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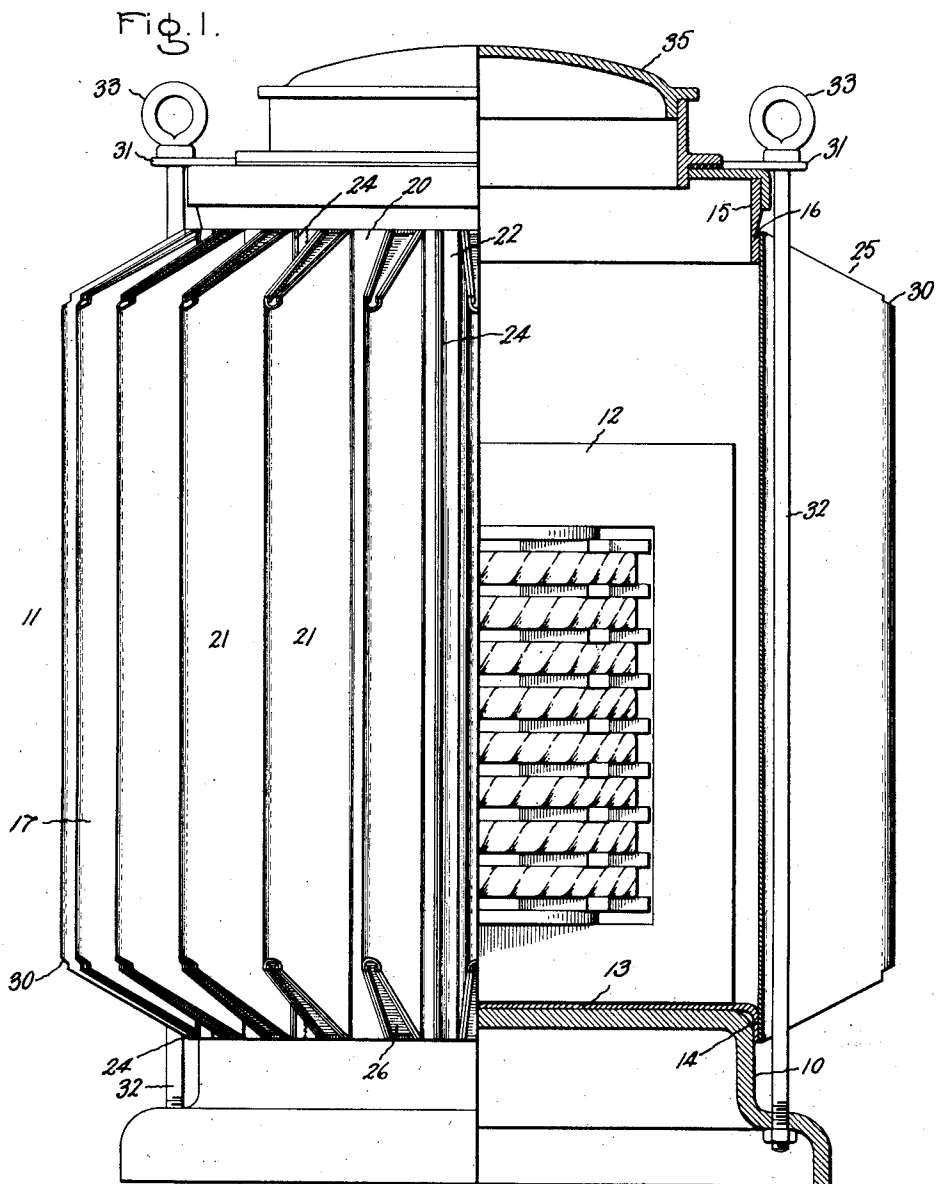
1,477,792

