Dec. 12, 1939. S. E. ALLEN ET AL 2,183,208

SAFETY SEALING MEANS FOR FIRE EXTINGUISHING SYSTEMS

Filed Dec. 28, 1936

Fig. 1.

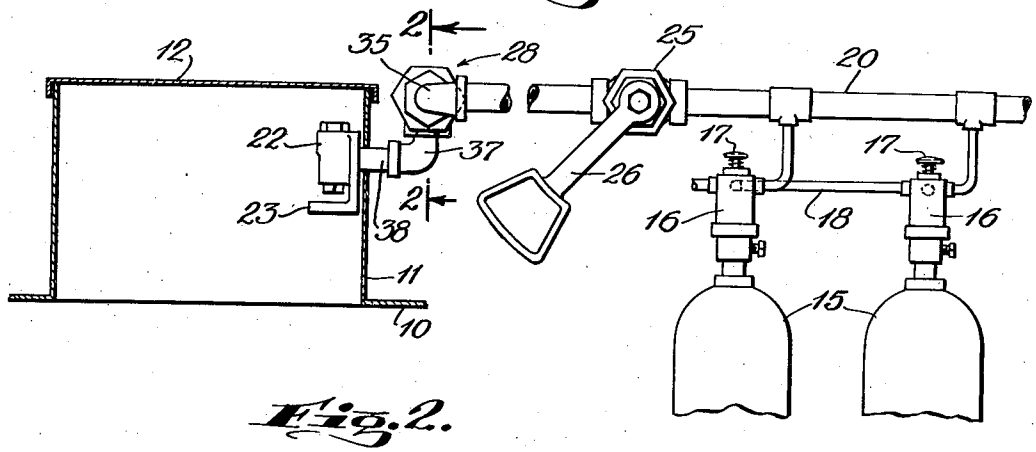


Fig. 2.

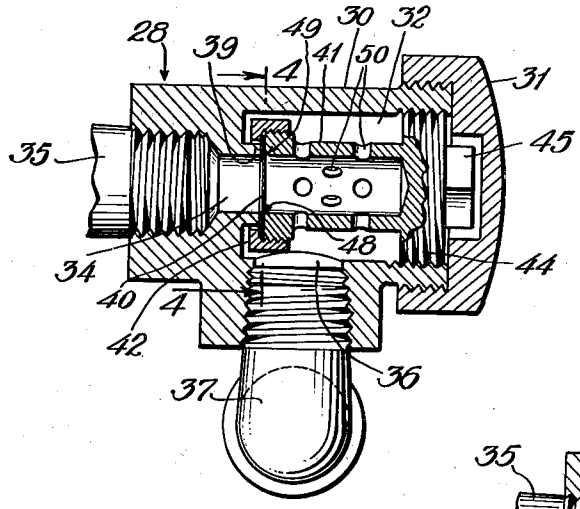


Fig. 3.

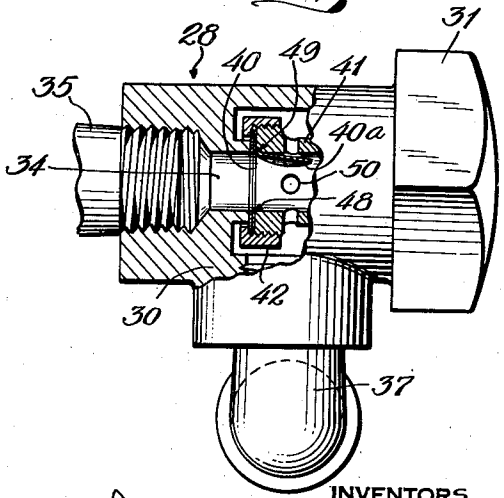
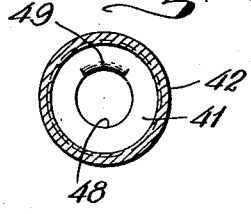


Fig. 4.



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SAFETY SEALING MEANS FOR FIRE EXTINGUISHING SYSTEMS

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Application December 28, 1936, Serial No. 117,868

10 Claims. (Cl. 169—11)

The present invention relates to fire extinguishing systems and has for an object to provide means for preventing the introduction of foreign matter which might obstruct the system or prevent it from operating.

