

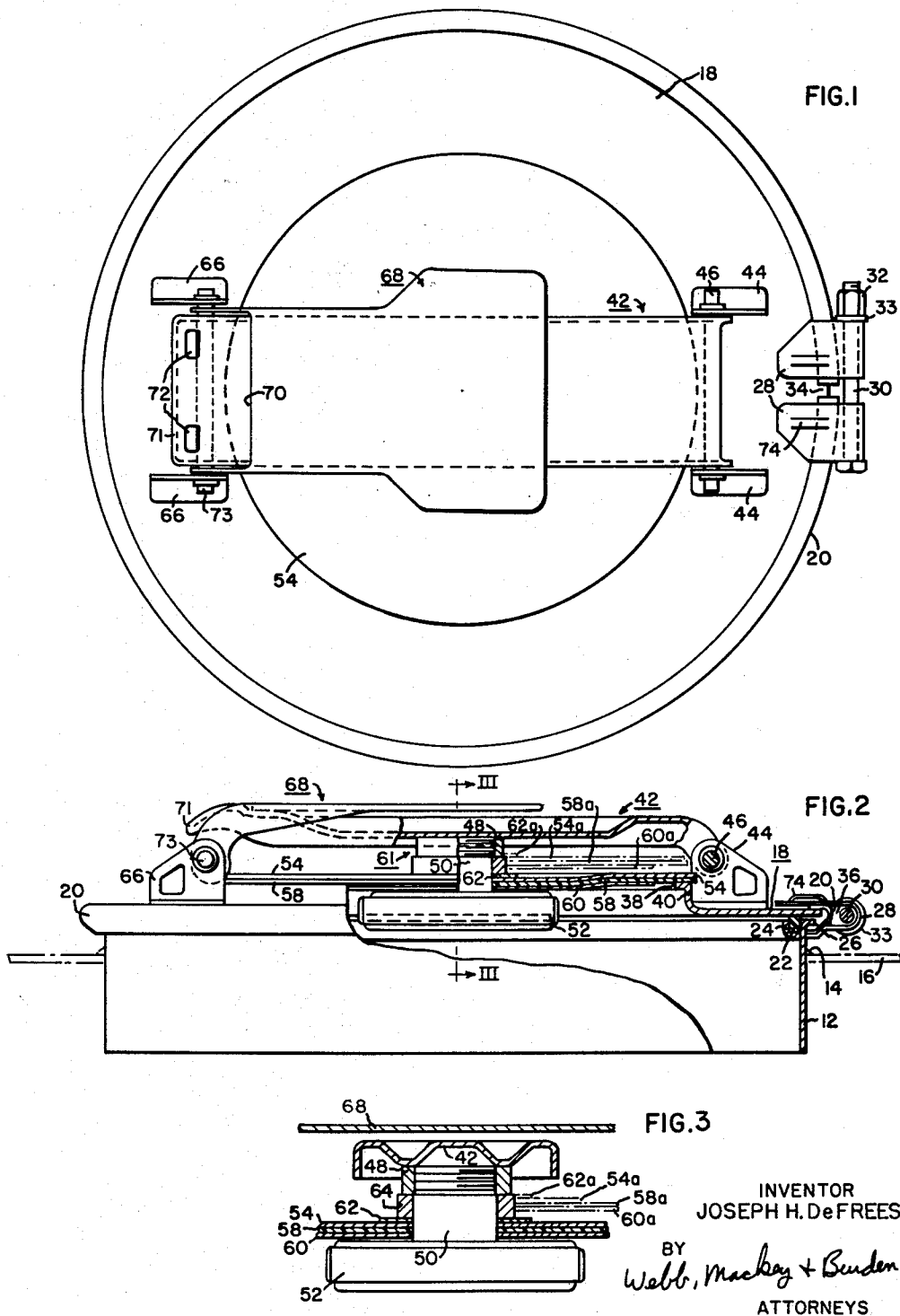
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MANHOLE FUSIBLE JOINT AND IMPROVED GASKET

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MANHOLE FUSIBLE JOINT AND
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This invention relates to an improved manhole cover for combustible liquid containers and relates in particular to a manhole cover that is provided with fusible means for providing pressure release to such containers.