R. E. WAGNER

CASING FOR ELECTRICAL APPARATUS

Filed Sept. 28, 1920

2 Sheets-Sheet 1



Inventor:
Robert E. Wagner,
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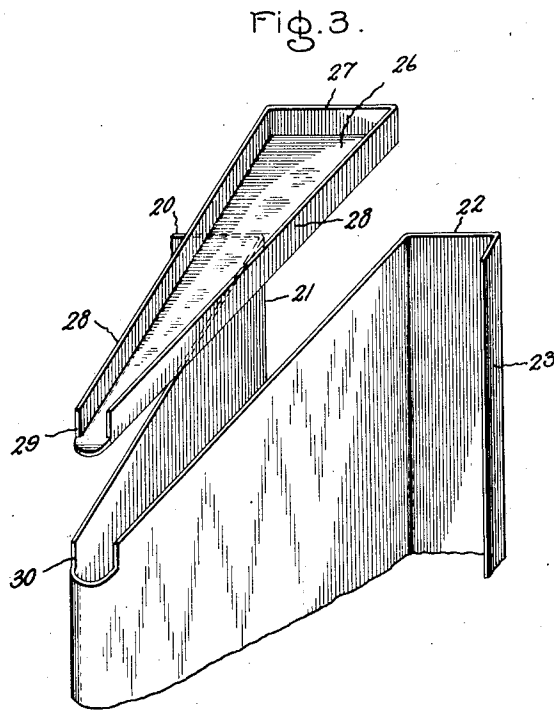
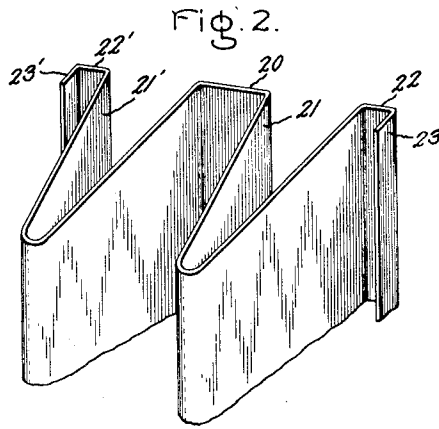
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CASING FOR ELECTRICAL APPARATUS

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2 Sheets-Sheet 2



Inventor:
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UNITED STATES PATENT OFFICE.

ROBERT E. WAGNER, OF PITTSFIELD, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

CASING FOR ELECTRICAL APPARATUS.

Application filed September 28, 1920. Serial No. 413,429.

To all whom it may concern:

Be it known that I, ROBERT E. WAGNER, a citizen of the United States, residing at Pittsfield, in the county of Berkshire, State of Massachusetts, have invented certain new and useful Improvements in Casings for Electrical Apparatus, of which the following is a specification.

My invention relates to casings for electrical apparatus submerged in oil, such as transformers and the like.

More specifically my invention relates to casings provided with deep corrugations in their side walls in order to increase the cooling capacity of so-called "self-cooled" apparatus.

The object of my invention is to provide an improved arrangement of parts which may be readily and economically manufactured.

The load which may be safely carried by any piece of electrical apparatus is determined by its ability to dissipate properly the heat generated while performing under load. This is particularly true of oil submerged electrical apparatus such as transformers. In the so-called "self-cooled" variety, which depend mainly on radiation to the surrounding medium or atmosphere to effect the necessary cooling, various forms of external radiators have been used to increase the radiating surface and thus increase the rating of the apparatus.

Another and cheaper way for increasing the radiating surface of the casing for electrical apparatus is to provide the side walls of the casing with corrugations; an advantageous form of such corrugations being disclosed in U. S. Letters Patent to Moody No. 713,901. Much difficulty however has been experienced in providing deep corrugations for apparatus of large capacity in a cheap and efficient manner; such corrugations are generally required to be six, eight or more inches deep.

In accomplishing the object of my invention, I employ corrugated units preferably having two or more convolutions which can be made by simple shearing and bending operations without the aid of drawing processes involving the use of expensive dies. I close the ends of such units by inserted pieces of novel design; all the parts being adapted to be assembled together by welding operations.

For a more complete understanding of the nature and objects of my invention reference should be had to the following detailed description taken in connection with the accompanying drawings in which:

Fig. 1 is a view, partly in vertical section and partly in side elevation, of a tank constructed in accordance with my invention; Fig. 2 is a perspective view of an end portion of a corrugated unit such as I employ without having its end pieces inserted; while Fig. 3 is a fragmentary view of the same unit to a different scale with an end piece about to be inserted.