Our invention is particularly adapted for use on fire extinguishing systems for oil tanks such, for instance, as are employed in oil tankers or ships which carry crude oil and other inflammable fluids. In such installations it is customary to provide means for introducing a spray of fire extinguishing fluid in case of fire. Preferably the spray forms a blanket across the hatch or manhole of the tank to smother the fire by cutting off the entrance of air into the tank. When the tanks are to be cleaned out it is necessary to rid them of fumes, and to this end it is customary to introduce live steam into the tank to carry off the fumes and also to wash down such of the oil as may adhere to the side walls of the tank, after which a workman may enter and clean out the sludge in the bottom of the tank. The steam is introduced under comparatively low pressure, but it is apt to find its way into the fire extinguishing line and may condense therein, forming pockets of water. In cold weather this water will congeal and obstruct the flow of fire extinguishing fluid therethrough. Condensation is also apt to collect in the control valves of the system and lock them against operation if they are exposed to a freezing temperature.

An object of the present invention is to provide a fire extinguishing system with a safety sealing head close to the spray nozzle designed to prevent entrance of steam or other foreign matter without preventing free discharge of the extinguishing fluid whenever desired.

A more specific object of the invention is to provide a sealing disk to cut off the discharge conduit close to the outlet, this disk being strong enough to resist the low pressure steam but weak enough to rupture at a pressure below the minimum pressure employed in forcing the extinguishing fluid into the tank.

A further object of the invention is to provide means for controlling the rupturing of the disk so that a flap will be burst out of the body of the disk, providing a wide opening therethrough, but the flap itself will remain attached at one side to the body of the disk.

Another object of the invention is to provide a cage adapted to catch and retain the flap should it by any chance be torn loose, so as to prevent it from being carried into the spray nozzle and obstructing the discharge.

A further object is to provide a safety sealing head which is readily accessible and which may be opened at any time to replace a ruptured disk with a fresh one.

Still another object of the invention is to arrange the sealing head in such relation to the spray nozzle that any moisture which might be forced into the sealing head would drain out of said spray nozzle.

With these and other objects in view which will appear hereinafter we shall now describe a preferred embodiment and thereafter the novelty and scope of the invention will be pointed out in the claims.

In the accompanying drawing;

Figure 1 is a view in side elevation of our improved fire extinguishing system for protecting a tank, said tank being shown fragmentally with the walls thereof in section;

Fig. 2 is a view in section of the safety sealing head, showing a sealing disk in normal sealing condition, the section being taken on the line 2—2 of Fig. 1;

Fig. 3 is a similar view of the safety sealing head, but only partially in section, showing the safety disk ruptured; and

Fig. 4 is a view in transverse section of the safety disk carrier, the section being taken on the line 4—4 of Fig. 2.

Referring to Fig. 1, we show at 10 a portion of a tank provided with a hatch 11 normally closed by a cover 12. The cover is bolted or otherwise secured in closed position. The tank is protected by a fire extinguishing system and in the particular system illustrated, carbon dioxide is used as the extinguishing fluid, the carbon dioxide being stored under pressure in liquid form in a battery of cylinders 15. Each cylinder is provided with a discharge head 16 which may be of the type shown in Patent No. 2,051,589, issued August 18, 1936. Each discharge head is provided with an operating button 17 which may be manually depressed to release the fluid from the battery. The discharge heads 16 are interconnected by a pipe 18 in such manner that when fluid is released from any cylinder it will cause the automatic release of fluid from all of the cylinders of the battery.

The cylinders 15 discharge into a pipe line 20 which conveys the extinguishing fluid to a discharge nozzle 22 within the hatch 11. A baffle 23 is arranged to spread the discharging fluid across the hatch so as to blanket and

smother any fire within the tank. At a suitable point in the line 20 there is a valve 25 provided with an operating lever 26 for controlling the flow. This valve is particularly useful when two or more tanks are served by the same battery to determine to which tank the flow will be directed.

