May 8, 1923. 1,454,839

W. D. WITTER

FIRE EXTINGUISHING APPARATUS FOR OIL TANKS

Filed Jan. 27, 1922 2 Sheets-Sheet 1

Fig. 1.

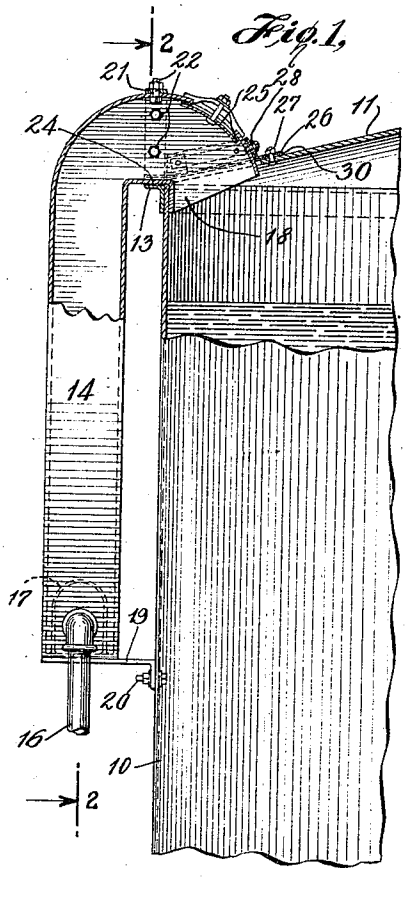


Fig. 2.

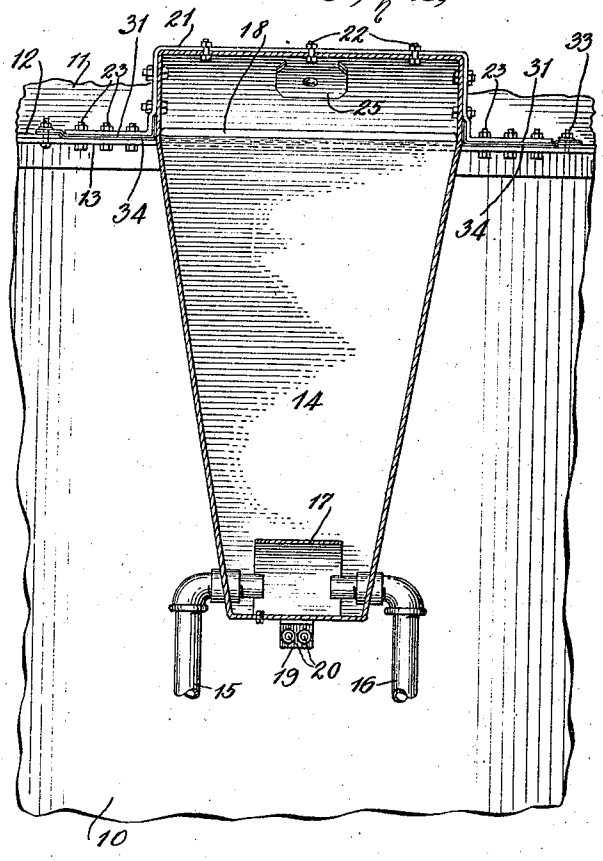
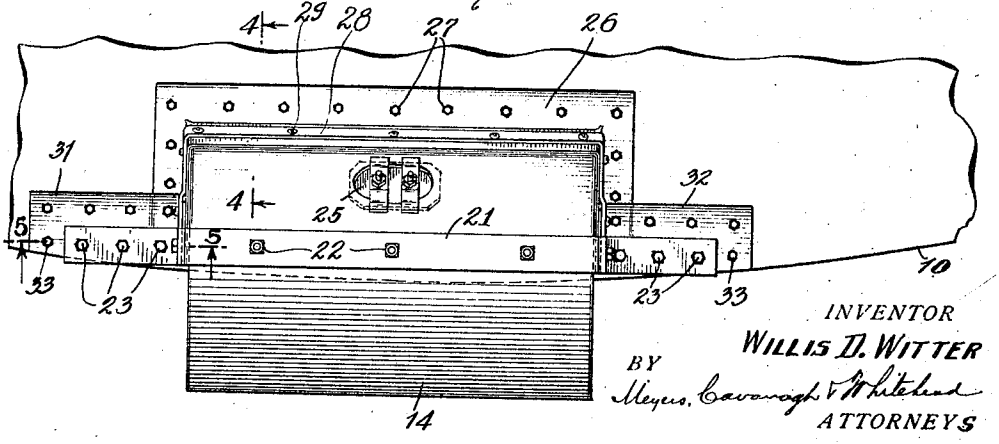


