June 23, 1931. W. S. EDSALL 1,811,665

ELECTRIC SWITCH

Filed Oct. 17, 1922

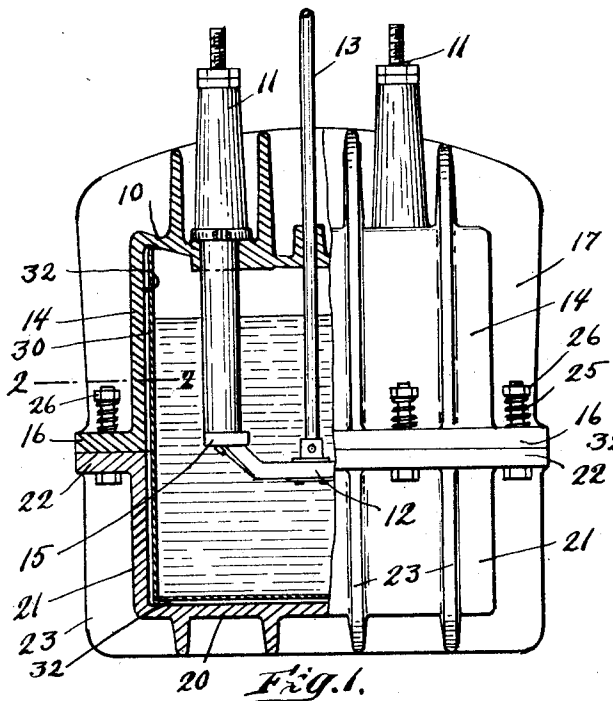


Fig. 1.

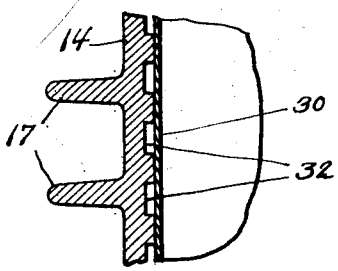


Fig. 2.

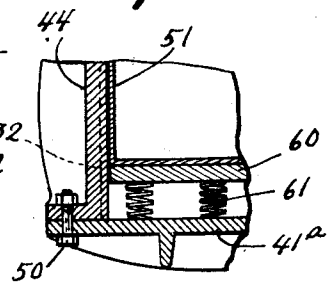


Fig. 5.

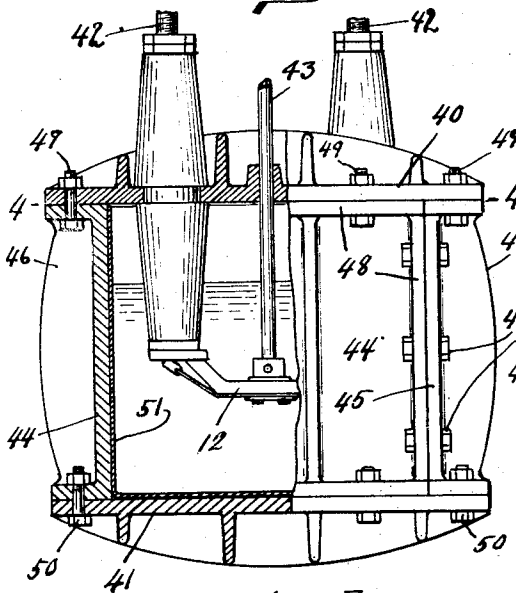


Fig. 3.

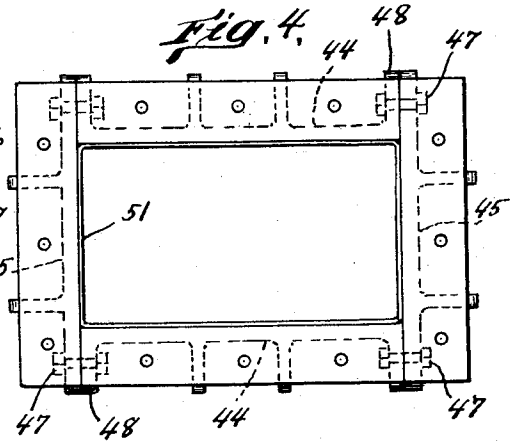


Fig. 4.

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Patented June 23, 1931 1,811,665

UNITED STATES PATENT OFFICE

WILLIAM S. EDSALL, OF BOSTON, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO CONDIT ELECTRICAL MANUFACTURING CORPORATION, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS

ELECTRIC SWITCH

Application filed October 17, 1922. Serial No. 595,172.

