July 7, 1931. J. F. M. TAYLOR 1,813,101

MIXING CHAMBER FOR FOAM FORMING SOLUTIONS

Filed Oct. 9, 1928

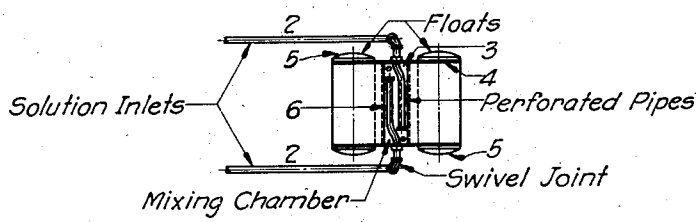


FIG. 2

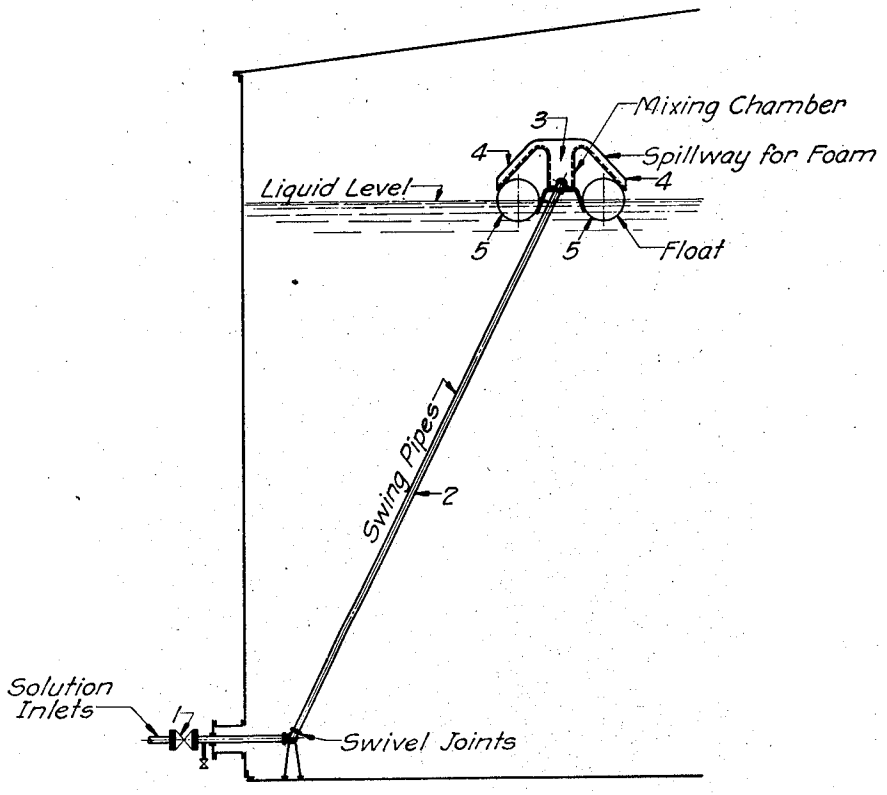


FIG. 1

WITNESS

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UNITED STATES PATENT OFFICE

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MIXING CHAMBER FOR FOAM FORMING SOLUTIONS

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This invention relates to the extinguishing of oil fires and similar fires, particularly of fires in oil tanks or reservoirs, by means of a smothering blanket of foam, formed by the mixing of suitable solutions.

It is an object of the invention to provide an improved apparatus for the mixing of the solutions, and the forming and spreading of the foam on the surface of the oil.

More particularly it is the object of this invention to provide a mixing chamber detached from the walls or roof of a tank and supported by floats, resting on the surface of the oil, in order to make the distance between the mixing chamber and the surface of the oil as short as possible.

Further objects and advantages of this invention will appear from the following description, in which I have set forth the preferred form of my invention. It is to be understood that the appended claims are to be accorded the scope and range of equivalents consistent with the state of the prior art.

In the last few years it has become general practice to extinguish oil fires by spreading over the surface of the burning oil a layer of incombustible foam, sufficient to exclude the air, and to smother the fire. Usually the foam is formed as close as possible to the fire, by the mixing of two suitable solutions which produce a large quantity of foam upon being mixed; the foam overflows on the oil surface from the mixing chamber. Several suitable solutions are commercially used, but my invention is not restricted to any particular kind.

To minimize the duration of fires as much as possible, especially in oil tanks and reservoirs, it has become the usual practice to equip these containers with a permanent installation for producing the fire-extinguishing foam, so that in case of fire the foam can immediately be formed close to the burning liquid and be spread over the whole surface of the tank, before the burning oil can escape.

The usual installation of this kind consists of a rectangular mixing chamber, fastened on the outside to the top of the tank and projecting inside. The solutions are simultaneously pumped under pressure to this mixing chamber. The foam, formed in the mixing chamber, drops free from the projecting outlet of the mixing chamber on the inside of the tank, onto the oil surface.