Fig. 3.



INVENTOR
WILLIS D. WITTER
BY
Meyers, Cavanagh & Whitehead
ATTORNEYS

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Fig. 6.

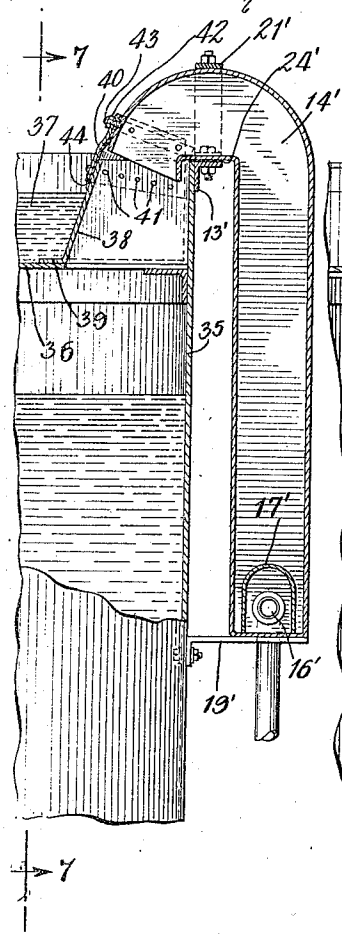


Fig. 4.

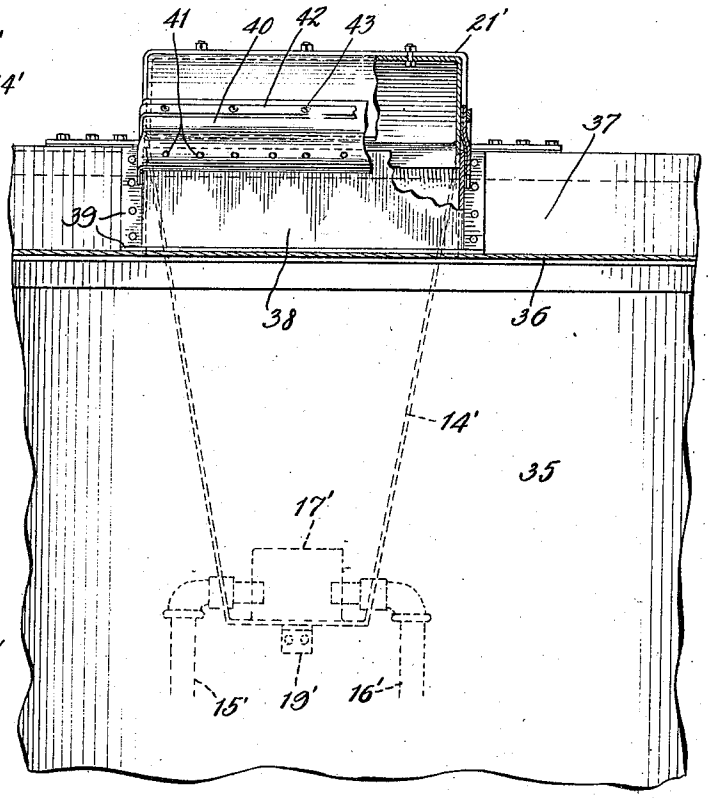


Fig. 5.