Referring now to the drawings, 10 represents a base surmounted by a corrugated tank 11, housing a transformer 12. The tank 11 has a bottom member 13 formed with a downturned rim 14 and a top member or ring 15 provided with an exterior welding lip 16. Between the top and bottom members is secured the corrugated wall 17 which completes the tank.

In accordance with my invention the wall 17 is made of corrugated units which preferably have two convolutions or corrugations such as disclosed in the patent application filed by M. L. Elder on July 16, 1920, Serial No. 396,824. An upper end of this preferred form of unit is shown in Fig. 2, and comprises an intermediate back portion 20, corrugated portions 21 and 21' at each side of the back portion, and side portions 22 and 22' in the plane of the back portion which in turn are provided with upturned edge portions 23 and 23' and are adapted to abut against a corresponding edge portion of an adjacent unit, thereby providing an upwardly projecting welding edge for uniting the units. Such upstanding edges which unite the units are thus located between corrugations or on protected parts of the casing where they are not likely to be injured, and at the same time permit all the corrugations or convolutions to be made uniform. These edges are clearly shown at 24 in Fig. 1.

A unit such as I have shown in Fig. 2 may be readily blanked out from sheet stock in an ordinary shearing machine, the dies having a serrated or V-shaped development for cutting the obliquely sloping or drooping end portions of the corrugations shown at 25 in Fig. 1. The blanks thus sheared out are formed into corrugated units by simple bending operations along parallel longitu-

dinal lines which intersect with the cusps of the serrations, thus avoiding the use of delicate and expensive tools. The ends of the bent up units thus formed are closed by wedge-shaped end pieces 26 which are provided with upstanding edges 27 and 28 about its back and sides, the tip of the end being rounded off and the edges cut back therefrom as shown at 29 for a reason which will appear hereinafter.

These wedge-shaped end or triangular pieces 26, when thus formed, have a configuration corresponding to the open spaces defined by the walls or sides of a corrugated portion 21, so as to snugly fit therein and close the ends of such open spaces when inserted; the triangular pieces being united with the walls of portions 21 by welding along the edges 28. The crests of the corrugations are also notched out as at 30 to correspond to the cut back tips 29 of the pieces 26, the edges of these portions being also united by a weld thereabout in the assembled unit.

Units thus formed are adapted to be assembled by welding along longitudinal meeting edges, such as are shown at 24; and when assembled form the walls of a tank 11, as has been indicated. When subsequently shaped to have the desired peripheral end-configuration, they are ready to have the top-ring or member 15 and bottom member 13 secured in place. It should be observed that the provision of pieces 26 with upstanding edges 27 provides each unit with a continuous flat welding end which may readily be united to the top and bottom members to form the tank.

The top ring 15 is provided with lugs or eyelets 31 through which vertical rods or bolts 32 pass to engage with the base 10 in order to secure the tank 11 in place. The rods 32, in addition to securing the tank to the base, are provided with eyelets 33 as shown in order to permit the tank to be readily lifted through their instrumentality by cranes and the like. The tank is closed by the cover member shown at 35.

Tanks thus formed with deep corrugations facilitate the rapid dissipation of heat from the transformers, much heat being lost by convection as well as by radiation by reason of the air currents passing up between the corrugations. Self-cooled units as a consequence may be considerably increased in size and extended well into the region of transformer units which now employ an auxiliary cooling medium such as water in addition to the main cooling medium such as oil in the tank.

Substantially the only practical limitation at present on the depth of the corrugations is the size in which the stock, used to make the corrugated units, is now manufactured.

Tanks of this construction are rugged

and well adapted to outdoor installations. The provisions of the tips on pieces 26 with cut back edges and the use of corresponding notches in the crests of the corrugations permits the rain and other moisture collecting on the pieces 26 to run off readily thus providing a watershed; pockets at the tips being in this manner avoided.

While I have used the term "welding" as describing the process for uniting the several members composing the tank of my invention, obviously any convenient process known to the art, such as brazing and the like, can be employed to unite the members.

