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March 20, 1951 D. D. AITKEN 2,545,640

FIRE EXTINGUISHING METHOD AND APPARATUS

Filed April 6, 1948

Fig. 2

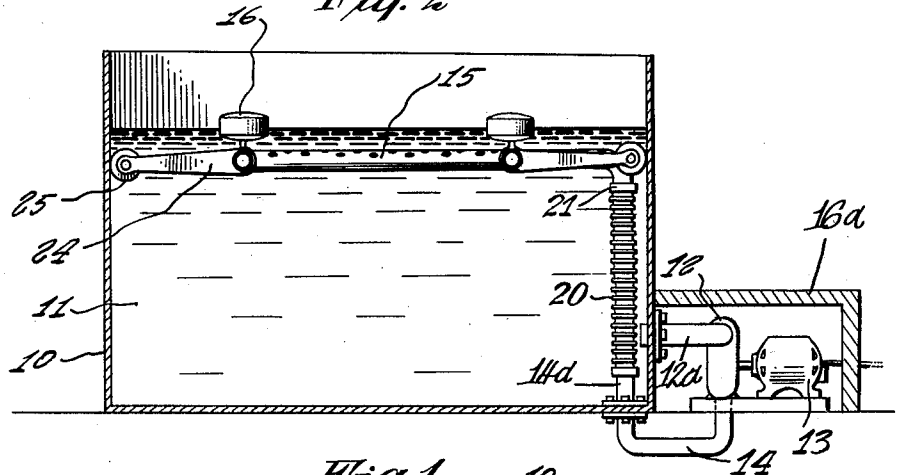


Fig. 1

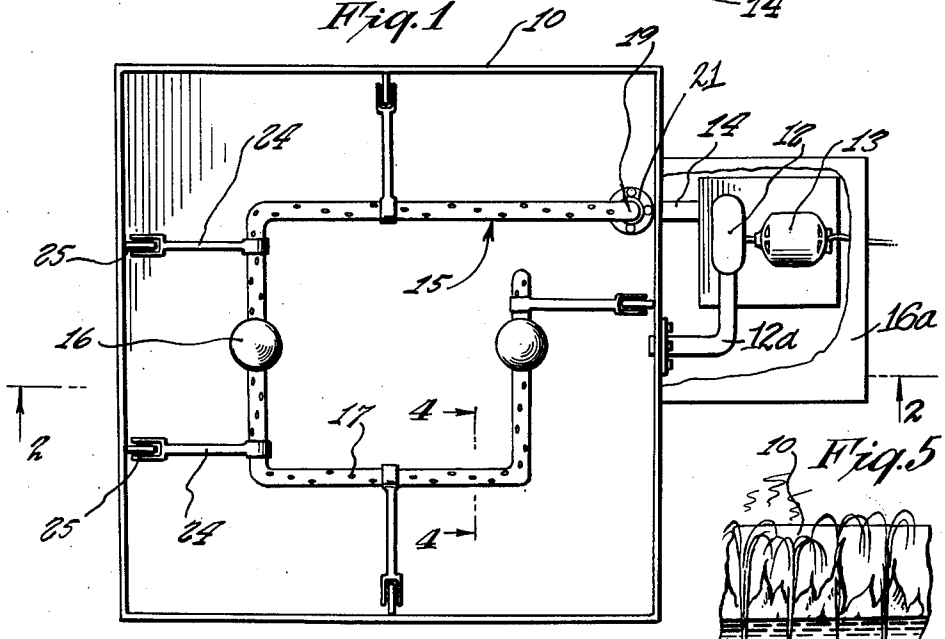


Fig. 5

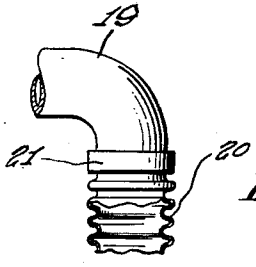


Fig. 3

Fig. 4



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FIRE EXTINGUISHING METHOD AND APPARATUS

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7 Claims. (Cl. 169—4)

1

This invention relates to a method and apparatus to prevent and extinguish fires in inflammable hydrocarbon and oil reservoirs.

It oftens happens that the upper surface of oil and inflammable liquid hydrocarbons within a reservoir becomes ignited or set on fire as a result of an explosion or contact with incendiary elements and the fluid will burn around the top of the tank to exhaust the contents.

