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FIRE FOAM APPLICATOR

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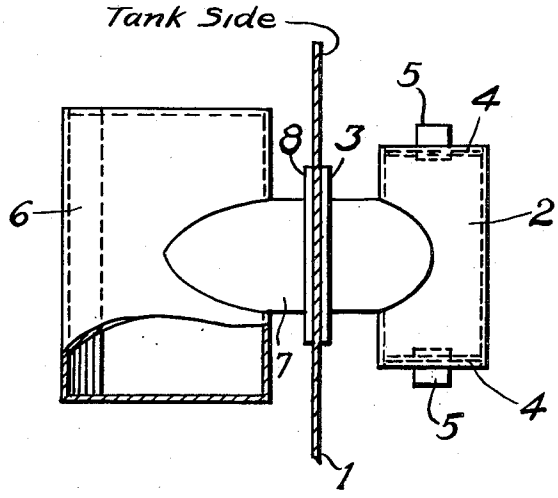


FIG. -1

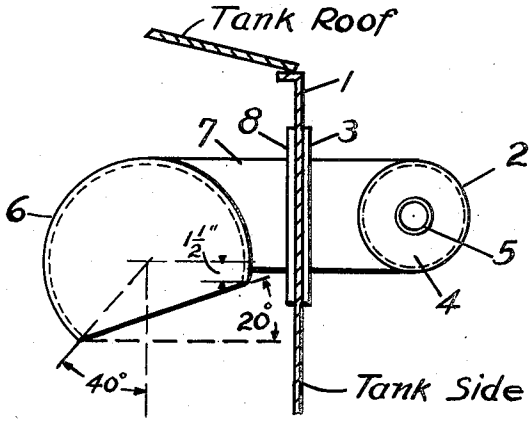


FIG. -2

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FIRE FOAM APPLICATOR

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7 Claims. (Cl. 169—4)

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This invention relates to improved apparatus for mixing and applying firefoam to oil storage and similar tanks. The invention is particularly concerned with an improved mixing chamber for combining and mixing the chemicals used to generate the foam and with an improved baffle design causing the foam to be deposited in a smooth blanket on the inner wall of a storage tank. The apparatus is characterized by the ease of fabrication from standard pipe fittings.

The fire protection system generally employed for oil storage tanks operates by covering the oil surface with a thick blanket of stiff foam. The foam is generated by the combination of two chemical solutions supplied to a mixing chamber from separate lines. The requisite chemicals may be stored as water solutions or alternatively the foam may be generated from dry chemical powders combined with water. In both cases the chemicals may consist of aluminum sulphate and sodium bicarbonate mixed with the proper proportion of water. As the composition and nature of the compounds producing the foam are no part of the present invention, they will not be described or referred to with any greater particularity. It is to be understood however, that the apparatus of the present invention is adapted to be used with any type of chemical firefoam material.

As stated, the chemicals required to generate a stiff foam are conducted in two streams to a mixing chamber which is generally on the tank to be protected. Mixing the streams produces a foam which is then conducted from the mixing chamber through a baffle arrangement to the inside of the tank to be protected. It is conventional practice to position the baffle discharge for the firefoam on the wall of the tank rather than on the under side of the tank roof due to the likelihood of the roof of the tank being blown off in the event of fire. It is likewise general practice to employ discharge baffles for the firefoam which are intended to conduct the foam down the sides of the tank in an even stream so as to permit even dispersion over the surface of flammable material contained in the tank.

The conventional mixing chambers heretofore employed have been characterized by somewhat complicated construction and extensive volume. It has been considered necessary to employ various internal baffles to secure better mixing and, as stated, consequently to employ a mixing chamber of considerable size. It is a particular object of the present invention to avoid these features of the mixing chambers generally used by

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the provision of a simple compact mixing chamber which may conveniently be constructed from standard piping.

The baffles employed in the firefoam applicators conventionally used differ widely in nature and are of many designs. While it is true that certain types are effective to apply an unbroken stream of firefoam to the walls of the tank or directly to the surface of the liquid in the tank, nevertheless these conventional types are noted by high velocity streams. The velocity of the streams is sufficient to break the surface of the foam in the tank or to splatter foam against the walls of the tank shell, in either case causing a breakdown of the foam and permitting uneven application of the foam particles causing open holes to form in the already existing foam slick. These baffles are also characterized by a large pressure drop in the firefoam line supplying the baffle causing a certain amount of backflow. Other baffles used heretofore are not suitable for applying the firefoam in an even blanket to the wall of the storage tank, causing splattering and breakdown of the foam or misdirection of the foam so that only a portion runs down the tank walls.

It is a further object of this invention therefore to overcome the aforementioned shortcomings of the baffles heretofore employed by supplying a baffle which will issue a thick blanket of foam evenly and continuously to the wall of a storage tank permitting uniform dispersion of the foam over liquid in the tank.

The objects and nature of this invention will be fully understood from a consideration of the following description which may be read in connection with the appended drawings in which;

Figure I represents a plan view of the mixing chamber and baffle arrangement embodying this invention and;

Figure II represents an elevation view corresponding to the plan view of Figure I.

