July 1, 1930. J. D. WOOD 1,769,562

FLUID CONTAINING CASING FOR ELECTRIC APPARATUS

Filed June 30, 1926

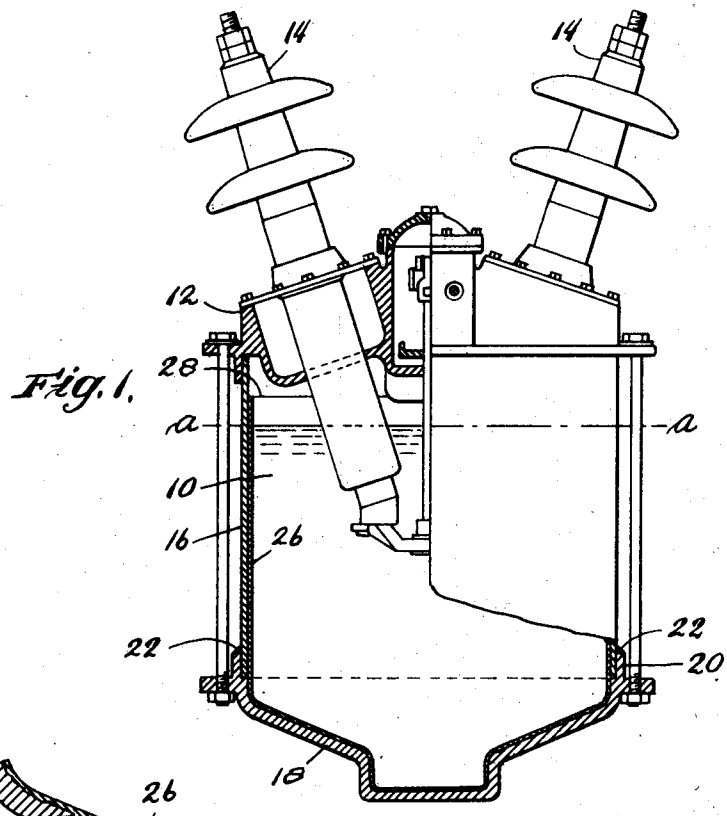


Fig. 1.

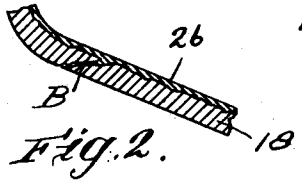


Fig. 2.

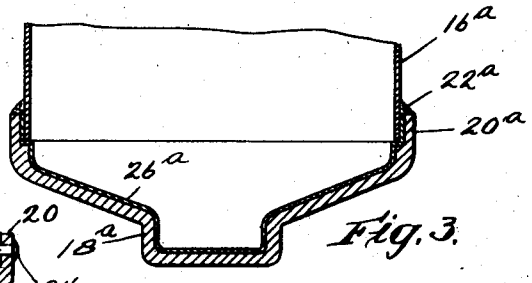


Fig. 3.

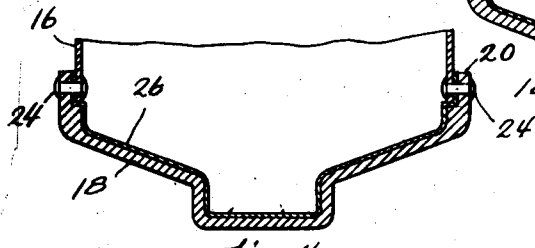


Fig. 4.

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UNITED STATES PATENT OFFICE

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FLUID-CONTAINING CASING FOR ELECTRIC APPARATUS

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This invention relates to oil immersed electrical apparatus as oil switches, transformers, and the like and has particular reference to the oil containing casings in which components of such apparatus are disposed and immersed in the oil or other insulating fluid therein contained.

The oil receptacle of an oil immersed electric switch, for instance, is made relatively strong and massive in order that it may successfully resist the high pressures which may be developed therein due to circuit interruption. To this end a part, as the bottom wall of the oil receptacle, is made of cast steel and is attached by welding or otherwise to the rolled steel cylindrical side wall. It is found in practice that while steel castings appear to be solid they may develop oil leaks by reason of minute and almost imperceptible blow holes or imperfections therein. It is now the practice to rigidly inspect and test under pressure these castings to locate and reject leaky castings since a leaky casting will sooner or later permit serious loss of oil from the oil receptacle and at the same time present an unsightly appearance.

It is an object of this invention to provide the oil receptacle or other liquid containing receptacle with a thin and impervious fluid-containing metal lining which is strongly adherent to the inner face of and is supported by the receptacle and is conformed to the contour thereof and which fills in or bridges and thereby seals the minute passages or blow holes which would otherwise result in a leaky receptacle.

While the thin metal lining is strongly adherent to the surface of the oil receptacle, it may not be so closely adherent as to produce an oil tight bond between it and the receptacle. Consequently, it is a further object of this invention to extend the metal lining to a point outside of the oil so that the oil ordinarily will not have access to the junction between the lining and the oil receptacle. Under these conditions, the oil can not ordinarily work between the lining and the receptacle and thence through the imperfections in the walls of the receptacle and escape.

A further object is generally to improve the construction of the casings of electrical apparatus.

Fig. 1 is an elevation partly in section of an electric switch having an oil containing casing constructed in accordance with this invention.

