May 3, 1966 T. U. CLARK 3,249,903

TRANSFORMER CASING STRUCTURE HAVING SHIELDED TERMINALS

Filed Dec. 21, 1964

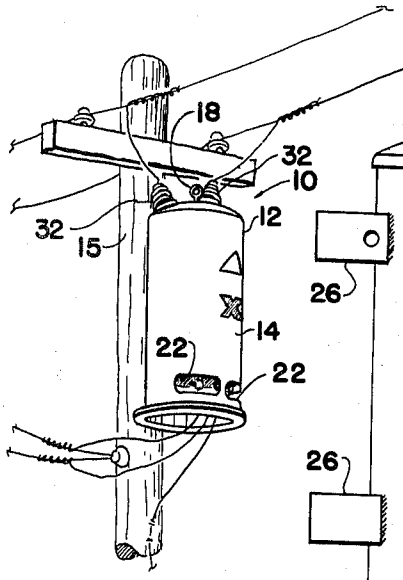


FIG. 1

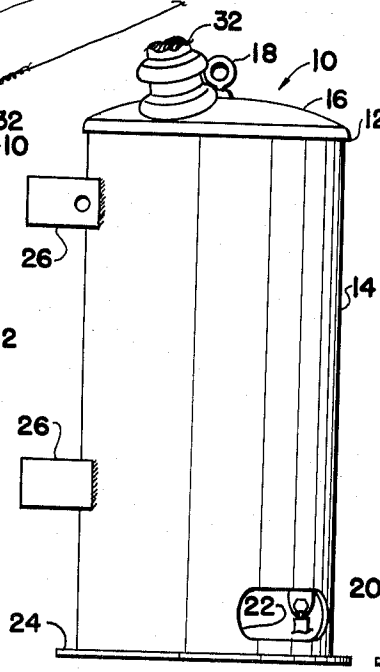


FIG. 2

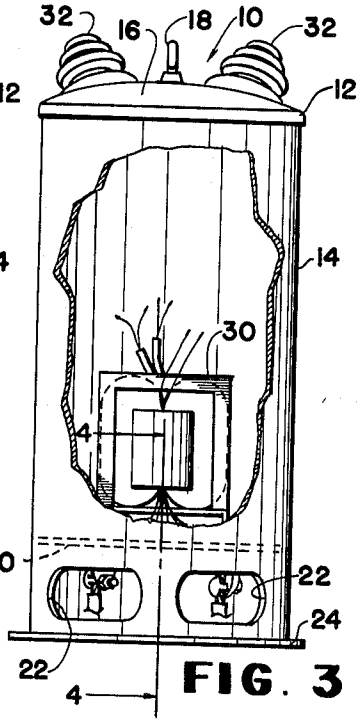


FIG. 3

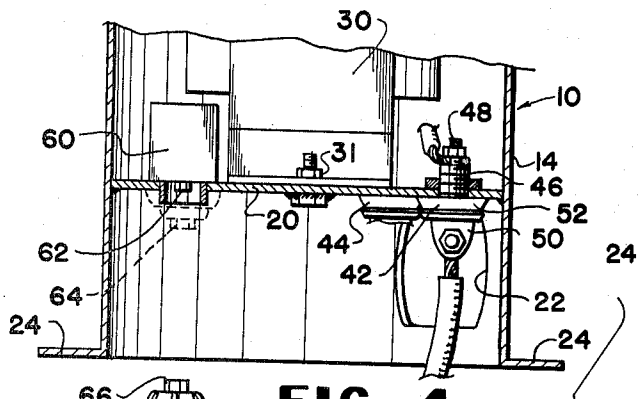


FIG. 4

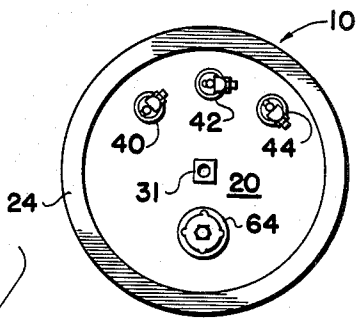


FIG. 5

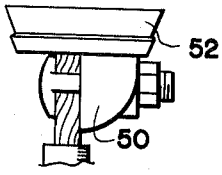


FIG. 6

INVENTOR.
THOMAS U. CLARK

United States Patent Office 3,249,903 Patented May 3, 1966

3,249,903

TRANSFORMER CASING STRUCTURE HAVING SHIELDED TERMINALS

Thomas U. Clark, Wichita, Kans., assignor to William D. Tarrant, doing business as Tarrant Electric Machinery Co., Wichita, Kans.

