prevented by the vertical portions 32 and 33, respectively, of the clip member which limit the up movement of the apparatus horizontally within the casing. A holding lug 34 is shown extending horizontally inward from the upper end of the vertical portion 32 of the clip 27.

After the electrical apparatus is positioned in the tank, the adapter clips 27 will be placed in the positions illustrated at the upper ends of the vertical members 12 and 13 and the key wedges 24 placed in position as shown in Fig. 3. Should it be found desirable to remove the transformer from the casing, this may be readily done by re-

moving the key wedge 24 and the positioning members 27. Should the key wedge or locking member 24 or the positioning member 27 become lost or broken, they can be readily made from available scrap metal available wherever such transformers are used.

It will be apparent to those skilled in the art that modifications in the structure shown and described may be made within the spirit of my invention, and I do not wish to be limited otherwise than by the scope of the appended claims.

I claim as my invention:

1. In combination, a casing for containing electrical apparatus including a core structure and an end frame therefor, guide means comprising outer channel members fastened to the casing and having flanges extending inwardly from the casing wall, said apparatus having rib members provided with co-operating surfaces for engaging between the flanges of said outer channel members to guide said apparatus within the casing while it is being lowered to its final position within the casing, each of said outer channel members extending upwardly above the associated rib member of the apparatus engaging within and co-operating with the outer channel member, the inwardly extending flanges of each of the outer channel members having openings therein at an elevation to accommodate a key member therethrough immediately above the rib member of the apparatus co-operating with the associated outer channel member, and locking means for retaining the apparatus in the casing comprising a key member removably positioned within said openings in the flange portions of the outer channel member and an adapter member extending between the key member and the top of the rib member to prevent the rib member from slipping past the key member.

2. In combination, a casing for containing electrical apparatus including a core structure and an end frame therefor, guide means comprising channel members fastened to the casing wall within the casing and having flanges extending inwardly from the casing wall, said apparatus having channel member portions presenting co-operating surfaces for engaging between the flanges of said outer channel members attached to the casing to guide said apparatus within the casing while it is being lowered to its final position within the casing, each of said outer channel members extending upwardly above the inner channel member portions of the apparatus that engage within and co-operate with the outer channel members, the inwardly extending flanges of the outer channel members having vertical slots therein at an elevation to accommodate a key member therethrough immediately above the inner channel portions of the apparatus that co-operate with the outer channel members, and locking means for retaining the apparatus in the casing comprising a flat wedge-shaped key member removably positioned and fastened within said slots and an adapter clip member having a central portion extending between the key member and the top of the inner channel member and having a leg portion extending upwardly from the central portion between the key member and the outer channel member and a leg portion extending downwardly inside the inner channel member comprising the inner channel member of the end frame to prevent the inner channel member from slipping past the key member.

3. In combination, a casing for containing electrical apparatus including a core structure and

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an end frame therefor, said end frame having outwardly pressed channel sections providing ribs on opposite sides thereof, guide means comprising channel-shaped members fastened within the casing and having flanges extending inwardly from the casing wall for engaging the ribs on the end frame to guide and center said apparatus within the casing, said channel members extending upwardly above the ribs, the inwardly extending flanges of the channel members having openings therein at an elevation to accommodate a locking member therethrough immediately above the rib portions of the end frame, and locking means for retaining the apparatus in the casing comprising a wedge-shaped key member removably positioned within said openings for engaging said ribs, and an adapter clip member extending between the key member and the top of the rib portion and locked in position to prevent the rib member from slipping past the key member.

4. In combination, a casing for containing electrical apparatus including a core structure and an end frame therefor, said end frame having outwardly pressed channel sections providing ribs on opposite sides thereof, guide means comprising channel members fastened within the casing and having flanges extending inwardly from the casing wall for engaging the ribs on the end frame to guide and center said apparatus within the casing while being lowered to its final position within the casing, said channel members extending upwardly above the rib portions of the apparatus positioned within and co-operating with the channel members, the inwardly extending flanges of the channel members having vertical slots therein at an elevation to accommodate a locking member therethrough immediately above the rib portions of the apparatus and frame, flat wedge-shaped locking members removably positioned and fastened within said slots for tightly holding the apparatus within the casing, and clip members extending between the locking members and the top of the rib portions of the apparatus and having a leg portion extending upwardly between the locking member and the channel member and a leg portion extending downwardly inside the rib portion of the apparatus.

5. In combination, a casing for containing elec-

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trical apparatus including a core structure and an end frame therefor, said end frame having channel portions providing ribs extending vertically on opposite sides thereof, guide means within the casing for guiding the ribs on the end frame to center said apparatus centrally of the casing while it is being lowered to its final position within the casing, each of said channel members having an opening therein, a locking member positioned in said opening, the opening being positioned at an elevation with respect to the upper end of the rib that the locking members hold the apparatus within the casing, and a clip member having a central portion extending between a locking member and the upper end of a rib and having two opposite leg portions extending vertically in opposite directions from the central portion, the one leg portion extending along the side of the locking member and the other along the side of the rib.

6. In combination, a casing for containing electrical apparatus including a core structure and an end frame therefor, said end frame having channel portions providing ribs extending vertically on opposite sides thereof, guide means within the casing comprising channel members attached to the casing and having flanges on opposite sides of the ribs on the end frame for engaging the ribs to guide and center said apparatus centrally of the casing while it is being lowered to its final position within the casing, elongated slots in the flanges of the guide means located at an elevation just above the upper ends of the ribs on the end frame when the apparatus is in position in the casing, flat wedge-shaped locking members removably positioned within said elongated slots for tightly holding the apparatus within the casing, a clip member associated with each locking member and having a central portion extending between the lower side of the locking member and the upper end of the rib and having a leg portion extending upwardly from the central portion between the locking member and the channel members and a leg portion extending downwardly inside the channel-shaped rib of the end frame to prevent the rib from slipping past the locking member.

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