Referring now to the drawings, the numeral 1 designates the shell of the tank within which it is desired to position the baffle for fire foam application. As illustrated in the drawing, the entire apparatus is preferably positioned near the roof of the storage tank. Externally positioned on the tank is the mixing chamber 2 consisting of a T-pipe connection which is connected to and held on the tank by means of the flange 3. This T may be conveniently made from standard weight lap welded steel pipe and, for an applicator designed to deliver 500 gallons per minute of firefoam solutions, the T may consist of 8"

diameter steel pipe. The length of the cross arm of the T wherein the two solutions employed are mixed is not extremely critical but it may be noted that a dimension of 18 inches is entirely satisfactory for the flow rate mentioned above. This dimension is sufficient to permit the opposing streams of chemicals to fan out somewhat before hitting each other. Each end of the cross arm of the T is closed by a welded steel plate 4 which may be of ⅜ inch plate. Centrally disposed in each of the steel plates are standard pipe couplings 5 to which the lines supplying the firefoam liquid may be connected. These couplings may consist of 2½ inch standard weight couplings which may extend through the plates 4 sufficiently to permit welding both within and without the plate.

Positioned within the tank is the baffle 6 connected as the cross arm of a T and having a line 7 held on the tank by flange 8. It is apparent the line 7 should be of the same diameter as the external line connecting with the mixing chamber which, as stated in the particular embodiment illustrated, is 8 inches. The cross arm of the T which comprises the baffle 6 is a somewhat larger pipe having a particular segment on the under part of the baffle cut-away. In the embodiment illustrated, this cross arm of the T may consist of 16 inch standard weight lap welded steel pipe. The length of this cross arm is preferably about 2 feet. Each end of the cross arm is terminated by a steel plate which may be ⅜ inch in thickness and is welded to the pipe. As stated, a particular segment of the lower part of this baffle is cut away. It will be noted from the drawings that the uppermost part of the cut-away segment is about 1½ inches below the center line of the pipe and that the lowermost part of the segment cut-away is at the point determined by an angle of 40° from the vertical drawn through the center of the pipe. In other words about ⅓ of the pipe is cut away so as to form a rectangular opening about 20° from the horizontal. The particular positioning of this segment is critical insofar as any segment not substantially as described will either cause the foam to splatter on the tank shell or would permit the foam to hit the surface of the liquid in the tank before contacting the shell of the tank. As either of these effects seriously decreases the efficiency of foam application, it must be appreciated that the nature and the positioning of the segment cut-away from the baffle described is of the utmost importance. Other portions of the apparatus of this invention shown in the drawings are not particularly critical.

It may be appreciated that while this invention comprises the combination of the particular mixing chamber and baffle described, it is possible in a less efficient installation to employ either different mixing devices or different baffles. Similarly it is to be understood that while the embodiment described has been specifically identified as being for the application of about 500 gallons per minute of firefoam solutions, different flow rates may be employed or alternately different sizes of the applicator of this invention may be constructed.

As described, therefore, the firefoam applicator of this invention comprises two T-shaped members interiorly and exteriorly positioned on a tank to be protected. The exterior member has longitudinally opposed solution inlets and is of sufficient diameter and length to permit fanning out of solutions pumped through the inlets before contact with each other. By this means the impact of the opposed streams on each other causes effective mixing. The interior member of the applicator has both ends of the T closed and has a portion of the pipe of about ⅓ the circumference cut away. This provides a rectangular discharge opening inclined at an angle of about 20° to the horizontal so as to direct the foam in an even continuous blanket against the wall of the tank when sufficient foam is passed through it.

Having now fully described the invention, what is claimed is:

1. A fire foam applicator comprising in combination, a first tubular member having closed ends and being provided with a slotted portion extending along the said member parallel to its longitudinal axis, a second tubular member having closed ends, inlet openings centrally disposed in each of the closed ends of the said second tubular member, a third tubular member joining to and providing a fluid passageway between said first and second tubular members, said first and second tubular members being positioned substantially parallel to each other and substantially perpendicular to the said third tubular member with reference to the longitudinal axis of the said members.

2. The apparatus defined by claim 1 in which the said third tubular member joins to said first and second tubular members at points substantially midway of the closed ends of said first and second tubular members.

3. The apparatus defined by claim 1 in which the said slotted portion has a length substantially equal to the length of the said first tubular member and in which the said slotted portion has a width about one-third of the circumference of the said tubular member.

4. The apparatus defined by claim 3 in which the said slotted portion is inclined at an angle of about 20° from the horizontal.

5. The apparatus defined by claim 1 in which said second tubular member includes means to fix said member in an opening provided in the wall of a storage tank.

6. The apparatus defined by claim 1 in which each of said first and second members extend on either side substantially beyond the juncture with said third member.

7. The apparatus defined by claim 1 in which the diameter of said second tubular member is substantially greater than the diameter of the said inlets.

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