

Draftman

CROSS REFERENCE

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J. B. MAC NEILL
THROTTLING DEVICE
Filed April 13, 1922

1,645,288

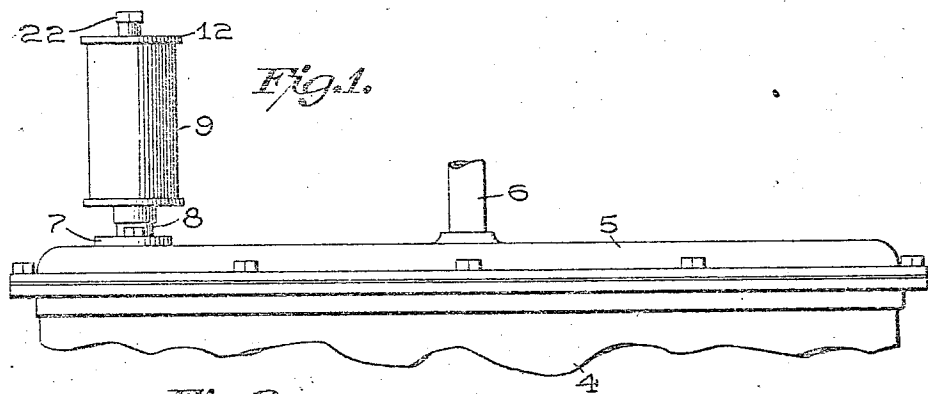


Fig. 1.

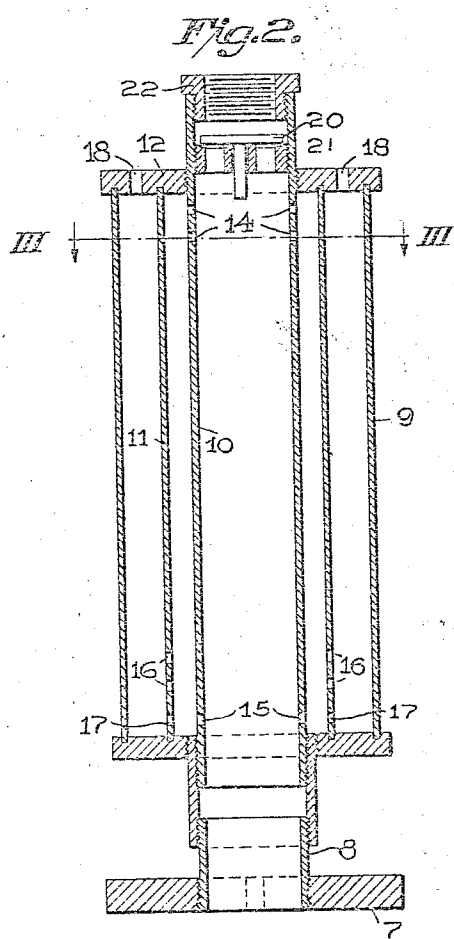


Fig. 2.

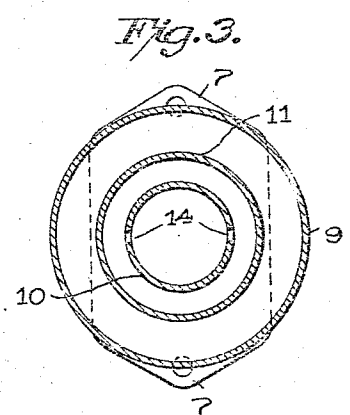


Fig. 3.

WITNESSES:

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JOHN B. MACNEILL, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

THROTTLING DEVICE.

Application filed April 13, 1922. Serial No. 552,147.

My invention relates to throttling devices and particularly to means for controlling the rapidly expanding gas and oil mixtures that are produced in the tanks of transformers and circuit breakers of the fluid-immersed type, through the formation of arcs, and for preventing or throttling explosive forces that are set up in the tank.

In that class of electrical apparatus wherein a quenching-fluid is employed for extinguishing arcs, provision must be made to relieve the pressure produced within the fluid-containing tank and it is also desirable to prevent the throwing of fluid therefrom upon the rapid expansion of the fluid when it is heated by arcs. One or more openings are provided to permit the relieving of pressure and, in order to properly confine the fluid, a muffling device should be mounted over such openings. It may happen that a rapid flow of heated gaseous mixture into the muffling devices will cause an explosion in the muffler because of the presence of oxygen therein.

The object of my invention is to provide a device wherein provision is made, in a vented circuit breaker, for the entrapment of liquid thrown through the vent and for preventing explosions within the trap, and to simplify and improve generally the construction of throttling devices for apparatus of the class described.

As shown in the accompanying drawing:

Figure 1 is a view, in side elevation, of a portion of a circuit-breaker tank, with my throttling device applied thereto.

Fig. 2 is a vertical sectional view of the throttling device, and

Fig. 3 is a view taken on the line III—III of Fig. 2.