Close to the hatch 11, but outside of the same, is our improved safety sealing head 28 which forms part of the discharge line connecting the battery of cylinders 15 to the spray nozzle 22. The head 28 is shown in detail in Figs. 2 and 3. It comprises a cup shaped casing 30 whose open end is normally closed by a screw cap 31 enclosing a chamber 32. There is an inlet port 34 leading into the chamber, which port is connected by an elbow 35 to the line 20. An outlet port 36 leading from the chamber 32, is connected to the spray nozzle 22 by an elbow 37 and a short length of pipe 38 which passes through the wall of the hatch. Within the chamber 32 and surrounding the port 34 is an annular flange 39, the end face of which provides a seat for a sealing disk 40. The sealing disk is clamped against the end of a tubular carrier 41 by means of a clamping ring 42 screwed upon the carrier. The outer end of the carrier is closed and is provided with an enlarged head 44 which has threaded engagement with the inner wall of the chamber 32. A lug 45 projects from the outer end of the head 44 and is squared so that it may be engaged by a wrench to screw the carrier inwardly and clamp the sealing disk 40 firmly against the seat formed on the flange 39. The bore of the tubular carrier is preferably of the same diameter as and in register with the bore of the flange 39. The end face of the carrier forms a sharp corner 48 with the inner wall of the carrier, except for a portion at one side which is rounded, as indicated at 49 in Fig. 4. This portion preferably extends through an arc of about 90 degrees. The tubular carrier is formed with perforations 50 to permit fluid to pass out of the bore of the carrier into the chamber 32.

When steam is admitted into the tank 10 (by means not shown) it may find its way through the outlet port 36 into the chamber 32 and also through the openings 50 into the interior of the carrier 41, but it will be blocked from entering the main discharge line 20 by the sealing disk 40. As a rule the pressure of the steam is not more than a pound or two and the disk is strong enough to resist this pressure and even a considerably higher pressure. Were the disk not present the steam would find its way into the discharge line 20. If the valve 25 happened to be closed its further progress in said line would be barred thereby. However, there would be an accumulation of condensation in the pipe 20 and in the valve 25 which if frozen would seriously obstruct the passage of extinguishing fluid therethrough. If by chance the valve 25 were open the steam might force its way into the discharge heads 16 and eventually block the same with ice. Such difficulties are avoided by the use of the safety sealing disk 40. Any condensation of moisture in the chamber 32 or in the carrier 41 will simply drain out of the port 36 to the nozzle 22 and thence into the tank.

The disk 40, while strong enough to resist rupture under the highest steam pressure that is likely to be applied in the tank 10, is nevertheless not strong enough to resist the pressure of the carbon dioxide or other extinguishing fluid admitted to the line 20. Under the pressure of this fluid the disk will be burst open and the sharp corner 48 will provide a line of cleavage extending through an angle of approximately 270 degrees, while the rounded portion 49 will not cut the disk but will leave an attaching part, so that a flap 40*a*, as shown in Fig. 3, will be forced out of the disk and will hinge about the rounded part 49. The flap will then be flattened by the outrush of extinguishing fluid against the inner wall of the carrier 41. If by any chance the flap 40*a* should be torn loose it would be trapped in the bore of the carrier 41 since it could not escape through the relatively small perforations 50. The fluid discharging through the opening in the disk will pass out through ports 50 into chamber 32 and thence into the discharging nozzle 22. After the extinguishing system has been operated the cap 31 may be unscrewed, the carrier 41 withdrawn, and a new sealing disk clamped thereto in place of the ruptured one. The parts may then be restored to the position shown in Fig. 2.

While we have described our system as applied to a tank on a ship it will be obvious that it may be employed in any situation where it is desirable to prevent admission of steam or other matter into the discharge line. It will also be understood that while we have described the system as applied to the use of carbon dioxide as an extinguishing agent it may also be used with other extinguishing mediums which are discharged under a pressure higher than the steam pressure which is used to clean out the tank or other enclosure protected by the system. Thus, while we have described a preferred embodiment of our invention it will be understood that this is to be taken as illustrative and not limitative and that we reserve the right to make various changes in form, construction and arrangement of parts without departing from the spirit and scope of our invention as pointed out in the claims.

We claim:

1. In combination with a source of fire extinguishing fluid under pressure, a discharge port for said fluid, a sealing disk normally closing the port but rupturable by the pressure of said fluid, an annular support for the disk having a sharp corner providing a line of cleavage along which a flap of the disk will be cut out as the disk is ruptured, said sharp corner being interrupted at one side by a rounded corner of sufficient extent to leave a hinge connection between the flap and the disk.

2. In combination with a source of fire extinguishing fluid under pressure, a discharge port, a sealing disk normally closing the port but rupturable by the pressure of said fluid, a tubular support for the disk having a sharp corner at the junction of its inner wall and end face providing a line of cleavage along which a flap of the disk will be cut out as the disk is ruptured, said sharp corner being interrupted at one side by a rounded corner of sufficient extent to leave a hinge connection between the flap and the disk, said tubular support being perforated to permit escape of the fluid therethrough when the disk is ruptured but being adapted to trap the flap should the flap be accidentally torn free from the disk.