In the handling of combustible liquids such as gasoline and other petroleum fractions, it is necessary to provide containers in which such materials are stored or transported with venting means to release a portion of the fumes and vapors that continually rise from the surface of such inflammable materials. Failure to provide such venting means may result in undue pressures building up within the container and an obvious explosion hazard is created. Venting valves conventionally provide a small orifice at the top of the container designed to "bleed off" the excess vapor pressure.

In addition to such limited venting it is customary, and in fact required by the Interstate Commerce Commission, to provide emergency venting to take care of a build-up in pressure due to fire.

Obviously, in the event of fire, the pressure within the tank will build up very rapidly, far faster than can be accommodated by the aforementioned limited venting orifice. Such build-up in pressure is far more dangerous than the fire itself since an explosion may cause considerably greater damage. Also, obviously, such an explosion will spread the fire in the form of flaming liquid. The additional venting is usually accomplished by means of fusible plugs which consist of threaded cylindrical members (usually pipe sections) that are provided with a fusible seal or cover that seals off the bore of the plug. Separate threaded openings must be provided in the container to accept these fusible plugs which may be of any size. The fusible seal is designed to melt at a predetermined temperature so that theoretically at least in case of fire the seal or cover member will melt and open to provide adequate venting to the container and consequently prevent an undue build-up of pressure and the resultant explosion hazard.

Such fusible plugs (a) congest the top of the tank or container and increase the danger of tripping for personnel that must traverse such containers and tanks for the maintenance and dispensing of the liquids; (b) increases initial and maintenance costs, and (c) complicates the cleaning of tanks.

Additionally, such plugs are objectionable because if such containers or tanks are overturned as where a gasoline truck is involved in a collision, the combustible liquid within the container rushes up against the fusible metal or the fusible plug itself and acts as a coolant which delays or prevents the melting of the fusible material at the time of the fire. Hence, the necessary venting action does not take place, excessive pressure is built up within the tanks, and an explosion hazard exists.

One solution to the aforementioned problems has been my development of a manhole cover that is provided with emergency venting means as taught in my patent, U.S. Patent No. 2,783,913. In this apparatus a manhole cover such as the one ordinarily employed to fill the tank or container is provided with a resilient disk used like a spring. The disk seals off an opening to the container but upon a predetermined pressure increase, as when the pressure rises within the container due to fire, the disk is forced upwardly so as to break the seal between it and the opening thus permitting venting. Although, my apparatus as described in the aforementioned patent has con-

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tributed significantly to the safety of containers containing volatile liquid, it is true that this apparatus functions in accordance with a maximum pressure build-up within the tank. An alternate arrangement would be a valve that would open once fire was involved to prevent any build-up of pressure within the container. Additionally, the safety device of my improved manhole cover (Patent 2,783,913) closes when such maximum pressure levels recede.

The apparatus of the present invention is an improvement of my manhole cover disclosed in my Patent 2,783,913 since the present apparatus provides not only the advantages of that taught by the patent, but additionally provides fusible means whereupon in the event of active fire the resilient disk may be released to float upwardly providing a greater amount of venting area and eliminating the necessity of predetermined pressures to break the seal and providing a large venting area.

In my improved apparatus, a fusible member is interposed between the means that provides downward sealing pressure to the resilient disk of my improved manhole cover and the disk, so that the disk will perform its usual function in providing venting. However, in the event of fire, the fusible member will melt so that the downward locking pressure will be released and the disk will no longer seal the opening so that uninhibited venting of the container is provided. Additionally, the fusible means of the present invention is positioned so that it does not come into direct contact with the liquids being stored. Consequently, in the event the container is upset, such fusible material will not be subjected to the cooling effects of the combustible liquid within the container, but instead will much more readily melt and provide the emergency venting so essential at this time.

Accordingly, it is an object of the present invention to provide a manhole cover for containers used in the handling of liquids, such cover being provided with emergency venting means that will vent pressure from within the tank whenever it exceeds a predetermined amount and additionally is provided with fusible means for continuously venting such container in the event of fire.

Other objects of advantageous features of the apparatus of the present invention will be obvious from the following description and the drawings wherein:

FIGURE 1 is a top plan view of a manhole cover that embodies the features of the present invention;

FIGURE 2 is the side elevation view of the apparatus of FIGURE 1 shown as partially broken away and partially in section to more clearly illustrate the function of the apparatus; and

FIGURE 3 is a fragmentary view partially in section of portions of the assembly of FIGURE 2 as seen along the line III-III of FIGURE 2.