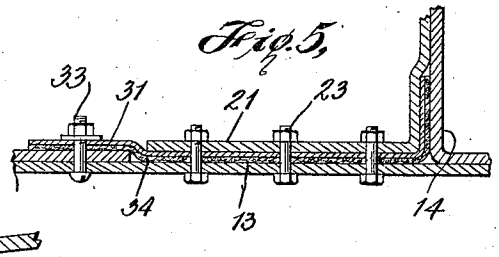
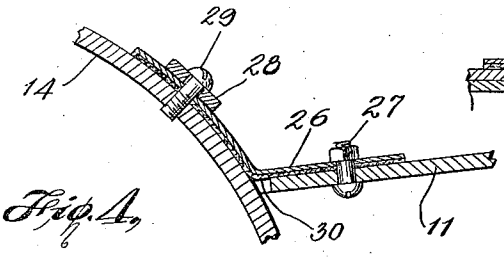


Fig. 4.



INVENTOR
WILLIS D. WITTER
BY
Meyer, Cavanagh & Whitehead
ATTORNEYS

Patented May 8, 1923. 1,454,839

UNITED STATES PATENT OFFICE.

WILLIS D. WITTER, OF ROSELLE PARK, NEW JERSEY, ASSIGNOR TO FOAMITE FIRE-FOAM COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

FIRE-EXTINGUISHING APPARATUS FOR OIL TANKS.

Application filed January 27, 1922. Serial No. 532,239.

To all whom it may concern:

Be it known that I, WILLIS D. WITTER, a citizen of the United States, and resident of Roselle Park, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Fire-Extinguishing Apparatus for Oil Tanks, of which the following is a specification.

This invention relates to fire extinguishing apparatus for use with oil tanks and more particularly to a fire extinguishing apparatus in which chemical component solutions are commixed to produce a fire extinguishing foam which is delivered to the burning surface of oil in the tank; and has special reference to the provision of apparatus of this nature in which the foam may be delivered in an efficient manner and in which the "blowing" of the tank top resulting from explosions will not affect the identity or integrity of the foam delivery apparatus.

In prior installations of fire extinguishing apparatus of the foam delivery type used in connection with oil tanks, one or more foam delivery means is or are mounted on the sides of the tank, the delivery means extending upwardly to a point above the normal oil level in the tank, the said delivery means having its mouth entering into the tank above such normal oil level. In one form of installation the delivery means, which usually consists of a mixing chamber, is attached to the side of the tank and has its mouth opening into the tank by way of or through the tank top. For the purpose of providing a gas, oil and water seal between the mixer mouth and the tank top these parts have necessarily been firmly attached together, forming practically a unitary construction. In the use of this type of installation, however, it has been repeatedly found that when an explosion occurs in the tank—this being generally preliminary to the beginning of a fire where lightning is the cause—the roof or tank top is forced or blown off violently and the mouth of the foam delivery system attached thereto is usually broken, disrupted and put out of use with the resulting failure of the fire extinguishing apparatus. To overcome this objection and weakness of this form of installation, foam delivery mixing chambers have been provided in which the mouth of the delivery system opens into the side wall of the tank at its top above the "normal" oil level therein. However, it has been found in numerous installations of this type that there are difficulties and objections in and to the arranging of the mouth of the delivery chambers in this manner. One objection, for example, resides in the fact that the "normal" oil level is never constant and the oil rising above a predetermined level will result in the oil leaking into the mixing chambers, this leaking being very objectionable. Furthermore, with this type of installation when a fire occurs the foam discharges through the mouth of the mixing chamber laterally into the tank, the foam column emerging from the mouth of the delivery system flaring outwardly and losing its mass formation, this foam column in being projected towards the center of the tank where the up-draft of the fire is greatest being further broken up by the up-draft, with the result that when the roof "blows", large quantities of the foam are carried away and out of the tank by the draft. Where the foam mixers are mounted with their mouths inserted in the top or roof of the tank these disadvantages are not present, oil leakage being eliminated; and the foam discharging downwardly in a solid column at the side walls of the tanks where the natural draft of the fire is downward, the foam column is not disrupted and carried away by the fire draft, such foam column in fact being pulled or "sucked in" the tank when discharged downwardly through the tank roof.