This invention relates to electric switches especially adapted to interrupt relatively high values of current in oil or other arc quenching fluid.

When a relatively heavy current is interrupted under oil a relatively high pressure may be set up within the oil receptacle, due, among other things, to the volatilization of the oil.

An object of this invention is to provide a switch having a casing particularly adapted to contain an arc quenching fluid and constructed and arranged to withstand relatively high internal pressures, whereby to increase the current-interrupting capacity of the switch.

In carrying out this object, I may provide a casing having relatively thick walls and ribbed to provide additional strength. Such a construction, if formed of a single piece, may be relatively expensive and, therefore, I prefer to make the casing of several sections which may be bolted or otherwise secured together. A multi-part casing, however, necessitates joints through which there may be danger of oil leakage.

A further object of this invention is to provide a switch having a relatively strong sectional casing and an inner fluid-tight lining or receptacle adapted to contain the oil. Said receptacle is adapted to be relatively weak and yielding and is adapted to be supported by the walls of the casing and cover the joints between the sections. With this arrangement, the supporting casing need not be fluid tight, and yet the composite structure is fluid-tight and strong and relatively inexpensive.

A further object is to provide means to support the oil receptacle yieldingly within its supporting structure.

A further object is generally to improve the construction and operation of electric switches.

Fig. 1 is a side elevation, partly in section, of an electric switch embodying the invention.

Fig. 2 is a sectional detail along line 2—2 of Fig. 1.

Fig. 3 is a view similar to Fig. 1 and illustrating a modified construction.

Fig. 4 is a plan view of the oil receptacle and enclosing casing taken along line 4—4 of Fig. 3.

Fig. 5 is a view similar to Fig. 3 and showing the oil receptacle yieldingly supported within the receptacle-supporting structure.

As here shown, the electric switch embodying this invention may include a casing having the upper casing section formed with the top wall 10 which may support the stationary switch members 11 in a more or less usual manner. A movable switch member 12 may have its supporting rod 13 movably extended through said wall 10 also in a more or less usual manner. Said top wall 10 in accordance with this invention is or may be relatively thick and massive, for strength, and may be more or less cylindrically formed whereby to enhance its ability to resist pressures developed within the casing.

The upper casing section may also include the depending flanges or side walls 14 which extend below the periphery of the top wall 10 and form an enclosure for the switch members and an oil receptacle. Preferably said flanges terminate at or slightly above the line of the contact members 15 carried by said stationary switch members 11. Said flanges 14 may be formed with a laterally outstanding peripheral flange 16 at the lower edge thereof and, as said flange 16 is in the line of the circuit-interrupting arc, and therefore in the line of maximum initial internal pressure, said flange aids materially in strengthening the casing. Said flanges 16 and 14 are preferably of substantial thickness, for strength, and integral with each other and said flange 14 is preferably integrally formed with the top wall 10. Said flanges 14 top wall 10 are or may be formed with relatively deep and massive outstanding and integral ribs 17, whereby to strengthen said flanges and top wall, and ribs of said flanges may be integral with and form a continuation of ribs of the top wall, as illustrated in Fig. 1.

The switch casing also includes a lower casing section having the relatively thick bottom wall 20 and the integral upstanding and rela-

tively thick side walls 21; and said side walls 21, in effect, serve as a continuation of the flanges 14 of the upper casing section. A peripherally outstanding flange 22 is or may be integrally formed with the side walls 21. Said lower section may be formed with the relatively deep integral ribs 23 which connect the bottom and side walls, whereby to strengthen said section.

Said lower casing section is adapted removably to be connected yieldingly with the upper casing section and the yielding connecting means may include bolts received in said flange 22 in said lower section and slidably extended through apertures in said flange 16 of the upper casing section; and springs 25 may encircle said bolts and engage said flange 16 and nuts 26, which latter are or may be adjustably threaded on the upper ends of said bolts. The arrangement is such that, normally, said flanges 22 and 16 are or may be held in contact by said springs and said bottom member may yield downwardly against said springs when an excessive pressure occurs within the casing, whereby to keep down the pressure rise within the casing and absorb energy incident to such pressure rise.

A lining or receptacle 30 is adapted to be received within the switch casing and supported by said bottom member and adapted to contain oil or other arc-quenching fluid in which the switch members are immersed. The walls of said receptacle are or may be of relatively thin and yielding material and therefore weak and unable to resist such an increase of pressure as may be created within the receptacle incident to circuit interruption. The walls of said receptacle are adapted to fit relatively closely within the walls of the switch casing, and the depending flanges 14 of the upper casing section, and the side walls 21 of the lower casing section are adapted to support the walls of the oil receptacle against internal pressure, and the walls of the oil receptacle are adapted to yield outwardly against the walls of the casing.