Filed Dec. 21, 1964, Ser. No. 420,016
5 Claims. (Cl. 336—94)

This invention relates to transformers, more particularly to improved transformer structure, which structure facilities the installation and maintenance of transformers.

Transformers are old and enjoy wide usage in the production and distribution of electrical power. However, known transformers, particularly distribution-type transformers, have a number of shortcomings. In general, the output terminals of the common distributor-type transformer presently in use are located on the side of the tank, often adjacent the top. This location of the output terminals makes the transformers difficult to install and service since they are located relatively near the high voltage input terminals. During servicing and installation, there is a danger that the personnel making the installation could inadvertently contact the high voltage terminals and be seriously injured or possibly killed. Further, relatively long lead wires are necessary in the installation of this know type of transformer. An additional disadvantage to known transformers is the location of the tap changer. The tap changer is used to compensate for a drop in the line voltage. The tap changers are often in inaccessible locations either within the tank itself or adjacent high tension terminals. Still another disadvantage of known transformer apparatus is that the terminals can be easily broken or damaged while the transformer is being handled and stored prior to installation, transported to the location, and during installation.

I have invented a new improved electrical transformer. The electrical transformer of my invention has an upright tank having a top and a bottom, with a core and coil assembly mounted within the tank. A high voltage terminal is mounted on the upper portion of the tank, and a low voltage terminal is mounted on the bottom of the tank. A downwardly extending means protrudes below the bottom to protect the low voltage terminals. In a preferred specific embodiment of my invention, the downwardly extending means is a cylindrically shaped extension provided with access openings to facilitate the joining of a lead to the low voltage terminal.

The transformer apparatus of my invention overcomes all of the shortcomings common to conventional transformers known to the prior art. The transformer of my invention has the output terminals located on the bottom. In this position, the output terminals are low and easy to reach for one servicing or installing the transformer. Further, the location makes working on the transformer much safer since they are spaced a relatively long distance from the high voltage input terminals. In addition, the location on the bottom of the tank of the output terminals makes possible the use of shorter leads. My transformer is also provided with a downwardly extending projecting means which in use protects the terminals during handling and also protects same after installation from the elements of the weather. The openings in the side of the downwardly extending projecting means enables maintenance personnel to inspect the terminals, and also provides ready access to the terminals during installation and maintenance. The tap changer of my transformer is located in a very convenient location, namely on the bottom, which makes adjustments of same safe and also readily accessible. The tap changer adjustment shaft is also protected from the elements of the weather and also from breakage during handling by the downwardly projecting means.

An object of this invention is to provide new transformer structure.

Another object of this invention is to provide a transformer that is safe to install and maintain.

Yet another object of this invention is to provide a transformer in which the low voltage terminals and the tap changer are protected from the elements and also spaced a relatively large distance from the high voltage input terminals.

Still another object of this invention is to provide a transformer having a new type tank that will protect the terminals from breakage during handling and storage prior to its installation.

Still another object of this invention is to provide a transformer with a means for protecting the terminals thereof from the elements of the weather which will not interfere with installation and maintenance of the transformer.

Other objects and advantages of the new transformer structure of my invention will become apparent to those skilled in the art upon reading the disclosure.

Drawings accompany and are a part of this disclosure. These drawings depict preferred specific embodiments of the new transformer structure of my invention and it is to be understood that such drawings are not to unduly limit the scope of my invention. In the drawings,

FIG. 1 is a perspective view of a preferred specific embodiment of my new transformer shown mounted on a conventional utility pole.

FIG. 2 is a side elevational view of the transformer of my invention.

FIG. 3 is a front elevational view, in broken section, of a preferred specific embodiment of the transformer of my invention.

FIG. 4 is a cross sectional view in broken section taken on line 4—4 of FIG. 3.

FIG. 5 is a bottom view of the transformer of my invention.