After considerable experimentation, I have found that it is feasible to retain the type of installation in which the mouth of the mixing chamber is inserted through or opens up into the tank roof or top, retaining the advantages of this construction while at the same time solving the problem of preventing the violent removal of the tank top from disrupting or breaking the foam delivery system. I have found, more specifically, that the mouth of the mixing chamber may be connected to the tank top to provide the usual gas, oil and water-tight seal between these parts, while at the same time attaching the mouth of the mixing chamber in such a manner as to permit the violent removal, during explosions, of the tank top without affecting the identity of the mixing mouth, the latter remaining intact to perform the functions for which it

is designed and intended. The provision of an apparatus in which these results may be accomplished is a prime desideratum of my present invention.

The principal objects of my present invention may be said to include, besides the provision of a fire extinguishing apparatus for extinguishing fires in oil tanks having the advantages and results hereinbefore recited, the further provision of an apparatus of this nature in which the mixing chamber of the foam delivery system is mounted and attached to the side walls of the tank and in which the mouth of the delivery system enters by way of or through the tank top, a separable means being provided preferably in the form of a rupturable connecting means for attaching the mouth to the tank top, the said means effecting the desired seal between these parts while permitting the movement, under unusual conditions, of the tank roof without the carrying away or disrupting of the mixer mouth attached thereto and the further provision of an installation of this nature in which the tank may be easily conditioned for the reception of mixing chambers, the manner and means of attching the two being effected with considerable convenience and economy.

To the accomplishment of the foregoing and such other objects as may hereinafter appear, my invention consists in the elements and their relation one to the other, as hereinafter particularly described and sought to be defined in the claims, reference being had to the accompanying drawings which show preferred embodiments of my invention, and in which:

Figure 1 is a fragmentary elevational view of an oil tank showing the novel manner of installing the fire extinguishing apparatus,

Figure 2 is a view taken in cross section on the line 2—2, Figure 1,

Figure 3 is a plan view of the same,

Figures 4 and 5 are fragmentary enlarged views taken on the lines 4—4 and 5—5 respectively of Figure 3, and

Figures 6 and 7 are views showing an installation of a modified form of oil tank.

Referring to the figures, the tank or oil reservoir to which the fire extinguishing apparatus is attached may be of the construction in which there is provided the cylindrical shell 10 and the conical shaped roof or top 11 fastened thereto, the peripheral flange 12 of the tank top being attached to the top angle 13 of the tank shell for this purpose. The fire extinguishing apparatus installed according to my invention may be of the foam producing and delivery type in which there is provided one or more foam mixing chambers such as 14 mounted alongside the shell 10 and adjacent the upper portion thereof, the said mixing chamber being intended for the reception of independent chemical component solutions conducted thereto through the independent solution lines 15 and 16 opening in opposite directions into the said mixing chamber, as clearly shown in the drawings, the chemical component solutions intermixing in the said chamber 14 for the production of a fire extinguishing foam, the baffle 17 being preferably provided in the said chamber for limiting the zone of intermixture, the intermixing solutions and the foam produced rising in the mixing chamber for delivery into the oil tank and on the burning surface of oil therein.