It is an object of the present invention to provide a method and an apparatus wherein the fire in a storage tank containing such fluids can be prevented or extinguished by the use of the medium itself by a simple pump arrangement to cause the fluid at the lower elevations of the tank to be projected upwardly through the surface of the fluid into the inflammable region where the flames might lie whereby to condense and lower the temperature of the gases below the combustion point and thus extinguish the fire, and to provide at all times a relatively cold layer of fluid on the top surface to reduce volatilization.

Other objects of the present invention are to provide a fire preventing and extinguishing apparatus for fuel tanks which is of simple construction, easy to install in a tank, adjustable therein to accommodate itself to the different levels of the oil as it is added to or taken from the tank, inexpensive to manufacture and efficient in operation.

For other objects and for a better understanding of the invention, reference may be had to the following detailed description taken in connection with the accompanying drawing, in which

Figure 1 is a top plan view of a fuel tank with illustrative apparatus embodying the features of the present invention mounted therein.

Figure 2 is a transverse sectional view taken on line 2—2 of Figure 1, looking in elevation upon the interior of the tank and upon the apparatus.

Figure 3 is a fragmentary and sectional view of the upper end of the inlet pipe from the pump and with portions of the expansible pipe portion broken away.

Figure 4 is a detail transverse sectional view of the spray pipe.

Figure 5 is a fragmentary illustrative view showing the operation of the fluid jets in penetrating and extending over the top surface of the fluid and spreading out in the region of the combustible gaseous mixture to lower the temperature of combustion thereof to prevent or put out a fire and to reduce the temperature of the fluid adjacent the surface.

Referring now to the figures, 10 represents a

2

large reservoir tank for a hydrocarbon such as oil 11. The tank may have a bottom over which the oil is extended and from which quantities of the oil adjacent the bottom where the oil is comparatively cool may be drawn outwardly at pipe 12a by a suitable pump 12 which may have an operating motor 13 and delivered upwardly through a pipe 14 to a spray head 15 adapted to lie beneath the surface of the oil. Spray head 15 is preferably supported to maintain a fixed position below the oil surface as by floats 16 while the operating means such as pump 12, motor 13 and pipes 12a and 14 are suitably protected as by a housing 16a.

The spray pipe has perforations or holes 17 through which the relatively cooler oil is projected to break the oil surface and to penetrate the upper gaseous inflammable mixture. The projection of the jets of said cooler oil performs at least two cooperative functions. In the first place, if an external source of heat or an incendiary has approached or traversed the said inflammable mixture along a particular path and momentarily raised the temperature thereof along said path to the combustion point, the heat will be immediately absorbed and the flames, if any have developed, will be quenched due to a lowering of the temperature below the combustion point of the inflammable gaseous mixture. Moreover, any additional volatilization of the fluid due to the presence of the source of said heat will quickly be dissipated by condensation. In the second place, the return of the jets of oil from the gaseous mixture to the fluid top surface maintains the latter in a relatively cool condition and absorbs any heat that may have been transferred thereto by immersion of a heat source. Since the top oil surface is the source of volatilization, a cooling thereof reduces the rate of evaporation and cuts down on the development of a gaseous mixture.

The invention herein if in constant operation serves to prevent a fire in a fuel tank; or it will extinguish a fire once it has started in short order.

With the floats on the spray head 15, the spray head will be automatically adjusted to the different locations of the oil within the tank. In order to accommodate the spray head to the new elevations, the upwardly bent portion 19 is connected through an expansible tube or bellows 20 with a flanged end of a portion of the pipe 14 as indicated at 21.

Extending laterally from the spray pipe head 15 are brackets 24 having wheels 25 engageable with the inner surface of the tank in order to

guide the downward and upward movement of the spray head as the same is raised and lowered in the tank. There may be any number of these brackets **24** located at the opposite sides of the spray head and adapted to engage all sides of the tank.

It should be apparent that there has been provided a method of preventing or extinguishing a fire by supplying the top combustible gas mixture and the top of the oil with relatively cooler oil drawn from the same medium so that the temperature thereof will be maintained below the temperature of combustion of said gaseous mixture. If by chance there are flames, the jets of relatively cooler oil will penetrate the base thereof and extend thereabove for a distance so that any of the flames present at and above the surface of the oil will be extinguished by the jets by bringing the temperature of the flaming gas mixture below the temperature necessary for combustion. Moreover, the reduction in temperature will cause a condensation of the fluid vapors and reduce the rate of volatilization of the oil from the surface.

