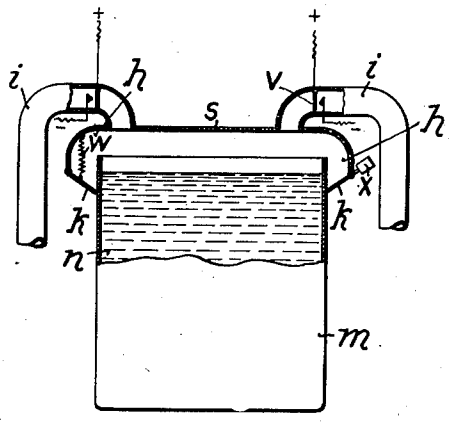
Sept. 13, 1927. 1,642,408

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PROTECTING LIQUID INSULATED ELECTRIC APPARATUS

Filed April 16, 1925



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Patented Sept. 13, 1927.

1,642,408

UNITED STATES PATENT OFFICE.

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PROTECTING LIQUID-INSULATED ELECTRIC APPARATUS.

Application filed April 16, 1925, Serial No. 23,683, and in Germany February 17, 1925.

My invention has reference to means for protecting electric apparatus operating in an insulating liquid, such as oil transformers, oil switches, grounding throttling coils, resistances and the like, and it is one of the important objects of my invention to provide a device of very simple construction and great reliability and adapted to operate before extensive injuries to the apparatus to be protected can occur by sparking, overloading or other disturbances.

My invention is particularly based on the fact that in the case of disturbances in the operation of the apparatus to be protected or in the case of sparking or other irregularities of operation, or whenever such irregularities are imminent, as well as in the case of any ebullition or fermentation processes in the oil, serving as an insulating liquid, bubbles of gas or vapor are formed which can operate an electric contact, either a working or a closed contact, which is adapted to switch out of circuit the apparatus to be protected, or which will operate an alarm or annunciator device indicating the disturbance, or which is adapted to effect both kinds of operations.

In protective devices of the kind aforesaid provision must be made for those cases in which the container or casing surrounding the apparatus to be protected and the insulating liquid is not entirely closed, but has ventilation apertures. It is a particular object of the present invention to provide means whereby a correct and reliable operation of the protective devices will be obtained notwithstanding the fact that the vessel or container encasing the apparatus to be protected allows the gases or vapors to escape more or less freely.

In the drawings affixed to this specification and forming part thereof a device embodying my invention is illustrated diagrammatically by way of example in vertical section.

In the drawings

m is a transformer vessel or casing containing a body n of oil or other insulating liquid and the transformer (not visible).

Cover s is mounted above the top edge of the container m with a clearance allowing gases or vapors to escape freely in order to prevent destruction of the container m or the apparatus enclosed therein in the case of an explosion. In such cases the pendulum contacts v inserted in the protective circuit and mounted in tubular extensions i of the cover will not be operated with certainty by gases or vapors developed in the insulating liquid. In order to provide for this drawback, loaded pendulum valves k are mounted on the cover s which close the gap h between the container m and the cover s. One flap is shown as being loaded by a spring w, the other by a counterweight x. Obviously, by making the spring w so strong and the weight x so heavy as to prevent the flaps k from being forced open before the operation of the contacts v, the operation of these contacts in the case of a sudden developing of gases or vapors in the insulating liquid is assured. At the same time, the provision of the valves k will prevent the container m from being destroyed in the case of a sudden generation of very large quantities of gases or vapors.

The circuit to be controlled by the contacts referred to may excite either directly or by the medium of an intermediate relay the releasing coil of an oil switch which interrupts the endangered circuit. In the case of apparatus the circuit of which does not include an oil switch, as frequently occurs, for instance in the cases of transformers mounted in the field at wide distances apart, other provisions should be made for the purposes of this invention.

Besides the form of construction herein shown and described, the invention is susceptible of a variety of other modifications and forms of application of the principle of my invention all of which operate substantially in a similar manner. The means of connecting the contacting device with the releasing circuit and the switching means are open to changes and alterations without any material importance for the operation of the apparatus according to my invention which in its broad aspects comprises the operation of safety devices for electric apparatus or the like, adapted for operation by vapors, fumes, gases or similar emanations liberated and expelled from the insulating medium, and means adapted to be operatively influenced by such emanations, and connected to fuses or equivalent safety means, the instrumentalities shown and described in this specification as embodiments of these prin-

ciples being susceptible of modifications without deviating from the spirit of my invention as set forth in the claim.

In the claim the term "gases" is meant to comprise also vapors and fumes.

I claim:—

Protective system for liquid insulated electric apparatus comprising a container, a supply of insulating liquid in said container surrounding the apparatus to be protected, a cover mounted above said container with a clearance, a loaded valve closing the clearance space between said cover and said container and normally preventing the escape of gases which may be developed in consequence of an abnormal condition of said apparatus and protective means adapted for operation by the increased gas pressure.

In testimony whereof I affix my signature.

MAX BUCHHOLZ.