The present invention, as heretofore mentioned, relates to the installation of the type of mixing chamber in which the foam is delivered into the tank by way of or through the tank top or roof thereof and to this end the mixing chamber 14 is preferably shaped at its upper end to provide the inturned bend having a mouth 18 opening into the tank by way of or through the tank top 11, the tank top being suitably cut away or orificed for this purpose. For securely supporting the mixing chamber 14 on the tank there is preferably provided the bottom bracket 19 bolted to the tank shell 10 as at 20, and the top strap 21 embracing the neck of the mixing chamber and being attached thereto by the spaced bolts 22, the said strap or yoke 21 firmly attaching and supporting the mixer on the top angle 13 by means of the spaced bolts 23. For the purpose of effecting a gas seal between these parts I preferably provide an asbestos gasket 24 between the neck of the chamber 14 and the angle iron 13. The mixing chamber 14 may, if desired, be provided adjacent the mouth thereof with the handhole and closure 25. With the provision of this type of construction in which the mouth of the mixing chamber opens into the tank through the top thereof with the mouth directed downwardly, leakage of oil into the mixing chamber is eliminated, this construction permitting the downward discharge or ejection of the foam in a solid column in time of fire, the integrity of the column being maintained since the natural draft of the fire is downward adjacent the walls of the shell, the column not being broken and the foam not being carried away by the updraft of the fire, as is the case when the mouths of mixing chambers open laterally into the tanks.

As heretofore recited, a principal object of the present invention comprehends the provision of an installation of this kind in which an air, gas and water-tight seal between the mouth of the mixing chamber and the tank top or roof is provided, such seal being so constructed, however, as to permit the removability of the tank top under un-

usual or abnormal conditions without affecting the identity of the foam delivery unit, the latter remaining intact for foam delivery purposes even though the tank top is blown off and carried away by internal explosions, common in oil fires. To accomplish these ends my invention consists in connecting the mixing chamber to the tank top by means which is easily separable when the tank top is blown off and, more specifically, by means of a breakable or rupturable joint between these parts which permits of the desired seal and yet permits of the relative movability of the parts under abnormal conditions. After considerable experimentation I have found that if a flashing joint is provided between the mouth of the mixing chamber and the tank top with the flashing joint being made of suitable light gauge sheet material, that the tank top may be removed under the impulse of explosion without affecting the identity of the mixing chamber. Accordingly, my invention consists in the provision of a flashing joint made of light gauge galvanized sheet material such as 26, this flashing embracing three sides of the mouth of the mixing chamber, the said flashing being attached to the tank and mixer mouth respectively. The flashing 26 is preferably first bolted to the tank top by means of the bolts 27, the said flashing being inserted beneath a yoke or strap 23 when the mixing chamber is installed, the yoke or strap 28 forming means in conjunction with the securing means 29 for securely attaching the flashing to the mouth walls of the mixing chamber 14. For the purpose of assuring a gas, air and water-tight joint or seal between these parts, I preferably interpose an asbestos gasket 30 between the flashing 26 and the tank top 11 and mixing chamber 14. The flashing 26 may be made all of one piece, it being preferred, however, in the form of installation shown in Figures 1 to 5 of the drawings, to provide additional end flash pieces 31 and 32 bolted to the tank as by means of the securing means 33 inserted beneath the yoke or strap 21 and the yoke or strap 28. Here, too, I prefer to interpose an asbestos gasket such as 34 to provide the desired seal, this being clearly shown in Figures 2 and 5 of the drawings. As an example of the character of material that I prefer to use for the flashing, I may mention galvanized sheet material of U. S. S. gauge #22.