The inner face of the flanges 14 may be formed with a series of vertically-arranged grooves 32 which extend from the top wall 10 to the lower edge of said flanges, whereby to provide vent passages between said flange and the side walls of the receptacle by which gas may escape from the interior of the switch, and relieve the internal gaseous pressure. The side and bottom walls of the lower casing section may be similarly formed whereby to provide a space below and externally of the oil receptacle in which may collect oil discharged from the oil receptacle.

Fig. 3 illustrates a switch having a modified construction. Said casing may include the relatively massive top plate 40 which may form the cover of the casing; and the bottom plate 41. Both plates may be ribbed for strength. Stationary and movable switch members 42 and 43, respectively may depend below said top plate.

The side walls of the casing are or may be formed of the side plates 44 and end plates 45, all of which may be relatively thick and formed with reinforcing ribs 46, for strength. Said side and end plates may be secured together by bolts 47 passed through said end plates and flanges 48 of said side plates, whereby to form a rectangular enclosure; and the top and bottom plates 40 and 41 may be secured to said side and end plates by the bolts 49 and 50. A casing is thus formed which is well adapted to resist relatively high internal pressures.

A receptacle 51, which may be similar to the oil receptacle 30 of Fig. 1, is received within said casing and is adapted to provide the oil-tight container for the oil in which the switch members are immersed.

The switch members may be inspected by removing the bolts 50 and lowering the lower portion of the casing.

In Fig. 3, the oil receptacle is not supported yieldingly, but in Fig. 5, it is so supported, the supporting means including a platform 60 on which the bottom of the receptacle rests and compression springs 61 disposed between said platform and the bottom plate 41*a* of the casing. With this arrangement, the oil receptacle may yield downwardly upon the occurrence of an abnormal pressure rise within it, and stress said springs. The space between said platform 60 and bottom plate 41*a* may also serve to collect oil spilled over the top of the oil receptacle upon circuit interruption.

With the arrangement thus provided, the joints between the various sections of the casing need not be oil tight as the oil receptacle is adapted to be oil tight and contain the oil or other fluid, and the walls of the oil receptacle cover the joints between the sections.

The structure may be otherwise modified without departing from the spirit of the invention.

I claim:

1. An electric switch having a sectional fluid-perforate enclosing casing, and a relatively weak fluid-tight oil receptacle enclosed within and supported yieldingly by said casing, the walls of said casing conformed generally with and arranged to support the corresponding walls of said oil receptacle against rupture and against change in configuration due to internal pressures.

2. An electric switch having a relatively strong enclosing casing comprising upper and lower yieldingly connected sections, and a relatively weak fluid-tight oil receptacle enclosed by and supported yieldingly within said casing and having its corresponding walls conformed generally with and supported by

the walls of and said casing substantially over their entire extent and restrained thereby against yielding and change in configuration when there is pressure within the casing.

3. An electric switch having a relatively strong sectional enclosing casing the joint between the sections providing a normally closed passage for venting the switch on overload, and a relatively weak fluid-tight oil receptacle enclosed within said casing, the walls of said oil receptacle conformed generally with and adapted to yield outwardly without rupture and engage and be supported by the corresponding walls of said casing upon the occurrence of an abnormal pressure within said oil receptacle.

4. An electric switch having a relatively weak fluid-tight oil receptacle, and a sectional supporting structure which is not fluid-tight arranged in conformance with the walls of and in supporting relation with said weak oil receptacle substantially over its entire extent and so restrains the walls of said weak oil receptacle against yielding and change in configuration when there is pressure within the receptacle.

5. An electric switch including a relatively strong supporting structure having a fluid venting passage therethrough, and a relatively weak fluid-tight oil-receptacle located within and conformed with the walls and arranged to be supported against rupture over practically its entire extent by said supporting structure and cover the fluid passage therethrough.

6. An electric switch including a relatively strong sectional fluid-perforate casing having a normally closed fluid-venting passage between its sections, a relatively weak oil-tight lining received within and conformed with the walls of the sections of said casing and adapted to be supported by and in intimate contact with the walls of said casing substantially over its entire extent, and means to permit one of said casing sections to yield and open said vent passage while still maintaining its supporting relation with said oil receptacle.

