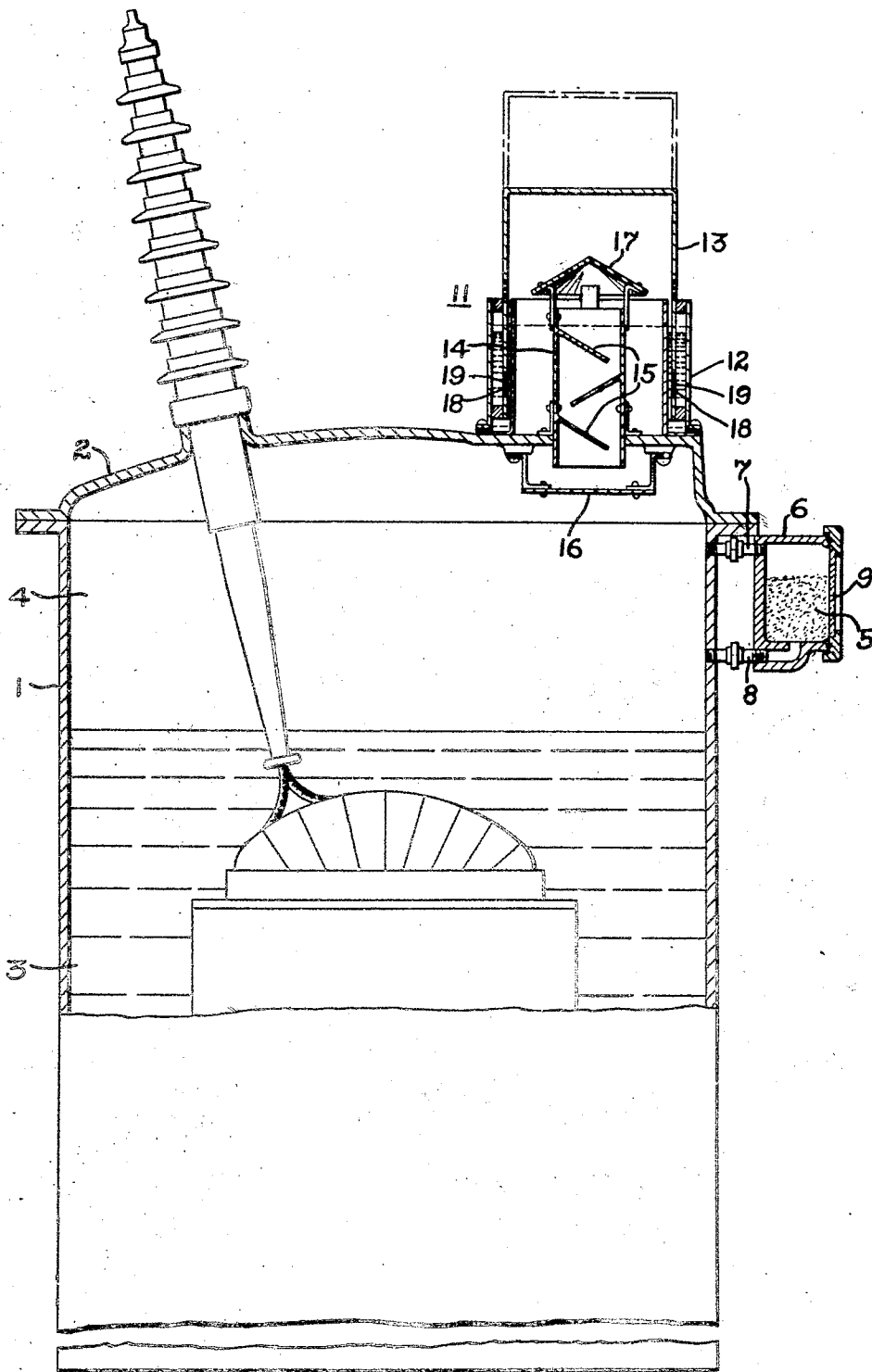


Dec. 29, 1925.