Having now described what is at present the best means known to me for carrying out an embodiment of my invention, I would have it understood that such means are merely illustrative and that I do not mean to be limited thereby to the exact details shown nor restricted in the choice of recognized equivalents except as defined in my claims hereunto appended.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. A sheet metal casing comprising top and bottom members, corrugated walls secured therebetween, said walls being composed of members bent on parallel longitudinal lines to form corrugations with spaced sides, and triangular end pieces with upturned edges inserted between the spaced sides of the corrugations, said upturned edges being cut back from the tips of said triangular end pieces and the edges of said members being cut back at the tips of said triangular end pieces to avoid pockets at the crests of the corrugations.

2. A sheet metal casing comprising top and bottom members, corrugated walls secured therebetween, said walls being composed of members bent on parallel longitudinal lines to form corrugations with spaced sides and being cut to have drooping ends, and triangular pieces inserted in the spaces between the sides of said corrugations, said triangular pieces being provided with upturned edges except at their tips, whereby the ends of said members are closed and provided with watersheds without pockets.

3. A sheet metal casing comprising top and bottom members, corrugated walls secured therebetween, said walls being composed of members bent on parallel longitudinal lines to form corrugations with spaced sides and being cut to have drooping ends notched at their extremities, and pieces inserted in the spaces between the sides of said corrugations and inclined to shed water.

4. A corrugated unit for side walls of casings, said unit including a pair of convolutions joined by an integral flat back portion, said convolutions having spaced sides cut back to provide drooping ends and

triangular pieces closing the ends of the spaces between said sides, said triangular pieces having upturned edges forming with the ends of said back portion continuous flat ends on the unit.

5 5. A corrugated unit for side walls of casings, said unit including a pair of convolutions joined by an integral flat back portion, said convolutions having spaced sides cut back to provide drooping ends and said drooping ends being notched at their outer extremities, and triangular pieces closing the ends of the spaces between the sides of said convolutions, said triangular pieces 10 having upturned edges except at their outer tips, whereby pockets are avoided between said upturned edges.

6. A casing for electrical apparatus, said casing comprising top and bottom members, 20 walls secured therebetween and comprising units having a plurality of convolutions with spaced sides joined by plane integral back portions, and end pieces closing the ends of the spaces between said spaced sides of the convolutions, said end pieces and said back portions forming continuous flat ends 25 of the walls, and said units being joined together between the convolutions.

7. A casing for electrical apparatus, said casing comprising top and bottom members, 30 corrugated walls secured therebetween and comprising units having a plurality of convolutions with spaced sides joined by plane integral back portions, said spaced sides having upstanding edges, and end pieces 35 closing the ends of the spaces between said spaced sides of the convolutions, said end pieces having upstanding edges forming with the ends of said back portions continuous flat wall ends, said units being 40 united by welding along said upstanding edges.

8. The method of making a casing for electrical apparatus which consists in forming corrugated members by shearing the 45 ends of stock to have a plane serrated development and bending the stock on longitudinal straight lines to form convolutions having spaced walls and drooping ends, inserting triangular pieces in said convolu- 50 tions, and welding said corrugated members together and to top and bottom members.

9. The method of making corrugated members for the walls of casings for electrical apparatus which consists in shearing 55 the ends of stock to have a plane serrated development, bending the stock on parallel longitudinal straight lines intersecting with the cusps of said serrations to form corrugations, forming end pieces having up- 60 turned edges and shaped to have the configuration defined by the corrugations produced by the bending, and securing said end pieces with their edges outermost in the ends of said members. 65

10. The method of making corrugated members for the walls of casings for electrical apparatus which consists in shearing the ends of stock to have a plane serrated development, bending the stock on parallel 70 longitudinal straight lines intersecting with the cusps of said serrations to form corrugations, forming end pieces having upturned edges and shaped to have the configuration defined by the corrugations pro- 75 duced by the bending, cutting back the upturned edges from the tips of said end pieces and forming notches at the crests of the corrugations to correspond, and securing said end pieces in the ends of said members 80 by welding along said upturned edges.

In witness whereof, I have hereunto set my hand this 24th day of Sept., 1920.

ROBERT E. WAGNER.