May 4, 1937. C. A. ELLIS 2,079,438

TANK FIRE EXTINGUISHING APPARATUS

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Fig. 1,

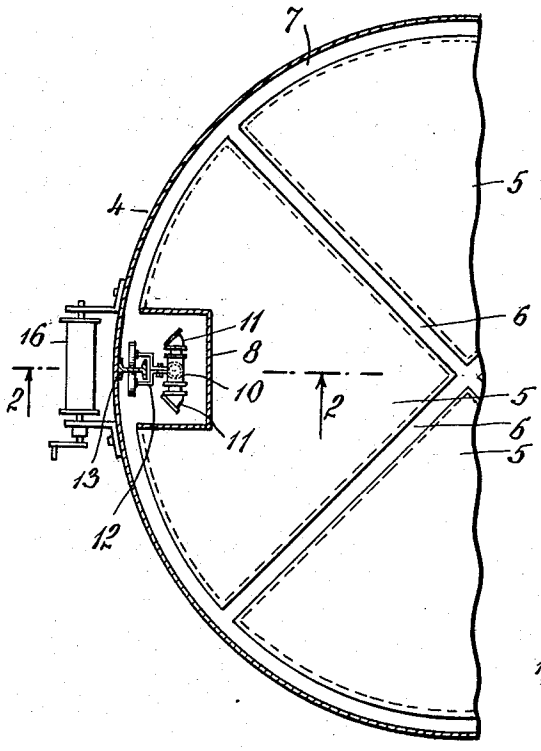
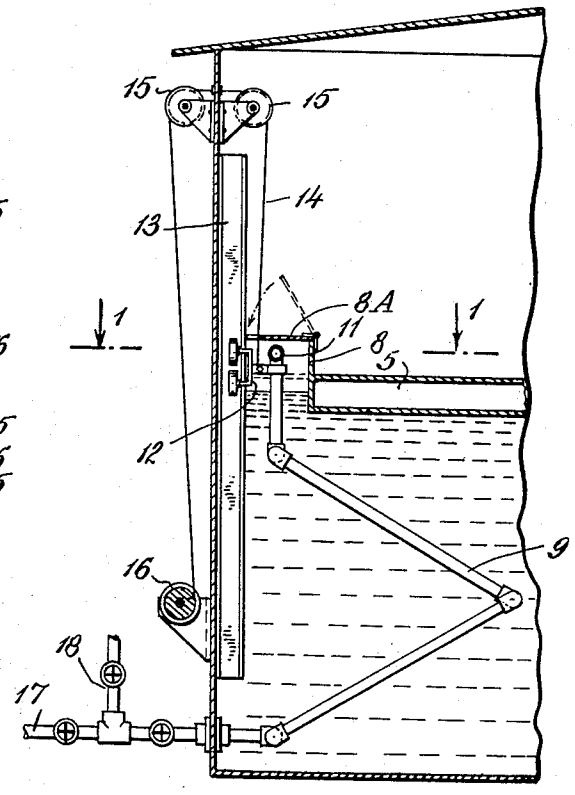


Fig. 2,



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TANK FIRE EXTINGUISHING APPARATUS

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1 Claim. (Cl. 169—4)

This invention has to do with apparatus for extinguishing fires occurring in oil storage tanks equipped with floating roofs.

In oil storage tanks equipped with conservation or evaporation protective roofs floating upon the surface of the oil, fire can only occur at those portions of the oil surface not covered by the floating roof structure. In one class of such roofs, the floating deck consists of a number of individual floats or pontoons, which may or may not be operatively connected together, and which collectively cover the surface of the oil in the tank. Between these individual floats, and between the floats and the walls of the tank there are passageways or interstices in which the oil is or may be open to the atmosphere. It is usual to install a floating deck of this type under a non-vapor-tight roof of ordinary construction placed on top of the tank. Another common form of floating roof construction is that in which the surface of the oil is covered by a single pontoon, and this pontoon has a flexible means of sealing against the tank wall, usually consisting of a flexible metallic shoe ring riding against the tank wall, the space between this shoe ring and the pontoon being sealed from the atmosphere by a flexible fabric member. In this case there is a peripheral space between the shoe and the pontoon of considerable area, in which vapors may gather, and which may be open to the atmosphere through failure or destruction of the fabric seal.