Fig. 2 is a sectional detail illustrating the manner in which the thin metal lining fills and overlies and seals a fault in the casing wall.

Fig. 3 is a sectional detail of a modification of the oil containing casing of Fig. 1 illustrating a modified arrangement of the oil retaining lining.

Fig. 4 is a further modification wherein the cylindrical side wall of the receptacle is riveted instead of welded to the bottom casting.

The electrical apparatus herein selected for the purpose of illustrating the invention comprises an electric switch having a casing which includes an oil receptacle 10 and a switch frame 12 which forms a cover for the receptacle. Switch terminals 14 are carried by the cover and extend into and are immersed in the oil in the casing.

The oil receptacle herein shown is cylindrical in form and is provided with the cylindrical side wall 16 which usually is made of sheet steel of considerable thickness whereby to provide sufficient strength to resist the relatively great internal pressures which may be developed by the circuit interrupting arc. The bottom wall 18 of the oil receptacle is in the form of a steel casting having relatively thick and massive side walls and provided with an annular flange 20 within which the lower end of the side wall 16 is received. The side and bottom walls may be secured together in an oil tight manner by welding as at 22, or by a line of rivets as at 24, Fig. 4, or in any other suitable manner. Since the side wall 16 is formed of rolled sheet steel it usually is free from such imperfections as will admit of the passage of oil therethrough. The bottom casting 18, however, is liable to be

formed with blow holes, slag streaks, and the like which more or less readily permit oil to pass therethrough. The majority of the imperfections are so small as to be not readily perceptible so that the casting is passed for machining and assembling as a perfect casting while upon subsequent test under pressure it may be found leaky.

In accordance with this invention, I provide the oil receptacle with a thin fluid-impervious and fluid-retaining lining or coating 26 of metal which lining is strongly adherent to the surface of the receptacle and fills in and bridges over and seals the imperfections and small passages therethrough. The lining is continuous beneath the oil level *a—a* and extends therebeyond or to some point 28, Fig. 1, which is above the normal level of oil in the receptacle. The lining is adapted to be flexible to expand and contract and flex with the walls of the oil receptacle without rupture and is adapted to be supported by the casing and walls against rupture due to elevation of pressure within the casing. The lining 26 is applied to the inner surface of the oil receptacle by the well known metal-spray process wherein a rod of the metal is melted in an oxy-acetylene flame and is sprayed in minute molten or fluid particles onto the surface of the oil receptacle on which it immediately chills and clings. Prior to the application of the metal coating, the surface of the oil receptacle is cleaned from any oil, scale and other foreign and loose particles which may be adherent thereto and the surface is sand-blasted or otherwise roughened to form irregular projections and cavities in which the molten metal is forcibly lodged whereby to effect a strong mechanical bond between the metal coating and the surface. The metal coating is sprayed on in a more or less usual manner until a sufficient thickness as from five thousandths to ten thousandths of an inch is built up uniformly on the surface of the oil receptacle.

During the process of building up the metal surface, holes or irregularities therein may be filled up solidly with the spray-deposited metal thereby to seal them. Minute passages in the wall of the receptacle, as at B, Fig. 2, may be filled and bridged over by the metal coating in the manner illustrated, the metal coating entering the passage part way and solidifying therein. The metal lining may be composed of any suitable metal depending upon the particular requirements. For use in connection with oil switches, the lining may be composed of zinc which has a low melting point and can be readily and rapidly applied.

While it is highly desirable to terminate the edge of the lining beyond the oil, it is not essential that the edge of the lining be disposed above the oil level as in Fig. 1. In Fig. 3, the metal lining 26^a is applied to the inner face of the bottom casting 18^a and extends over the machined inner face of the flange 20^a. The bottom end of the cylindrical side wall 16^a is received within said flange and upon the metal lining and the flange and the side wall are united together by welding material 22^a. In this illustration, the lining 26^a may be composed of some material, as iron, which may unite with the welding material 22^a so that the welding material forms an oil tight seal at the edge of the lining as well as mechanically uniting the casing 18^a with the side wall. In the construction illustrated in Fig. 4, the lining is terminated at the top of the flange at the bottom casting as in Fig. 3 and the line of rivets 24 provides the seal between the side wall and the bottom casting so that the terminal edge of the lining is not immersed in oil.

I claim:

1. A sectional fluid containing casing for an electrical apparatus comprising a fluid-impervious upper section and a fluid-pervious bottom section, said latter section having a spray-deposited metal coating applied to the inner face thereof over and in sealing relation with any imperfection therein, said metal coating characterized by being extended upwardly over said fluid-impervious upper section and having a terminus thereat ordinarily inaccessible to the fluid in the casing, said coating further characterized by being strongly mechanically adherent to said casing and flexible to yield with said casing without rupture.

2. A fluid containing casing for an electrical apparatus having a fluid-impervious sheet-metal wall and a fluid-pervious cast-metal bottom and a fluid-seal for said bottom comprising a thin spray-deposited fluid-impervious metal lining which is strongly mechanically adherent to the inner face of said cast metal bottom and fills in and bridges over and seals the imperfections therein and which is extended under the lower face of said sheet-metal wall and has its edge terminated without the fluid containing space in said casing.

In testimony whereof, I have signed my name to this specification.

JOSEPH D. WOOD.