FIG. 6 is a detail view showing the construction of the low voltage outlet terminals.

The following is a discussion and description of the new transformer apparatus of my invention made with reference to the drawings, wherein the same reference numerals are used to indicate the same or similar parts and/or structure. The discussion and description is of preferred specific embodiments of the new transformer structure of my invention, and it is to be understood that such is not to unduly limit the scope of my invention.

Referring now to the drawings, FIGS. 1 through 6, there is illustrated transformer **10** of my invention. Transformer **10** is a single phase distribution-type electrical transformer having an upright tank **12** having a cylindrically shaped upright wall **14**, a semi-cylindrically shaped top **16** joined to wall **14**, with a lifting eye **18** in the center of the top **16**. The lifting eye **18** is used to handle the transformer during storage and transit, and also hoist the transfermer in place during installation. A flat bottom **20** is joined to wall **14** in spaced relation to the end of the wall. The wall **14** is provided with a plurality of access openings or apertures **22** positioned below bottom **20**. A radially extending flange **24** is provided on the bottom portion of wall **14**. The tank **12** is preferably formed of metal, most preferably of steel, and painted or otherwise coated to resist corrosion. Suitable bracket means **26** are provided for mounting the tank on a pole or the line. In FIG. 1 the tank **12** is shown mounted on a pole **15**.

A core and coil assembly **30** is mounted within tank **14** and secured to the bottom **20** with bolt **31**. The coil assembly **30** includes primary and secondary windings and is well known in the art. Two spaced and insulated generally upright high voltage terminals **32** are mounted on top **16** of transformer **10** and are in electrical contact with the primary winding of the core and coil assembly **30**. Three spaced downwardly extending low voltage output terminals **40**, **42** and **44** are mounted in the bottom **20** of the tank **12** adjacent access apertures **22**. The low voltage terminals **40**, **42** and **44** are connected to the secondary winding of the core and coil assembly **30** in the conventional manner well known in the art. The low voltage terminals can be mounted in any suitable position. The center terminal **42** is conventionally the ground terminal. The specific construction of the low voltage terminals is shown in detail in FIGS. 4 and 6. The terminal consists in general of a threaded portion **46** which is positioned within the tank, and a longitudinally extending reduced threaded portion **48** connected to the secondary winding of the core and coil assembly. Protruding outside of the tank **12** is a lug **50**, and an insulating washer **52** positioned between the lug and the bottom of the tank. The portion **46** of the terminal is also insulated from the tank with suitable washers, etc. when the terminal is not the ground terminal. Any suitable terminal structure can be used however.

A tap changer **60** is provided, which is in electrical contact with the primary winding of the coil assembly. The hook-up of the tap changer **60** is conventional and is well known in the art. The tap changer provides a means for compensating for a line voltage drop. The tap changer has an insulated actuating shaft **62** extending through bottom **20**, as shown most clearly in FIG. 4. The protruding portion of shaft **62** is non-circular in cross section. A cover **64** is provided having thread means to secure same to the tank in overlying protective relation, as shown in the dotted lines in FIG. 4. The cover is also provided with a wrench portion **66** having a shape complementary to the end portion of insulated shaft **62** for turning or adjusting same. An insulated liquid is disposed within the tank **12** of the transformer, as is well known.

It can be seen that the lower wall portion of the tank **12** forms a protective means around the low voltage terminals **40**, **42** and **44**, and also the tap changer, which protects these elements from the elements of the weather and also from breakage during handling and installation. The access openings **22** provide a very convenient opening for inspecting and also for facilitating the installation of the leads to the low voltage terminals. It can also be seen that the low voltage terminals and the tap changer are all located a relatively long distance from the relatively dangerous input terminals **32**. My transformer structure is therefor adapted for ease, simplicity and safety in maintenance and installation.

As will be obvious to those skilled in the art, various changes and modifications of the preferred transformer structure of my invention, as described herein, can be made or followed without departing from the spirit of the disclosure or the scope of the claims.