Referring now to Figures 6 and 7 of the drawings in which I show the manner of installing the mixing chambers to the type of water top tanks, I show the tank shell 35 provided with the inset roof or top 36 having a top water chamber 37. The mixing chamber 14′ provided with the solution lines 15′ and 16′ opening in opposed relation into the mixing chamber and provided with the usual baffle 17′, is supported on the bracket 19′ and connected to the top angle 13′ by means of the strap 21′ with the interposed gasket 24′ in a manner similar to the construction and attachment of the mixing chamber shown in Figures 1 to 5 of the drawings. For the purpose of connecting or attaching the mouth of the mixing chamber 14′ to the tank top 36 I first preferably provide the hood 38 which preferably is of the same material as the roof of the tank, the said hood being attached to the roof, as by having peripheral flanges 39 bolted thereto. The hood 38 which is now essentially unitary with the tank top 36, is connected to the mouth of the mixing chamber 14′ by means of the flashing 40, the latter being preferably bolted to the hood 38 by the securing means 41 and attached to the mouth of the mixing chamber 14′ by being inserted beneath the yoke or strap 42 attached to the mouth by the spaced securing means 43. Here, too, I preferably interpose between the flashing 40 and the other parts the gasket 44.

The manner of installing and using the fire extinguishing apparatus on and with the oil tanks will, in the main, be apparent from the above detailed description thereof. It will be further apparent that the mixing chambers or delivery means of the foam extinguishing systems by means of my invention may be arranged to open into the tank by way of or through the tank top, retaining all the advantages incident to and inherent in such a construction, while the prior fatal objection to such installations in that the foam delivery system is "put out of commission" and rendered useless on the occurrence of an explosion is successfully eliminated.

While I have shown my device in the preferred forms, it will be obvious that many changes and modifications may be made in the structure disclosed without departing from the spirit of the invention, defined in the following claims.

I claim:

1. In apparatus for extinguishing fires in oil tanks, a fire extinguishing means for delivering a fire extinguishing medium to and over the oil level in said tank, the said means including a mouth opening into the tank by way of or through the tank top and separable means connecting said mouth to the tank top for permitting violent removal of the tank top without disrupting or removing the said mouth.

2. In apparatus for extinguishing fires in oil tanks, a fire extinguishing means for delivering a foam compound to and over the oil level in said tank, the said means including a mixing chamber attached to the tank and having a mouth opening into the tank by way of or through the tank top and rup-

turable means connecting said mouth to the tank top for permitting violent removal of the tank top without disrupting or removing the said mouth.

3. In apparatus for extinguishing fires in oil tanks, a fire extinguishing means for delivering a foam compound to and over the oil level in said tank, the said means including a mixing chamber attached to the side walls of the tank having a mouth opening into the tank by way of or through the tank top and means connecting said mouth to the tank top, the said means comprising a separable gas and water-tight seal permitting violent removal of the tank top without disrupting or removing the said mouth.

4. In apparatus for extinguishing fires in oil tanks, a fire extinguishing means for delivering a fire extinguishing medium to and over the oil level in said tank, the said means comprising a mixing chamber attached at its lower end to the side wall of the tank and at its upper end to the top angle of the tank, the said mixing chamber being provided with a mouth at its upper end opening into the tank by way of or through the tank top and means connecting the said mouth with the tank top, the said means including a breakable or rupturable flashing joint attached respectively to the tank top and the walls of the mouth, the said connecting means permitting violent removal of the tank top as during an explosion without disrupting or removing the said mouth, the latter remaining intact for foam delivery purposes.

5. In apparatus for extinguishing fires in oil tanks, fire extinguishing means for delivering a fire extinguishing medium to and over the oil level in said tank, the said means including a mixing chamber situated at the side of said tank and bent or inturned at its upper end to provide a mouth opening into the tank by way of or through the top or roof thereof, a strap or yoke member attached to the upper end of the mixing chamber and connecting the same to the top angle of the tank and means connecting the mouth of the mixing chamber to the tank top, the said means comprising a breakable or rupturable flashing joint of relatively thin gauge attached respectively to the tank top and the walls of the mouth; the construction being such that the tank top may be violently removed as during an explosion without disrupting or removing the said mouth of the mixing chamber.

Signed at New York city in the county of New York and State of New York this 25th day of January, A. D. 1922.

WILLIS D. WITTER.