7. An electric switch having a relatively strong sectional fluid-perforate casing, and a relatively weak oil-containing lining received within and conformed with the walls of the sections of said casing and adapted to be supported against rupture by the walls of said casing, said casing and lining arranged to provide a vent passage over the top of the lining and down between the side walls of the casing and lining.

8. An electric switch having a relatively strong sectional fluid-perforate casing adapted to enclose an oil-containing space, and a relatively weak oil-containing lining received within and conformed with the walls of the sections of said casing except at the bottom and adapted to be supported by the walls of said casing, said casing and lining arranged to provide a vent passage over the top of the lining and down between the side walls of the casing and lining, and an oil receiving space below the bottom wall of said lining.

9. An electric switch including a casing comprising upper and lower connected sections, and an oil receptacle contained within said casing having its side walls conformed with the walls of both sections and arranged in covering relation with the joint between said sections.

10. An electric switch including a casing comprising upper and lower connected sections, and an oil receptacle contained within said casing and adapted to have its walls supported by the walls of said casing and cover the joint between the sections of said casing.

11. An electric switch including a casing having relatively movable upper and lower sections, yielding means connecting said sections, and an oil receptacle contained within said casing having its side walls conformed with the walls of both sections and arranged in covering relation with the joints between said sections.

12. An electric switch including an upper casing section having depending side walls, a lower casing section having cooperating side walls, means connecting said sections, and an oil receptacle contained within said connected sections adapted to be supported against deformation by the side walls of and cover the joint between said sections.

13. An electric switch including an upper casing section having depending side walls arranged to surround and support an oil receptacle, a lower casing section having side walls arranged to surround and support an oil receptacle, means including springs arranged yieldingly to connect said sections, and an oil receptacle contained within said connected sections and adapted to be supported against deformation by the side walls of and cover the joint between said sections.

14. An electric switch including an upper casing section having depending side walls arranged to surround and support an oil receptacle, a lower casing section having side walls arranged to surround and support an oil receptacle, means arranged removably to connect said sections, and an oil receptacle contained within said connected sections adapted to be supported against deformation by the side walls of and cover the joint between said sections.

15. In an electric switch, a casing-section having a top wall and peripherally depending side walls, said side walls arranged to end substantially in the plane of the circuit-interrupting arc and having the ends thereof provided with a laterally-outstanding peripheral reinforcing flange, and an oil receptacle having the upper portion of its side walls re-

ceived within and supported by the side walls of said casing.

16. In an electric switch, a casing-section having a top wall and peripherally-depending side walls, stationary contact members disposed within said casing, said side walls arranged to end adjacent the line of said contact members, and an oil receptacle having upstanding side walls the upper portion of which is received removably within the walls of said casing.

17. An electric switch including a casing, contact members disposed therein, said casing including an upper casing section having peripherally-depending side walls arranged to surrounding and support an oil receptacle, said walls terminating about in the line of said contact members, a lower casing section having upwardly extended side walls also adapted to surround and support the oil receptacle, means connecting said casing sections, and an oil receptacle contained within and supported by said casing sections and adapted to cover the joint between said sections.

18. An electric switch including a casing, contact members disposed therein, said casing including an upper casing section having peripherally-depending side walls arranged to surround and support an oil receptacle, said walls terminating about in the line of said contact members, a lower casing section having upwardly extended side walls also adapted to surround and support the oil receptacle, yielding means arranged to connect said sections removably, and an oil receptacle contained within and supported by said casing sections and adapted to cover the joint between said sections.

19. An electric switch having a weak fluid-tight lining, and a sectional fluid-perforate casing containing the lining and including yielding supporting means for the lining, the lining being conformed with and engaging the walls of the sections of the casing.

20. An electric switch having a weak and fluid-tight lining, and a strong and fluid-perforate sectional casing containing said lining and including means to support the lining yieldingly, the lining being conformed with and engaging the walls of the sections of the casing and being supported thereby against outward displacement and rupture.

21. A switch having a casing constituting an oil containing receptacle, said casing having walls which are strong and pressure-resistant and are also fluid-permeable so that oil can pass through them, and means to prevent such escape of oil including a lining which fits within said casing and has thin, flexible and weak walls which lie upon the inner faces of the casing walls and are restrained thereby against yielding and change in configuration when there is pressure within the casing and so are supported against rupture, the lining walls being fluid-impermeable so that the lining holds the oil while the casing supports the lining against rupture, stationary switch members extended within said casing and the interior of said lining and immersed in the oil therein, and a conducting member cooperating with said switch members and immersed in the oil.

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

WILLIAM S. EDSALL.