I claim:

1. A single phase distribution-type electrical transformer comprising, an upright tank having a cylindrically shaped upright wall, a semi-spherical shaped top joined to said wall, a lifting eye in the center of said top, a flat bottom joined to said wall in spaced relation to the end of said wall, said wall having a plurality of spaced access apertures positioned below said bottom, a radially extending flange on the bottom portion of said wall, a bracket means for mounting said tank on a pole or the like, a core and coil assembly including primary and secondary windings mounted within said tank, two spaced and insulated generally upright high voltage input terminals mounted on said top in electrical contact with said primary winding, three spaced downwardly extending low voltage output terminals in electrical contact with said secondary winding mounted on said bottom of said tank adjacent said access apertures, a tap changer in electrical contact with said primary windings of said coil assembly mounted within said tank and having an insulated acting shaft with a non-circular end portion extending through said bottom, a cover for said tap changer actuating shaft having a thread means to secure same in overlying protective relation to said shaft, and a central protruding wrench portion adapted to releasably engage the end portion of said shaft, and an insulating liquid within said tank, said transformer particularly adapted for ease, safety and simplicity of installation and maintenance.

2. A single phase distribution-type electrical transformer comprising, a tank having an upright wall, a semi-spherical shaped top joined to said wall, a lifting eye in the center of said top, a flat bottom joined to said wall in spaced relation to the end of said wall, said wall having a plurality of spaced access apertures positioned below said bottom, a bracket means for mounting said tank on a pole or the like, a coil and core assembly including primary and secondary windings mounted in said tank, a plurality of spaced and insulated generally upright high voltage input terminals mounted on said top in electrical contact with said primary winding, a plurality of spaced downwardly extending low voltage output terminals in electrical contact with said secondary winding mounted on said bottom of said tank adjacent said access apertures, a tap changer for said coil assembly mounted in said tank having an insulated actuating shaft extending through said bottom, a cover for said tap changer shaft having wrench means thereon adapted to releasably engage the end portion of said shaft, said transformer particularly adapted for ease, safety and simplicity of installation and maintenance.

3. A single phase electrical transformer comprising, a tank having an upright wall, a top joined to said wall, a flat bottom joined to said wall in spaced relation to the end of said wall, said wall having a plurality of spaced access apertures positioned below said bottom, a bracket means for mounting said tank, a core and coil assembly including primary and secondary windings mounted in said tank, a plurality of spaced and insulated generally upright input terminals mounted on said top in electrical contact with said primary winding, a plurality of downwardly extending output terminals in electrical contact with said secondary winding mounted on said bottom of said tank adjacent said access apertures, a primary tap changer for said coil assembly mounted within said tank and having an insulated actuating shaft extending through said bottom, said transformer particularly adapted for ease, safety, and simplicity of installation and maintenance.

4. An electrical transformer comprising, an upright tank having a top and a bottom, a core and coil assembly including primary and secondary windings mounted in said tank, a plurality of high voltage terminals mounted on the upper portion of said tank in electrical contact with said primary winding, a plurality of low voltage terminals mounted on said bottom of said tank in electrical contact with said secondary winding, an axially extending wall portion on the bottom of said tank having an axial length in excess to the length of said low voltage terminals, a plurality of access apertures in said axially extending wall adjacent said low voltage terminals, a tap changer mounted within said tank in electrical contact with said coil assembly and having an actuating shaft accessible through said bottom, said transformer particularly adapted for ease, safety, and simplicity of installation and maintenance.

5. An electrical transformer comprising, a tank positionable in an upright position, a core and coil assembly having windings and mounted in said tank, a first voltage terminal mounted on an upper portion of said tank and in electrical contact with said windings, a second voltage terminal mounted on the bottom of said tank and in electrical contact with said windings, an axially extending skirt portion on the lower portion of said tank and extending therefrom a distance greater than the length of said second terminal, an access aperture in said axially extending skirt and positioned therein to give ready access to said second terminal, and tap changer means mounted within said tank in electrical contact relation with said coil assembly and having actuating means accessible through

said bottom of said tank, said transformer adapted for ease, safety and simplicity of installation and maintenance.

References Cited by the Examiner

UNITED STATES PATENTS

2,668,274	2/1954	Schneider	336—94 X
3,164,794	1/1965	Broverman et al.	336—94 X

LARAMIE E. ASKIN, *Primary Examiner.*

JOHN F. BURNS, *Examiner.*

D. J. BADER, *Assistant Examiner.*