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METHOD OF EXTINGUISHING FIRES IN AND ABOUT HYDROCARBON TANKS AND APPARATUS FOR CARRYING OUT THE SAME.

APPLICATION FILED SEPT. 26, 1918.

1,347,057. Patented July 20, 1920.

Fig. 1.

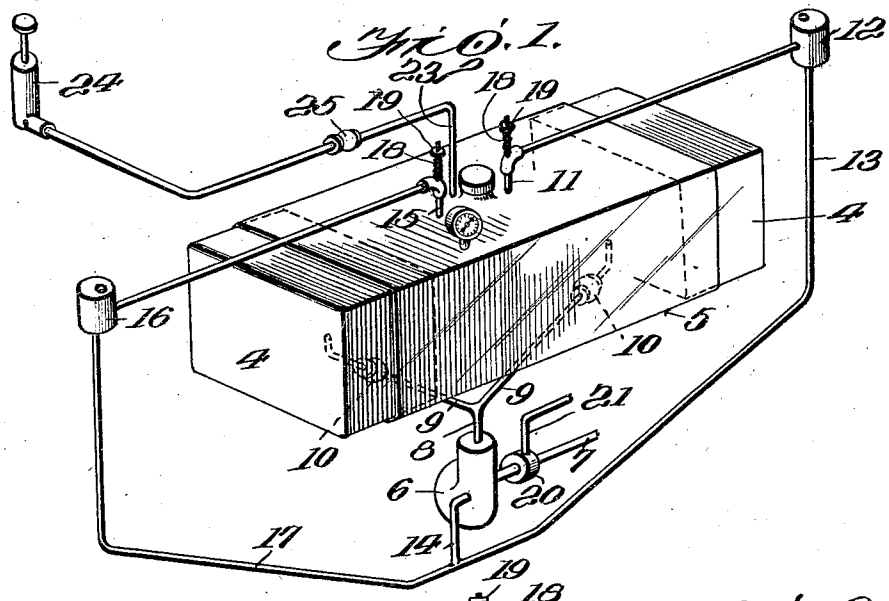


Fig. 2.

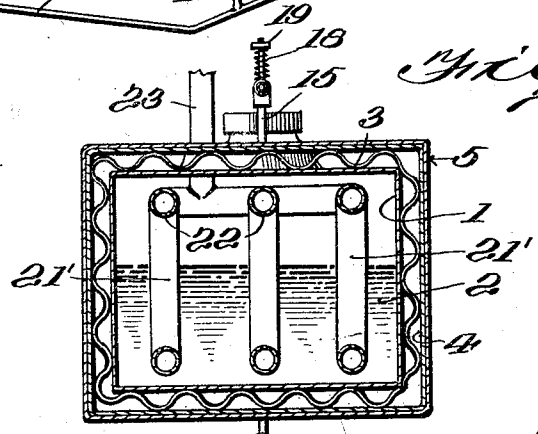
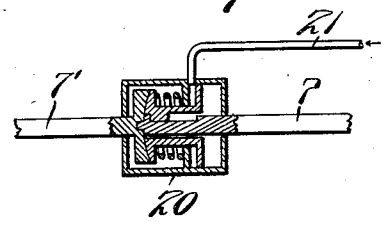


Fig. 4.



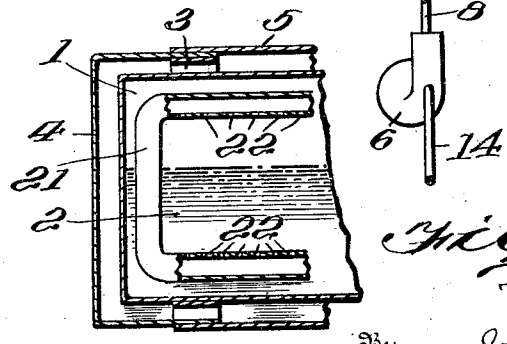


Fig. 3.

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METHOD OF EXTINGUISHING FIRES IN AND ABOUT HYDROCARBON-TANKS AND APPARATUS FOR CARRYING OUT THE SAME.

1,347,057. Specification of Letters Patent. **Patented July 20, 1920.**

Application filed September 26, 1918. Serial No. 255,801.

To all whom it may concern:

Be it known that I, WALDO A. ROSS, a citizen of the United States, residing at Sioux Falls, in the county of Minnehaha, State of South Dakota, have invented certain new and useful Improvements in Methods of Extinguishing Fires in and About Hydrocarbon-Tanks and Apparatus for Carrying Out the Same, of which the following is a description, reference being had to the accompanying drawing and to the figures of reference marked thereon.

The invention relates to new and useful improvements in a method of extinguishing fires in or about hydro-carbon tanks and an apparatus for carrying out the same, and more particularly in connection with tanks for containing gasolene used in connection with airplanes.