I have illustrated a portion of a circuit-breaker tank 4 that is provided with a cover 5 through which an operating rod 6 extends to effect the movement of switch members (not shown) within the tank, in the usual manner.

A plate 7 is bolted to the top 5 and has an opening therein that registers with an opening in the cover 5. A nipple 8 has screw-threaded connection with the plate 7 and supports, at its upper end, a throttling device or muffler 9, the nipple 8 serving as a communicating passage between the tank 4 and the throttling device 9.

The muffler 9 is provided with circular partitions 10 and 11 and with a top wall 12. The partition 10 is provided with openings 14 and 15 and the partition 11 with openings 16 and 17. The wall 12 is provided with openings 18 that communicate with the atmosphere.

A check valve 20 is supported, in the upper end of the muffler 9, upon a block 21. The valve 20, when raised to its closed position, seats against a threaded member 22. When the valve is in its lowermost or open position, fluids may pass around it freely. The threaded member 22 may communicate directly with the atmosphere or may serve also as a support for a pipe (not shown) that may be employed to direct gases to a point remote from the tank 4.

Upon the rapid expansion of liquid and gas within the tank 4, pressure is set up and the mixture is vented through the muffler 9, the first rush of the expanded mixture through the nipple 8 driving before it the oxygen and causing the discharge of the major portion of such oxygen through the check valve 20 before such valve is moved to its seat. Thus, enough oxygen is driven off to minimize the danger of explosion resulting by reason of the heated gases from within the tank mixing with the oxygen in the muffler.

The check valve 20 closes before the mixture of oil and gas reaches it, thus causing the flow of oil and gas to be diverted through the openings 14, 16 and 18. During the passage of the oil-and-gas mixture through this tortuous path, the liquid impinges upon the walls or partitions and is caused to fall to the bottom of the muffler 9 from which it may flow back to the tank 4 through the openings 17 and 15.

When the arc within the tank 4 has been extinguished, the pressure dies down and the check valve 20 falls to its open position, thus re-establishing direct communication, through the passage 8, to the atmosphere.

From the foregoing description, it will be seen that I provide a simple and efficient device for relieving pressure within an explosion tank, entrapping the liquid ejected therefrom and for permitting the rapid driving off of oxygen.

Various modifications and changes may be made without departing from the spirit and

scope of the invention, as defined by the accompanying claims.

What I claim as my invention is:

1. The combination with an explosion chamber containing liquid and gas, of an expansion chamber having communication therewith and with the atmosphere, and means permitting substantially free and direct communication with the atmosphere for automatically restricting the exit from the expansion chamber after a predetermined amount of gas has escaped.
2. The combination with an explosion chamber containing liquid and gas, of an expansion chamber provided with a plurality of openings to the atmosphere and having communication with the said chamber and means for automatically effecting the closure of one of said openings after the occurrence of an explosion.
3. The combination with an explosion chamber containing liquid and gas, of a throttling device mounted exteriorly thereof and having a plurality of openings communicating with the atmosphere and a check valve for closing one of said openings under a surge of pressure from within the chamber.
4. The combination with an explosion chamber containing liquid and gas, of a throttling device mounted exteriorly thereof and provided with a tortuous passage which establishes a direct and an indirect passage between the atmosphere and the interior of the chamber, and means for partially closing the direct passage to the atmosphere under predetermined conditions.
5. The combination with an explosion chamber containing liquid and gas, of a throttling device mounted exteriorly thereof and provided with a tortuous passage which establishes a direct and an indirect passage between the atmosphere and the interior of the chamber, and a check valve for partially closing the direct passage exit to the atmo-

sphere under a surge of pressure from within the tank.

6. The combination with an explosion chamber containing liquid and gas, of means for venting said tank through direct and indirect passage and means for retarding the venting action of the direct passage at an interval after the occurrence of a rapid expansion of the fluids within the tank.

7. The combination with an explosion chamber containing liquid and gas and having a vented discharge passage, of a throttling device having communication with the chamber and provided with means for permitting a comparatively free exit of the liquid and gas under rapid expansion and with means to deflect the gas to other parts of the passage and retard the flow of the vented mixture at an interval after the occurrence of the rapid expansion.

8. The combination with an explosion chamber containing liquid and gas and having a vented discharge passage, of a throttling device having communication with the chamber and provided with means to permit a comparatively free exit of the liquid and gas under rapid expansion and with means to deflect the gas to other parts of the passage for retarding the flow of the vented mixture at an interval after the occurrence of the rapid expansion and to separate and return the liquid to the tank.

9. The method of venting an explosion chamber which consists in discharging the gas into a vented muffler normally open to the atmosphere and in partially closing communication between the atmosphere and the muffler after the gas normally occupying the muffler has been expelled.

In testimony whereof, I have hereunto subscribed my name this 31st day of March 1922.

JOHN B. MACNEILL.