1,567,580

O. H. ESCHHOLZ
ELECTRICAL APPARATUS
Filed May 26, 1923



WITNESSES:

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ELECTRICAL APPARATUS.

Application filed May 26, 1923. Serial No. 641,620.

To all whom it may concern:

Be it known that I, OTTO H. ESCHHOLZ, a citizen of the United States, and a resident of Wilksburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Electrical Apparatus, of which the following is a specification.

My invention relates to electrical apparatus, and it has particular relation to casings or tanks for transformers, circuit breakers or other electrical devices.

My invention has, for one of its objects, to provide means whereby inert gases isolated from the atmosphere within a casing or tank for electrical apparatus may expand or contract within certain limits and whereby the gaseous contents may escape into the atmosphere only upon the occurrence of a predetermined maximum pressure.

A second object of my invention is to provide simple and efficient means whereby the pressure of gases within closed casings is maintained substantially constant within a predetermined range of temperatures and whereby access to the atmosphere is provided upon the occurrence of excessive pressure.

A further object of my invention is to provide simple means for preventing oil or other insulating fluid from being ejected from a casing for electrical apparatus in case of sudden increase of pressure or production of gases therein.

A still further object of my invention is to provide means whereby the air-tight seal between the main body and the cover of a tank for oil-immersed devices is protected by limiting the pressure to which it may be subjected under normal operating conditions and under abnormal conditions.

In the operation of transformers, it has been found to be desirable to maintain a blanket of inert gas over the oil for insulating the apparatus in order to reduce the danger from explosions of hydrocarbon gases. Inasmuch as a deoxidizing material is employed to produce and maintain the inert gas, preferably nitrogen, it is desirable also, to minimize the exchange between the

gaseous contents of the tanks and the atmosphere in order to conserve the deoxidizing material.

In view of the fact that short circuits may cause arcs within the apparatus and that gases may be produced thereby in relatively large quantities with a resultant sudden increase in pressure, it is desirable to provide means for relieving excessive pressure, and, at the same time, to prevent the escape of oil from the tank.

In accordance with the present invention, I provide a gasometer on the tank to permit variations in volume of the gas without contact with the atmosphere. Relatively thin portions of the gasometer walls yield at predetermined pressures, while suitable baffles are provided to prevent the escape of oil from the tank in case of its agitation by arcs under its surface.

In the accompanying drawing, the single figure is a longitudinal sectional view of a casing for electrical apparatus constructed in accordance with my invention.

A casing 1, which may be, for example, a transformer casing, is provided with a cover 2 that is attached to the main portion of the casing in an air-tight manner. The casing may be partially filled with oil or other suitable insulating fluid, indicated at 3. The space 4 above the oil is occupied by inert gas, such, for example, as nitrogen.

The inert gas is provided by means of a suitable deoxidizing agent indicated at 5 and occupying a container 6 that is connected for communication with the tank 1 by pipes 7 and 8. A glass cover 9 renders the deoxidizing agent 5 visible from the exterior whereby its condition may be inspected.

While any suitable deoxidizing agent may be employed, I prefer to use the deoxidizer constituting the subject-matter of the co-pending application of C. J. Rodman, Serial No. 608,798, filed Dec. 23, 1922, (case No. 10326), and assigned to the Westinghouse Electric & Manufacturing Company.

Upon the cover 2 is mounted a gasometer 11 of the type comprising an annular container 12 for liquid which constitutes a seal for a movable member 13. Communication

between the casing 1 and the gasometer 11 is provided by a pipe 14 which contains a plurality of baffle members 15. The baffle members are inclined downwardly and are in staggered relation in order to prevent liquid from passing upwardly therethrough. A baffle member 16, which is of larger cross-sectional area than the pipe 14, is in alignment with and spaced from the lower end of the pipe 14. A conical member 17 covers the upper end of the pipe 14 and serves to direct downwardly into the gasometer 11 any liquid that may traverse the pipe 14.

The movable member 13 is provided with openings 18 which are covered by relatively thin members or diaphragms 19.