The manhole cover of the present invention is of similar construction to that taught by U.S. Patent 2,783,913 in that it is formed with an annular neck 12 disposed to be welded as at 14 to the top 16 of a container for combustible liquids. A cover plate 18 is sealed to the neck 12 by means of a circular clamping ring 20, a sealing gasket 22, and a sealing gasket holder 24.

Sealing gasket holder 24 is a circular member, L-shaped in cross section, that is attached to the inside surface of the neck 12 in a manner to support the gasket 22 so that it projects above flange 26 of the neck 12. The clamping ring 20 is disposed to bear on the flange 26 of neck 12 and cover plate 18 so as to draw such members toward one another when the ring 20 is tightened. When flange 26 and cover plate 18 are drawn towards one another, the gasket 22 is compressed to effect a liquid-tight seal between cover plate 18 and annular neck 12.

The ring 20 is tightly drawn so as to effect the seal by means of clips 28, a bolt 30, a nut 32, and a washer 33.

The clips 28 are rigidly attached to the ring 20 and are positioned on either side of a discontinuity 34 (FIGURE 1) of the ring 20. A space 36 is provided between the ring 20 and clips 28 that is disposed to receive the bolt 30 and, as may be observed, by tightening the nut 32 on bolt 30 against the washer 33, the ring 20 may be reduced in diameter so as to be drawn tightly against the flange 26 and cover plate 18 to effect the desired seal. Such sealing arrangement being positioned entirely outside of the container is a safety factor since it is not necessary with this type of arrangement to employ potential spark-producing metal-against-metal arrangements as where wrenches must be employed to loosen or tighten bolts within the tank.

Cover plate 18 is formed with a central opening 38 and an upwardly projecting flange 40 adjacent the opening 38. A hinge arm 42 is pivotally mounted to the cover plate 18 by means of hinge lugs 44 that are rigidly attached to the surface of cover plate 18 and which are provided with appropriately opposed perforations disposed to receive a hinge pin 46 which projects through an appropriate opening within the hinge arm 42. Hinge arm 42 is of sufficient length to extend across opening 38 formed within cover plate 18. A threaded collar 48 is rigidly attached to the hinge arm 42 so as to project downwardly when the arm 42 is pivotally positioned to extend across the opening 38. The threaded stem 50 of a vent 52 is threadably engaged with the collar 48 and a resilient disk shaped fill cover 54 formed with a central opening is projected over the stem 50 of the three-way vent 52. A similarly shaped gasket 58 is also projected over the stem 50 and is positioned between vent 52 and fill cover 54 and provides a seal between fill cover 54 and flange 40 of the cover plate 18. A third and smaller diameter disk 60 is also positioned as projected over the stem 50 in advance of the gasket 58. This member (60) is disposed to hold the gasket 58 in position when the fill cover 54 is raised and lowered. A shim washer 62 is positioned on top of the fill cover 54 and a fusible ring 64 is positioned between the washer 62 and the threaded collar 48.

Hence, the entire assembly shown generally as hinge fill assembly 61 consist of the hinge arm 42, collar 48, fusible ring 64, shim washer 62, fill cover 54, fill gasket 58, and the gasket's retainer 60. All these members are held together by vent 52 and its threaded stem 50 and the collar 48.

In the apparatus of the present invention, the hinge arm 42 may be pivotally raised and lowered to raise and lower the fill cover 54 and the associated gaskets so that when in a raised position the area 38 is open to the atmosphere. Consequently, access to the container may be gained through opening 38, or if a larger opening is required, nut 32 may be loosened so as to expand the accessible area by loosening the clamping ring 20 to break the seal of gasket 22. In this manner the cover plate 18 may be entirely removed to increase the area of access to the interior of the container.

When the hinge arm 42 is pivotally lowered so as to extend across the opening 38 and, hence, cause fill cover 54 to cover the opening 38, a predetermined pressure is applied so as to dish fill cover 54 in a manner to seal the opening 38 (gasket 58 is compressed between flange 40 and fill cover 54). A predetermined pressure within the container will spring fill cover 54 and vent the interior of the container between the fill cover 54 and opening 38.