If the liquid level in the tank is high this way of supplying the foam to the burning liquid is sufficient. However, I have found that if the oil level is low and the foam has to drop some distance before reaching the surface, its efficiency is seriously impaired. I have noticed that if the foam is exposed to heat this greatly lessens its effect; if a large tank of a height of 30 feet is only partially filled, the foam has to drop such a distance, that during the fall it is seriously affected by the intense heat of the fire below. Further the updraft of the fire carries away part of the free dropping foam. Still another great disadvantage is that the foam, dropping from any height, does not spread evenly on the surface of the oil, but falls down a little into the oil and becomes mixed with films of burning oil, which prevents exclusion of the air from the fire. My experiments show, that if the drop is more than 20 ft. the quantities of foam which would be needed to overcome these intervening factors, are so large as to practically make the method useless.

Further, I have noticed in several tank explosions, especially of tanks containing light oils, that not only the roof was blown off but the top portion of the tank shell was bulged outward to such an extent that the mixing chambers attached to the top of the tank were damaged and no longer effective.

To overcome these difficulties, and to avoid the necessity of dropping the foam down on the oil surface, I propose to let the mixing chamber float on the surface of the oil. This construction has the advantage that the foam is formed at the oil level, and can be sideways discharged on the surface, forming an even covering; the foam is only a very short time exposed to heat, and there is no loss by updraft. This arrangement also lessens the danger of the apparatus being damaged in an explosion of the tank, as it is detached from the shell and the roof of the tank.

In the accompanying drawings the pre-

ferred arrangement of apparatus adapted to carry my invention into effect is illustrated. It will be understood that other designs may be used and found suitable to carry out the method and obtain the results of this invention and I do not intend to limit myself to the particular form of apparatus shown. It is further understood that my apparatus is not limited to use for oil fires, but may be used for any similar fires where this method can be applied, and not only for oil tanks, but for any containers of inflammable liquids, in which fires can be extinguished by this method. It may also be designed for use in tanks equipped with floating roofs.

Figure 1 of the drawings shows an elevation of an installation, embodying my invention, as applied to an oil tank. Figure 2 shows a plan view thereof.

The solutions are pumped to the mixing chamber through two parallel pipes, which enter the tank at 1; these pipes are connected by swivel joints to the swing pipes 2, which again by swivel joints are connected to the mixing chamber 3; the solutions enter this chamber through the perforated pipes 6. This mixing chamber is supported a little above the surface of the oil by the floats 5; the foam formed in the mixing chamber runs over the sides and down the spillways 4, onto the surface of the oil.

To prevent, as much as possible, oil leaking in the mixing chamber, this is kept a little above the surface of the oil; and the floats are of sufficient buoyancy to keep the chamber above the oil surface even though the chamber and the pipes leading to the same should become filled with oil or with foam liquid or though the temperature of the oil in which the chamber floats is raised on account of fires at the surface of the oil. Drain valves may be provided on the outside of the tank for draining same before the foam liquid is pumped into the line. In the event of the fire preventing this however, the incoming foam liquid would displace the oil.

If desired the chamber may be provided with a very light thin metal strip across the outlets to prevent oil from entering the chamber. This metal strip must be thin enough to be easily ruptured by the pressure of the incoming foam liquid.

I prefer to use the connection by swing pipes and swivel joints, though any other suitable connection, as by metallic hose could also be used. If metallic hose is used, some means must be provided to prevent the hose from getting entangled, when the oil level is lowered, or the float from turning horizontally, and subjecting the hose to undue stresses. As the heat of the fire penetrates only a few inches below the surface of the oil, the pipes or hose and the liquid in them are sufficiently protected.

If it is considered important to keep the floating mixing chamber centrally located, a variation of the arrangement of the apparatus shown in the drawings may be employed, without changing the principle of my invention. For instance, it might be advantageous to prolong the horizontal inlet pipe to the middle of the tank, and connect the floating chamber therewith by two swing pipes with double swivel joints, bending in opposite directions, and use a circular mixing chamber instead of the rectangular one, shown in the drawings.

I claim as my invention:

1. In an apparatus for preventing fires in oil tanks, substantially as described; a mixing vessel, supported by floats, close to the surface of the oil, connected by swing pipes and swivel joints, with the inlets for the foam forming solutions in the lower part of the tank containing the oil, its outlet consisting of a sloping spillway for the foam, ending near the oil level.

2. An apparatus for introducing foam onto the surface of a liquid in a tank comprising a member adapted to define a mixing chamber, a pipe adapted to discharge into said chamber, a second pipe adapted to discharge into said chamber, both of the pipes being normally adapted for connection to sources of solutions which produce foam on mixing, and means for supporting said member in a substantially constant relationship with respect to the surface of the liquid, said member continuing from said chamber to substantially the surface of the liquid so that foam is discharged onto the surface of the liquid without falling.

3. An apparatus for introducing foam onto the surface of a liquid in a tank comprising a member adapted to define a longitudinally extending chamber, pipes adapted to discharge foam forming solutions into said chamber, said pipes being arranged longitudinally of the chamber and opposite each other so that their respective discharges are in intimate contact, and means for supporting said member on the surface of the liquid.

4. An apparatus for introducing foam onto the surface of a liquid in a tank comprising a member adapted to define a longitudinally extending mixing chamber, discharge pipes extending longitudinally in said chamber, swiveled pipes joining said pipes to exterior sources of foam forming solution, float means for supporting said member on the liquid surface, and a spillway leading from said chamber over said float means to the liquid surface.

In testimony whereof, I have hereunto set my hand.

JACK FRANCIS MAHON TAYLOR.