GAS DISSIPATING MEANS

Filed Feb. 2, 1938

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My invention relates to gas dissipating means, and more particularly to gas dissipating venting means for apparatus for storing liquefied gases. In the storage of certain petroleum gases, such as butane and propane, which are adapted to be liquefied under pressure, and stored in a storage tank, and adapted to vaporize or turn into a gas at a temperature that is relatively low, a housing commonly called a hood is located on the upper side of the tank for storing the liquefied gas, which housing or hood contains various apparatus, such as a pressure gauge, safety valve, and other devices. Means is provided for relieving the pressure in such a tank, should it reach a value above a predetermined maximum, by means of the safety valve, and to conduct the vapor or gas discharged from the safety valve outside the housing on top of the tank. Also, in order to avoid any possibility of collection of any vapors or gases that might be of an explosive nature, venting means is provided for the housing to conduct any such explosive gases from said housing.

My invention particularly relates to means for venting said housing and for conducting vapors or gases discharged by the safety valve from said housing, and for dissipating such gases after the same are conducted from the safety valve or from the housing.

It is a particular purpose of my invention to provide means associated with the safety valve and with the venting means for the housing, whereby gas or vapor passing through the safety valve and from the venting means will be dissipated and scattered so that no pockets will exist near the housing that might cause fire or explosion. This is accomplished by providing a dome-like cover over the outlet from the safety valve, which is provided with a plurality of openings, or slits, therein, through which the gas is adapted to escape in such a manner that any current of air whatsoever striking the same will cause the combustible gas thus escaping to be spread out and dissipated, so that it will not be of sufficient quantity in any part of the atmosphere adjacent the housing and the outlet from the safety valve to ignite under any circumstances. This application is a continuation in part of my application, Serial No. 151,837, filed July 3, 1937.

Other objects and advantages of my invention will appear as the description of the drawing proceeds. I desire to have it understood, however, that I do not intend to limit myself to the particular details shown or described, except as defined in the claims.

In the drawing:

Fig. 1 is a fragmentary view partly in vertical section and partly in elevation of a liquefied gas tank and housing mounted thereon, showing my improved gas dissipating means applied thereto.

Fig. 2 is a fragmentary view, partly in vertical section and partly in elevation, on an enlarged scale, of the safety valve and gas dissipating means for the gases escaping from the safety valve.

Fig. 3 is a similar view of a modification.

Fig. 4 is a top plan view of the gas dissipating means with the dome-like cover or bell cap removed therefrom.

Fig. 5 is a view similar to Fig. 2 of a further modification.

Fig. 6 is a fragmentary sectional view of a further modification, and

Fig. 7 is a top plan view of the supporting means shown in Fig. 6 for the bell cap or dome-like cover member, with the cover member or cap removed.

Referring in detail to the drawing, a fragmentary portion of the tank 10 is shown, which has a vapor space 11 in the upper portion thereof. A housing or hood 12 having a removable cover member 13 is provided on the top of the tank 10. The tank and the main portion of the housing or hood 12 are mounted below the level of the ground, and, preferably, a filling of loose material, such as crushed rock, indicated at 14, is placed around the top of the tank and around the lower part of the hood portion or housing. Earth 15 is provided around the upper portion of the hood up to within a short distance of the depending flange 16 on the cover member 13.

Within the housing 12 certain apparatus is provided, which must be located in such a manner as to be accessible at certain times to the operator of the gasdispensing means associated with the tank 10. A high pressure gas line 17 and a return line 18 extends into the housing 12 from the tank and out through a side wall thereof, said line 17 having an upward extension 19, to which a T 20 is connected, said T having a closure 21 provided on the upper end thereof, through which the contents of the tank may be gauged, and having an elbow 22 extending therefrom, to which a safety valve 23 is connected, said safety valve having a tubular discharge member 24 extending upwardly therefrom.

Other apparatus may also be provided within the housing 12, such as a pressure gauge 25 on the pipe 18, an electrical controlling switch 27 and an electrical conduit 23 extending into the tank to operate suitable electrical heating means, 55.
and a fill pipe 29, which is provided with a check valve 33 and a filler valve 31, and suitable coupling means 32 for connecting another conduit thereto. The pipe 28 is provided with a combination of a pipe valve 33 of any desired construction. Any other desired apparatus may be provided within the housing 12 and the particular apparatus shown need not be provided exactly as shown nor need all of the same be provided in such a housing, the important thing being that numerous pipe connections from the tank extend into the housing, and due to this fact there is a possibility that some leakage of the liquefied gas in a vaporized state may enter the housing unintentionally. It is accordingly desirable to provide means for venting the housing.

The cover member 12 is provided with a tubular member 34, extending upwardly therefrom and welded thereto, the same constituting a tubular conduit communicating with the interior of the housing 12 through an opening 35 in the rounded cover member 13. The tubular member 24, forming the discharge conduit for the safety valve, extends upwardly in the tubular conduit 34 to near the top end thereof. The conduit 34 is open at its upper end 36 and has extending upwardly therefrom, in the forms of the invention shown in Figs. 2 and 5, a reduced bracket portion 37, which has an angular end portion 38 at the upper end thereof, which underlies the inner face of the cup-like or dome-like member 39, as shown in Fig. 2. Said dome-like or cup-like member 39 is provided with an opening 40 and a weld 41 is made through the opening 40, so as to firmly secure the dome-like cover member or cap member 39 to the upper transverse portion 38 of the bracket 37.