Positioned on the other side of the opening 38 of the manhole cover 18 are opposing lugs 66 corresponding to lugs 44. These lugs 66 pivotally support a latch 68 on a pin 73 in a similar manner that hinge arm 42 is pivotally attached to the lugs 44. Latch 68 is provided with an opening 70 that is disposed to receive the end (tongue 71) of the hinge arm 42. Hinge arm 42 and latch 68 have cooperating shoulders (not shown) which snap into retaining abutment to maintain peripheral edge contact between the fill cover 54 and flange 40 of cover plate 18.

Hence, by pivotally upwardly retracting latch 68, hinge arm 42 is released and may be pivotally moved to project fill cover 54 and its associated gaskets upwardly.

Openings 72 in the tongue 71 of the hinge arm 42 are provided as means to seal or limit the amount of upward motion or pivotal motion of the hinge arm 42. Tabs 74 are provided on ring clips 28 for sealing clamping ring 20.

Fusible ring 64 is, of course, formed of a low melting metal alloy designed to melt at a predetermined low temperature. Such alloy may be formed of a tin base composition designed to melt at temperatures as low as 200° F. However, the exact composition and melting temperature is optional.

It may be seen that under emergency conditions, wherein the container is engulfed in flames, it is not necessary that reliance be placed on predetermined pressures within the container for venting by pushing outwardly fill cover 54 since fusible ring 64 will melt and the fill cover 54 along with gaskets 62 and 58 and gasket retainer 60 will be free to move upwardly on the instance of practically any pressure at all within the tank so as to assume the position shown in dotted outline in FIGURES 2 and 3 at 54a, 58a, 60a and 62a.

In the embodiment of FIGURE 3 the hinge arm 42 is shown to be embossed to provide passageways for the escape of vapors from vent 52 through collar 48 and between collar 48 and the arm 42.

It should be noted that by means of the present construction, a fusible element consisting of a fusible ring 64 is so positioned that it does not come into direct contact with the liquid if overturned within the container. Hence, there is no cooling effect and should the container become engulfed in flames, no pressure will build up within the tank since the fusible ring 64 will release fill cover 54 and any hazardous explosive potential is substantially erased.

The three-way vent 52 along with its stem 50 is not described in detail in the present specification since such vent is identical in construction to that identified as vent housing 17 of United States Patent 2,783,913.

Although the embodiments set forth in the present description are preferred, it is obvious that my invention is not limited to the exact construction set forth. For example, other vents than vent 52 (described in Patent 2,783,913) may be employed and it is not required that a venting arrangement such as vent 52 and its stem 50 be used as the retaining member to hold fill cover 54 and its associated gaskets to hinge arm 42.

I claim:

1. A manhole cover for liquid containers comprising:
 - (a) a cylindrically shaped ring;
 - (b) a first cover consisting of a flat circular member formed with a central opening and on one open end of said cylindrically shaped ring;
 - (c) means for sealing said first cover to one open end of said ring;
 - (d) a locking arm pivotally attached to said first cover and disposed for pivotal movement to project over the central opening of said first cover means;
 - (e) a flexible fill cover attached to said locking arm and disposed to cover and seal said central opening of said first cover means when said locking arm is projected over said central opening, said flexible fill cover being further disposed to spring upwardly and vent said container upon a predetermined maximum pressure occurring within said container;
 - (f) means for maintaining said locking arm as projected over said central opening of said first cover; and
 - (g) fusible means positioned between said locking arm and said flexible fill cover, said fusible means being disposed to melt at a predetermined temperature to release said fill cover for limited upward movement so as to freely vent said container.

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2. A manhole cover according to claim 1 being additionally provided with venting means in said fill cover disposed to bleed off vapors normally arising from the surface of combustible liquids.

3. A manhole cover according to claim 2 wherein said venting means is formed with a threaded projection that is projected through an opening in said fill cover and is threadably engaged with said locking arm so as to fasten said fill cover to said locking arm.

4. A manhole cover according to claim 3 wherein said fusible means consists of a metal ring made from a fusible metal projected over said threaded projection of said venting means and positioned between said fill cover and said locking arm so that when said ring melts said fill cover is free to move upwardly on said threaded projection.

5. A manhole cover according to claim 1 wherein said

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cylindrically shaped ring is inserted into an opening in a container and is attached to said container so as to communicate with the interior of said container.

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