An object of the invention is to provide a method of extinguishing a fire in or about the tank containing the hydro-carbon fluid, wherein a non-combustion supporting agent is caused to automatically intermix with the hydrocarcon gas or fluid whenever a leak in the tank occurs; as, for example, when the tank is penetrated by a bullet, whereby the fire in the hydro-carbon liquid or gas is at once extinguished.

A further object of the invention is to provide an apparatus wherein the hydro-carbon tank may be completely surrounded with a non-combustion supporting agent under pressure greater than the pressure in the hydro-carbon tank so that, if said tank is penetrated by a bullet or a leak in the tank otherwise caused, the noncombustion supporting material may enter the tank through the opening and intermix with the hydro-carbon fluid and extinguish or prevent fire in said hydro-carbon fluid or the gas formed thereby.

These and other objects will in part be obvious and will in part be hereinafter more fully described.

In the drawings which show by way of illustration one embodiment of the invention—

Figure 1 is a perspective view, showing more or less diagrammatically one form of apparatus for carrying out my invention;

Fig. 2 is a sectional view through the tank transversely of the same;

Fig. 3 is a sectional view through a portion of the tank longitudinally of the same.

Fig. 4 is a detailed view of the pressure controlled clutch.

The invention relates broadly to a method of extinguishing a fire in or about a hydro-carbon tank and consists in surrounding the tank on exposed surfaces thereof with a non-combustion supporting agent under pressure greater than the pressure of the hydro-carbon in the tank, so that, if the tank is penetrated by an incendiary bullet or if the tank in any way springs a leak, the non-combustion supporting agent being under greater pressure than the pressure in the tank will flow through into the tank intermixing with the hydro-carbon fluid therein, thus destroying its combustion properties and preventing or extinguishing any fire in the gas forming therefrom—whether the fire remains in the tank or issues from the tank at the opening made by the bullet. I prefer to completely surround the tank with the con-combustion supporting agent and to place the same under pressure by circulating the non-combustion supporting agent through a chamber surrounding the tank by means of a force pump working against a pressure, so that the pressure on the non-combustion supporting agent may be greater than the pressure on the fluid in the tank.

My improved method and the apparatus for carrying out the same will be more clear from reference to the drawings which show more or less diagrammatically one embodiment of the invention. In the drawings, I have illustrated at 1 an ordinary form of gasolene tank adapted to contain a hydro-carbon fluid, indicated at 2. Near each end of the tank are corrugated metal straps 3—3. These straps are soldered or otherwise secured to the tank. Surrounding the end of the tank is a cap 4. The cap 4 extends inwardly over the top, bottom and side walls of the tank to a point at the inner side of the corrugated straps. These end caps are sweated or otherwise secured to the corrugated straps. Surrounding the tank at the section between the straps 3—3 is the main part of the casing, which is indicated at 5. This is also soldered or otherwise secured to the caps. The caps 4 and the main section

of the casing 5 make up a casing which completely surrounds the tank 1 and which is spaced therefrom substantially a uniform distance throughout so that there is a chamber extending completely around the tank 1. In this chamber I place a non-combustion supporting agent, such as pyrene, or the like. It will be noted that by the use of the corrugated straps, the non-combustion supporting agent may be freely circulated throughout the entire outer extent of the tank 1. As a means for circulating this non-combustion supporting agent, I have provided a centrifugal pump 6 connected to the main shaft 7. A pipe 8 leading from the pump branches at 9—9 so that it is connected to the tank at parts adjacent the ends of the tank. In each section of pipe 9 there is a check valve 10 to prevent the back flow of the non-combustion supporting agent, so that, if a pipe 9 be penetrated by a bullet or becomes in any other way broken, the non-combustion supporting agent will be trapped by the check valve and held in the chamber surrounding the tank. The non-combustion supporting agent passes out from the chamber through a pipe 11 at one side of the center of the tank to a receptacle 12 and from the receptacle 12 through a pipe 13 to a pipe 14 leading to the pump 6. The non-combustion supporting agent also passes out through a pipe 15 which leads to a receptacle 16 and through a pipe 17 to the pipe 14. By having the two pipes 11 and 15, if the pipe at one side of the receptacle be penetrated by a bullet or the receptacles 12 or 16 in any way destroyed, the other side of the system remains intact and will operate to circulate the non-combustion supporting agent through the chamber surrounding the hydro-carbon tank. In the pipe 11 there is a check valve controlled by a spring 18. The tension of this spring may be adjusted by turning the nut 19. There is a similar check valve in the pipe 15 controlled by the spring 18 and nut 19. The fluid is forced into the chamber by the centrifugal pump 6 and when the pressure on the fluid reaches a certain predetermined degree, then the check valves in the pipes 11 and 15 will be raised and the fluid caused to pass to the receptacles 12 and 16, respectively. The pump draws the fluid from these receptacles and returns it to the chamber. It will thus be seen that I have provided means for directly placing the non-combustion supporting agent under pressure and the degree of the pressure may be readily varied by adjusting the nuts 19. These nuts are set so that the pressure on this non-combustion supporting agent will be greater than the pressure on the gas in the tank 1. If an incendary bullet penetrates both the outer casing and the tank, the non-combustion supporting agent being under greater pressure than the fluid in the tank will pass into the tank intermixing with the same and prevent any fire in the gas forming from the fluid or extinguish any fire in the gas. Any gas passing out through the opening which may be fired by an incendiary bullet will likewise be thoroughly impregnated with the escaping non-combustion supporting agent and the flame therein at once extinguished. It is understood that the action of the non-combustion supporting agent must be almost instantaneous. Where the liquid is under direct pressure there is no liability of air pockets forming preventing the quick action of the fluid.