3. A safety head for the discharge line of fire extinguishing fluid under pressure, said safety head comprising a casing formed with a fluid chamber having an inlet port and an outlet port, a carrier movable within the chamber toward the inlet port and having threaded engagement with

the casing, said carrier having a tubular stem, a disk for closing the inlet port, said disk being removably mounted on the free end of the stem, and means for screwing the carrier into the chamber to clamp the disk against the inlet port, said disk being rupturable by the pressure of said fluid, said stem being perforated to release the fluid to the outlet port when the disk is ruptured, said stem providing a sharp corner forming a line of cleavage along which the disk will rupture, forming a flap, said sharp corner being interrupted by a rounded corner of sufficient extent to leave a hinge connection between the flap and the disk.

4. A safety head for the discharge line of fire extinguishing fluid under pressure, said safety head comprising a casing formed with a fluid chamber having an inlet port and an outlet port, a carrier movable within the chamber toward the inlet and having threaded engagement with the casing, said carrier having a tubular stem, a disk for closing the inlet port, said disk being removably mounted on the free end of the stem, and means for screwing the carrier into the chamber to clamp the disk against the inlet port, said disk being rupturable by the pressure of said fluid, said stem being perforated to release the fluid to the outlet port when the disk is ruptured, said stem providing a sharp corner extending through an arc of more than 180 degrees and forming a line of cleavage along which the disk will rupture, forming a flap, said sharp corner being interrupted by a rounded corner of sufficient extent to leave a hinge connection between the flap and the disk.

5. In a safety head to be used in a discharge line connected to a source of fire extinguishing fluid under pressure, including an inlet port, an outlet port, a seat for a safety disk surrounding said inlet port and a safety disk on said seat, and means supported by said head for supporting said safety disk on said seat, said means including a cutting edge for cutting said disk under fluid pressure from said source.

6. In a safety head to be used in a discharge line connected to a source of fire extinguishing fluid under pressure, including an inlet port and an outlet port, a seat for a safety disk surrounding said inlet port, and a safety disk on said seat, and means supported by said head for supporting said safety disk on said seat, said means including a cutting edge for cutting said disk under fluid pressure from said source and comprising a perforated cylinder for trapping any portion severed from said disk.

7. In a safety head, the combination of a main body substantially cup-shaped and provided with an inlet port at its closed end and an outlet port at its side, a safety disk seat surrounding said inlet port, and a member threaded on said head and provided with means for detachably holding a safety disk on said member and against said seat, and a safety disk, said member being provided with a cutting edge for cutting said safety disk, said member also being provided with perforations in communication with said outlet port.

8. In combination with a source of fire extinguishing fluid under pressure, a discharge line, a safety head connected in said line having inlet and outlet ports, a seat for a safety disk formed in said safety head adjacent said inlet port, a cup-shaped safety disk carrier movably mounted in said safety head with its open end extending toward said seat, for movement to and away from said seat, and a safety disk removably secured upon the open end of said carrier and adapted to be pressed against said seat, said disk having a tensile strength to withstand a substantial pressure against said disk through the outlet port but rupturable under higher fluid pressure from said source through the inlet port, said cup-shaped carrier being ported to provide a communication between said inlet and outlet ports after said disk has been ruptured.

9. In combination with a source of fire extinguishing fluid under pressure, a discharge line, a safety head in said line having inlet and outlet ports, a seat for a safety disk adjacent said inlet port, a safety disk, and a perforated cup-shaped member adjustably mounted in said safety head with the edge of its open end engaging said disk for holding said safety disk on said seat.

10. In combination with a source of fire extinguishing fluid under pressure, a discharge line, a safety head in said line having inlet and outlet ports, a seat for a safety disk adjacent said inlet port, a safety disk, and a perforated cup-shaped member adjustably mounted in said head for holding said disk on said seat, said cup-shaped member being perforated intermediate of its ends to establish communication between said inlet and outlet end of said cup-shaped member constituting a trap to catch the portions of the disk torn off when the disk is ruptured.

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CERTIFICATE OF CORRECTION.

Patent No. 2,183,208. December 12, 1939.

SCOTT E. ALLEN, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, second column, line 49, claim 10, after "outlet" insert ports upon rupture of said disk, the unperforated; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 30th day of January, A. D. 1940.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)