Said dome-like or bell cap member 39 is provided with means for dissipating any combustible vapors that may escape from the outlet 24 of the safety valve 23, or through the venting tube 34 of the housing 12. This is accomplished by providing a large number of slots or slits 42 in the bottom peripheral edge of the dome-like or bell cap member 39, through which the combustible vapor is adapted to escape. It will be obvious that this vapor will be scattered by this means, so that if there is any movement of air whatever, the vapor will be carried away in small amounts in the moving air passing into the atmosphere in such a manner that no pockets will collect in the air, that could possibly be ignited. The slits or slots 42 are of such an extent that their upper ends 43 are substantially on the same level as the top end of the tubular member 24, and the top end of the tubular member 34. Said slots, are, preferably, large in number and narrow, so as to provide many narrow openings for the discharge of the combustible vapors. The combined cross-sectional area of all of the slots or slits must be at least equal to the cross-sectional area of the tubular member 34 extending from the housing 12. Air passing through these slits or slots 42 across the top 35 of the tubular member 24 will cause a siphoning action to be set up, drawing air and vapors up through the tubular member 34 from the housing 12. Discharge of vapor through the tubular upper end portion 24 of the safety valve 23 is provided by a similar siphoning action in the tubular member 34, which would tend to draw any mixture of air and vapors, existing in the housing 12, out of the same. Instead of welding the bell cap or hood 39 to the tubular member 34, said bell cap 39 can be detachably mounted thereon, as shown in Fig. 3. In this form of the invention the tubular member 34' is provided with a flange or fin 44, extending upwardly therefrom, forming an upwardly extending ear 45 at the top end of the tubular member 34' and having a laterally extending ear 45 thereon, which is provided with a screw-threaded opening 46, with which the screw-threaded portion 47 of the headed screw-threaded member 48 engages, the head 49 of said screw-threaded member being secured in the opening 48 in the cap or cover member 39.

While the slits or slots 42 are preferred, the bell cap or hook-like member may be provided with a plurality of closely spaced small openings, such as shown on the bell cap or dome-like member 39', which is shown in Fig. 5 as having a large number of openings 50 therein, that are arranged in a plurality of rows, the holes in the various rows being staggered and the top edges of the uppermost row of holes 50 lying substantially in the same plane as the top edge of the tubular member 34. In all the forms of the invention the tubular member 34 or 34' is welded in gas-tight relation to the top 13, as indicated at 51.

Instead of providing a reduced upward extension as described in the tubular member 34, as shown in Figs. 2 and 5, a triangular bracket member 52 may be welded on the top end 36 of the tubular member 34", as shown in Figs. 6 and 7. Said member 52 being merely a triangular piece of heavy gauge sheet metal, which has the apex 53 thereof extending into the opening 40 in the bell cap or dome-like member 39, and which is welded in said opening 40 by means of the weld 41.

What I claim is:

1. The combination with a tank for liquefied gas and a housing over said tank, of a safety valve for said tank, means for venting said housing comprising a conduit extending upwardly from and communicating with the space within said housing, and a dome-like member mounted on said conduit having its bottom edge spaced from said housing and said conduit, said conduit extending into and being open to the interior of said dome-like member and the peripheral portion of said dome-like member, and means for venting said housing by an opening for passage of gas and gas vapors away from said housing and said dome-like member.

2. The combination with a tank and a housing over said tank and a safety valve for said tank in said housing, of means for venting said housing comprising a conduit extending upwardly from and communicating with the space within said housing, and a dome-like member mounted on said conduit having its bottom edge spaced from said housing and said conduit, and a discharge connection from said safety valve extending into and opening into said conduit within said dome-like member, said conduit being open to the interior of said dome-like member, said conduit extending in the peripheral portion of said dome-like member having a plurality of restricted passages therethrough, providing a perforate wall portion extending from substantially the level of the top of said conductor to the bottom edge of said dome-like member.

3. The combination with a tank and a housing over said tank and a safety valve for said tank in said housing, of means for venting said hous-
ing comprising a conduit extending upwardly from and communicating with the space within said housing, a dome-like member mounted on said conduit, having a concavo-convex top wall and a depending peripheral wall the bottom edge of which is widely spaced from said housing and said conduit, said conduit extending a substantial distance into said dome-like member, and a discharge connection from said safety valve extending into and opening into said conduit within said dome-like member adjacent the upper end of said conduit, said conduit being open to the interior of said dome-like member, the bottom of said dome-like member being unrestrictedly open to the atmosphere, and the depending peripheral wall portion of said dome-like member having a plurality of closely spaced restricted passages therethrough to provide a perforate dome portion extending substantially to the level of the upper end of said conduit.

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