In Fig. 1 of the drawings, I have shown diagrammatically at 20 a friction clutch controlled by a pressure pipe 21 which is in connection with the pressure in the gas tank. Under certain conditions it may be desirable that the pump be disconnected from the actuating shaft as long as the tank remains intact. By use of the friction clutch and a controlling pipe connected with the pressure tank, the pump may be inactive until the tank is punctured and then when the pressure drops the friction clutch will close and the pump started into action, thus forcing the fluid into the gas or hydro-carbon fluid.

From the above, it will be apparent that I have provided a method of extinguishing a fire in or about a hydro-carbon tank, which consists broadly in surrounding the tank with a non-combustion supporting agent, such as pyrene, under a pressure greater than the pressure on the hydro-carbon fluid in the tank, so that, if the tank is punctured by a bullet or the like, the non-combustion supporting agent will at once thoroughly intermix with any escaping gas; also intermix with the fluid in the tank and prevent or extinguish a fire in or about the tank.

As an auxiliary means for preventing and extinguishing fires in hydro-carbon tanks, I have shown in the drawings more or less diagrammatically, a controlling system for forcing a non-combustion supporting agent directly into the contents of the hydro-carbon tank. In the tank are a series of pipes 21′. These pipes are formed with a series of perforations 22 extending throughout the extent of the pipes so that by the aid of the pipes, a non-combustion agent may be very quickly distributed throughout the entire extent of the hydro-carbon liquid and the gas formed thereby. These pipes 21 in the tank are connected to a supply pipe 23 which leads to a hand pump 24. A check valve 25 is placed in the pipe so as to prevent the escape of any hydro-carbon gas through the pump 24. Normally, the pipes in the tank are free from the non-combustion supporting agent—the pump 24 being loaded therewith. The tank is connected with a pres-

sure gage which is visible to the operator and, if the tank is punctured by a bullet, the operator is at once made aware of the fact by the pressure gage indicating a drop in the pressure. This, of course, renders the tank useless and the operator may, by quickly actuating the pump 24, fill the tank with a non-combustion supporting agent, such as pyrene, which will thoroughly intermix with the hydro-carbon liquid and the gas formed therefrom, and thus prevent or extinguish any fire therein.

It is obvious that many changes in the form of the apparatus may be made without departing from the spirit of the invention as set forth in the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. The method of extinguishing fire in or about hydro-carbon tanks consisting in surrounding the tank on exposed surfaces thereof with a non-combustion supporting agent under pressure in excess of the pressure due to its head and greater than the pressure on the hydro-carbon in the tank.

2. The method of extinguishing fire in or about hydro-carbon tanks consisting in surrounding the tank with a non-combustion supporting agent, and circulating said agent by a direct pump pressure greater than the pressure on the tank.

3. The combination of a hydro-carbon tank, an outer casing spaced therefrom and forming a chamber for a non-combustion supporting agent, and means for placing said agent under pressure in excess of the pressure due to its head and greater than the pressure in the tank.

4. The combination of a hydro-carbon tank, a casing completely surrounding and spaced therefrom and forming a chamber for a non-combustion supporting agent, a pump connected with said chamber for forcing the agent into the chamber, a spring controlled check valve for controlling the discharge of the agent from the chamber, a supply receptacle connected to the discharge pipe and to the pump, and means for varying the tension on the spring.

5. The combination of a hydro-carbon tank, corrugated straps extending about the tank adjacent each end and rigidly secured thereto, a casing completely surrounding the tank and secured to said straps and forming an unobstructed chamber adapted to receive a non-combustion supporting agent, and means for placing said agent under pressure greater than the pressure in the tank.

6. The combination of a hydro-carbon tank, an enveloping casing forming a chamber for a non-combustion supporting agent, means for circulating such agent therethrough, and means for maintaining the same at a pressure greater than the pressure of the hydro-carbon in the tank.

In testimony whereof I affix my signature.

WALDO A. ROSS.