The underlying method of effecting the extinguishment or prevention of flames therefore of inflammable liquids stored in tanks and caused by sparks, incendiaries or other sources of heat normally capable of starting a conflagration is to reduce or maintain the temperature of the inflammable gaseous mixture below the temperature of combustion of said gaseous mixture and to reduce the rate of volatilization of the liquid.

The apparatus is adapted to be kept in operation at all times so that if a heat source normally causing combustion were applied to the area of the tank, the surface of the oil could not become overheated to increase the rate of volatilization to form a rich combustible gaseous mixture and so that whatever gaseous mixture is present, a temperature required to initiate or maintain combustion of the gaseous mixture could not be attained.

It is understood that minor changes and variations in apparatus and method may be resorted to in accordance with the appended claims.

I claim:

1. A fire preventing and extinguishing apparatus for tanks containing combustible fluids comprising a pump device having a connection with the bottom of the tank to extract cold portions of the fluid therefrom, an outlet pipe connected with the tank and with the pump and having a spray head thereon for delivering the cold fluid to adjacent the surface of the fluid and into the space immediately thereabove.

2. A fire preventing and extinguishing apparatus for tanks containing combustible fluids comprising a pump device having a connection with the bottom of the tank to extract cold portions of the fluid therefrom, an outlet pipe connected with the tank and having a spray head thereon for delivering the cold fluid to the surface of the fluid and into the space immediately thereabove, and said spray head being located beneath the surface of the combustible fluid and adapted to extend streams of the cold fluid upwardly through the surface of the fluid and into the space immediately thereabove.

3. A fire preventing and extinguishing apparatus comprising a tank and pump device adapted to remove fluid from the portion of a tank where it is relatively cool and deliver such oil to and above the surface of the fluid whereby to maintain the surface of the fluid and the gaseous area thereabove at approximately the temperature of the cool portion of the fluid, an outlet pipe connected to the pump device and emptying below the surface of the fluid adapted to fill the tank, the said pump device forcing said fluid through the upper region of the tank and above the surface of the fluid in the tank.

4. A fire preventing and extinguishing apparatus for oil tanks comprising a pump device adapted to withdraw cool oil from the bottom of the tank and deliver it to an elevated position through and above the surface of the oil, said pump device including an outlet pipe penetrating the tank, an expansible portion connected to the outlet pipe, and a spray head connected to the expansible portion, and float means for retaining the spray head adjacent the surface of the oil but beneath the same, the spray head being adapted to deliver streams of oil upwardly through the top surface of the liquid and into the space thereabove whereby to extinguish flames thereon and to maintain a cold top surface layer on the top of the tank and to maintain a substantially uniform temperature in the gaseous layers thereabove.

5. A fire preventing and extinguishing apparatus for oil tanks comprising a pump device adapted to withdraw cool oil from the bottom of the tank and deliver it to an elevated position through and beyond the surface of the oil, said pump device including an outlet pipe penetrating the tank, an expansible portion within the tank connected to the outlet pipe, and a spray head connected to the expansible portion, and float means for retaining the spray head adjacent the surface of the oil but beneath the same, the spray head being adapted to deliver streams of oil upwardly through the top surface of the liquid and into the space thereabove whereby to extinguish flames thereon and to maintain a cold top surface layer on the top of the tank and to maintain a substantially uniform temperature in the layers thereabove, and brackets extending from the spray head and having rollers engageable with the sides of the tank whereby the spray head will be held against lateral displacement within the tank.

6. The method of preventing and extinguishing fires on the surface of combustible liquids which comprises bodily removing portions of the liquid from the colder areas of the same and bodily delivering the same to a location immediately below the top surface of the liquids and extending the same upwardly through the top surface and into the space immediately thereabove in the form of jets.

7. The method of preventing and extinguishing fires from the surface of combustible liquids which consists of bodily supplying the surface vicinity of the combustible liquid under pressure with cold portions of the same liquid and extending the same upwardly through the top surface and into the space immediately thereabove in the form of jets.

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