When the transformer or other electrical apparatus is placed in operation, the air enclosed in the space 4 is gradually deoxidized by the deoxidizer 5, substantially pure nitrogen remaining. When the temperature within the casing 1 varies by reason of changes in load or for other reasons, the volume of the oil varies with the changes in temperature to correspondingly vary the pressure of the gas. The gasometer 11 provides a convenient means for maintaining the pressure of the gas substantially constant within the limits corresponding to the capacity of the gasometer.

When heavy overload conditions occur to cause the pressure within the tank to exceed a predetermined safe value, the diaphragms 19 in the side walls of the movable member 13 which, under such conditions, occupies its uppermost position, are ruptured to permit escape of gases into the atmosphere. When the overload conditions are relieved, the diaphragms may be replaced by the operator. The deoxidizer will again render inert the gas in the transformer.

In case short circuits occur between the windings of a transformer, the resultant arcs occurring beneath the surface of the oil cause the generation of gases in relatively great volume and a sudden increase in pressure within the casing. The gasometer substantially immediately assumes its expanded position and the diaphragms are ruptured to permit the escape of gases. It is probable also that a portion of the oil above the arcs will be thrown upwardly and will tend to escape through the opening provided by the ruptured diaphragms. The baffles 16 and 15 will operate to prevent substantially any oil from entering the gasometer. Such amount as may, however, traverse the pipe 14 will be deflected by the conical member 17 into the interior of the gasometer and thereby prevent it from escaping with the gases. Under ordinary circumstances, the space within the gasometer will be sufficient to retain such oil as may pass the several baffles.

Apparatus constructed in accordance with

my invention will operate under normal conditions to maintain a substantially constant pressure on the gases therein; that is, access of the gases to the atmosphere is prevented during the usual temperature changes or during the expansion and contraction of the confined fluid. Means are provided, however, for escape of gases upon the occurrence of abnormal pressures and for preventing the escape of insulating oil with the gases.

I claim as my invention:—

1. The combination with a casing, of pressure-relieving means therefor comprising a gasometer communicating with said casing, and baffles interposed between said casing and said gasometer.

2. The combination with a casing, of a gasometer communicating therewith, said gasometer having walls with portions that are weak relatively to the other portions for yielding at a predetermined pressure within said gasometer.

3. The combination with a casing for containing an insulating fluid and having an opening, of means for controlling the flow of fluid through said opening, said means comprising a gasometer and a series of baffles adjacent to said opening.

4. The combination with a casing for electrical apparatus and means for maintaining inert gas therein, of means for maintaining the pressure of the gaseous contents of said casing substantially constant through a predetermined range of temperatures and for permitting said gas to escape into the atmosphere when the pressure reaches a predetermined value.

5. The combination with a casing for electrical apparatus and deoxidizing means associated therewith for maintaining inert gas therein, of a gasometer communicating with said casing to permit variations in volume of said inert gas within predetermined limits, said gasometer having a diaphragm for rupturing at a predetermined pressure within said gasometer.

6. The combination with a casing for electrical apparatus and deoxidizing means associated therewith for maintaining inert gas therein, of a gasometer communicating with said casing to permit variations in volume of said inert gas within predetermined limits, said gasometer having a diaphragm for rupturing at a predetermined pressure within said gasometer, and a series of baffles adjacent to said gasometer.

7. The combination with a casing for electrical apparatus and for containing an insulating fluid, of deoxidizing means associated therewith, said deoxidizing means being visible from the exterior of said casing, and a gasometer communicating with said casing.

8. The combination with a casing for electrical apparatus and for containing an in-

insulating fluid, of deoxidizing means associated therewith, said deoxidizing means being visible from the exterior of said casing, a gasometer communicating with said casing and having a diaphragm to be ruptured when the pressure within said casing exceeds a predetermined value, and baffles adjacent to said gasometer for preventing the entrance of said fluid into said gasometer. In testimony whereof, I have hereunto subscribed my name this 22nd day of May, 1923.

OTTO H. ESCHHOLZ.