In case of fire in tanks of either type of construction, the fire occurs only on those surfaces of the liquid which are or which may be exposed to the atmosphere. In tanks of the first type, the spaces between floats are usually left open. In the normally sealed spaces of the second type or of the first type if so constructed, corrosion or fatigue failures of the seal fabric may result in leaks, with possibility of creating an explosive atmosphere under the seal, ignition of which would destroy the seal material and lay the space open to the atmosphere.

It is of importance, in fighting such fires by the application of foam, to apply the foam directly to the surface of the burning oil. The methods of applying foam above such a roof of which I am now aware are all designed to apply the foam broadcast over the roof. This method is faulty in that the interstices and spaces to which it should be applied usually constitute less than one tenth of the total surface. The effect of such broadcast application is to apply by far the greater portion of the foam to points where it is not needed at all. This not only results in a waste of foam, but results in an inescapable and dangerous delay in the application of foam in sufficient quantity to the points where it will be most effective. It is also quite likely, in certain types of roof which have been sealed, and fire is caused or followed by partial failure of the sealing means, that the ordinary broadcast method of foam distribution may fail entirely to put foam on the point where combustion is actually occurring.

It is an object of this invention to provide an apparatus whereby fire fighting foam may be applied to the burning surfaces to and through the channels normally existing as a part of such roof structures. Further objects of this invention are the speeding up of foam application, the accomplishment of a given object with a less amount of foam, and such other objects and advantages as may hereinafter appear.

In order that my invention may be completely and readily understood, reference is now made to the drawing attached to and made a part of this specification. In this drawing, Figure 1 is a plan view of a tank having a roof of the type first described. Figure 2 is a vertical section of that tank.

In Figure 1, **4** is the wall of the tank and **5, 5, 5** are sectional pontoons floating thereon, having between them the spaces **6, 6**, and between the pontoons and the tank wall the space **7**. In the following discussion, Figures 1 and 2 should be read together for clarity, like parts being given like numbers in both views. One at least of the pontoons **5** is equipped with a hatch **8**, having a swinging hinged cover **8A**. The purpose of this hatch is not only to give access below the pontoon when desired for cleaning, repair, etc., but to provide a definite space in which there is an enclosed free space above the surface of the liquid at all times. The tank is further equipped with a suitably jointed swing pipe **9**, terminating preferably at its upper end in a T **10**, each outlet of which carries an elbow, **11**. This upper end of swing pipe **9** is carried by trolley carriage **12**, running on an I beam **13** attached vertically to the side wall of the tank. The swing pipe may be raised or lowered by means of the cable **14** which is carried outside of the tank over pulleys **15** and manipulated by winch **16**. Swing line **9** may be used for filling and emptying the tank, in which case it is submerged in the oil. When not transferring liquid it will usually be pulled above the oil surface to prevent loss of oil in case of failure of valves in the oil transfer line **17**. Swing line **9**, in its raised position, is also intended as the

means for the introduction of fire fighting foam, and for this purpose line 18, leading from a source of foam supply is connected to line 17 outside the tank. Foam discharged from the upper end of line 9, when in the position shown in the drawing, will immediately pass into peripheral space 7, then into spaces 6, 6, and lastly, if still necessary to extinguish the fire, may pass from those spaces to flow broadcast over the surface of the tank. Even if some or all of the pontoons have been damaged or sunk, pipe 9 can still efficiently discharge foam at the exact point of needful use. Since the cable 14 does not operatively connect with any part of the pontoons 5, it is unlikely that destruction of one or more pontoons will sever the cable.

By the use of the apparatus herein shown I am able to apply fire fighting foam directly to the exposed liquid surfaces or to those surfaces liable to be exposed, and need not depend on broadcast distribution. Further, the method of application to those surfaces is positive, and not a matter of chance as in broadcast distribution. Further I am enabled to quench a fire much more rapidly and with much less use of foam.

While the apparatus herein exemplifies my preferred form, it is given for purposes of illustration, and I do not desire to be expressly limited thereto except by such limitations as appear in the following claim.

I claim:

Apparatus for fighting fire in a tank having a floating deck consisting of pontoons floating on the surface of the oil with spaces between pontoons and tank wall and between pontoons, comprising a chamber affixed to the pontoon structure and affording a free space above the oil surface and in communication with the said spaces around pontoons, means to confine the travel of said chamber to vertical movement along a desired line, a swing pipe in the tank, the free end of which may be raised above the oil surface in said chamber, and means to introduce fire quenching material through said swing pipe into said chamber.

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