Sept. 5, 1967 J. H. DE FREES 3,339,791

EMERGENCY VENTING MANHOLE COVER

Filed Oct. 22, 1965

Fig. 2

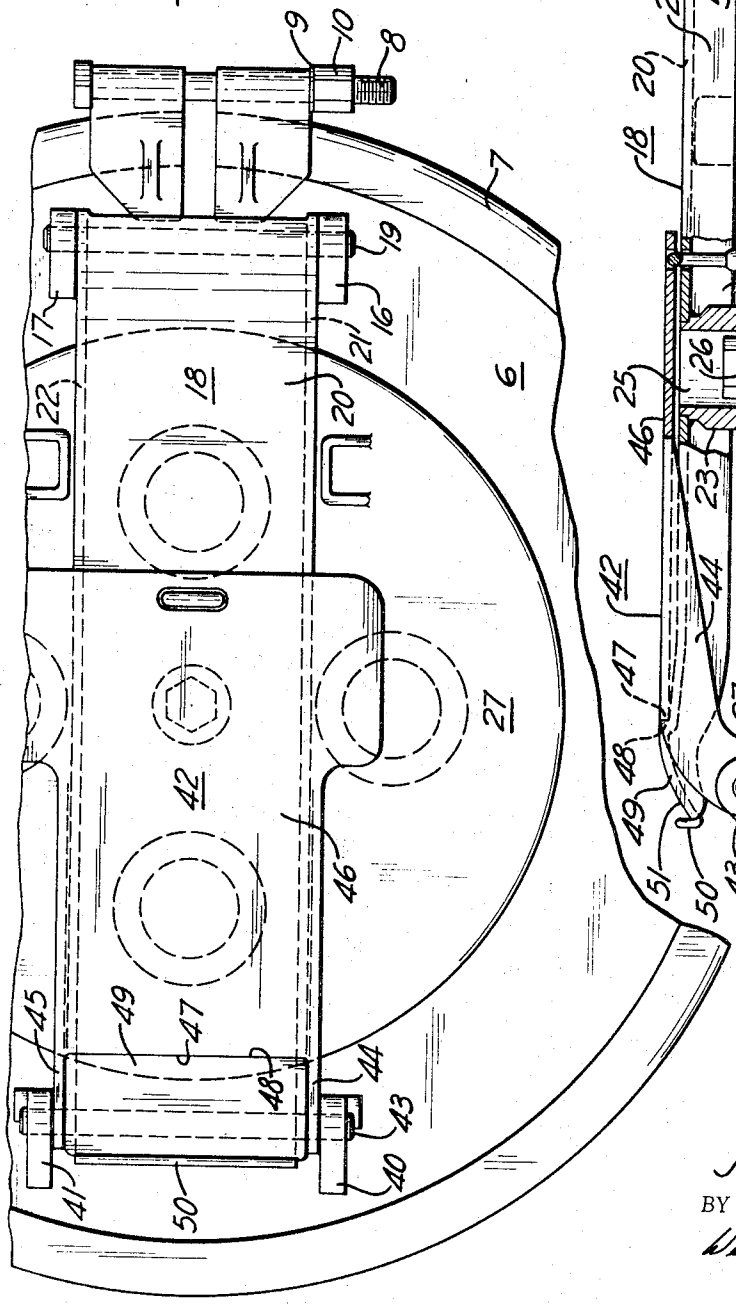
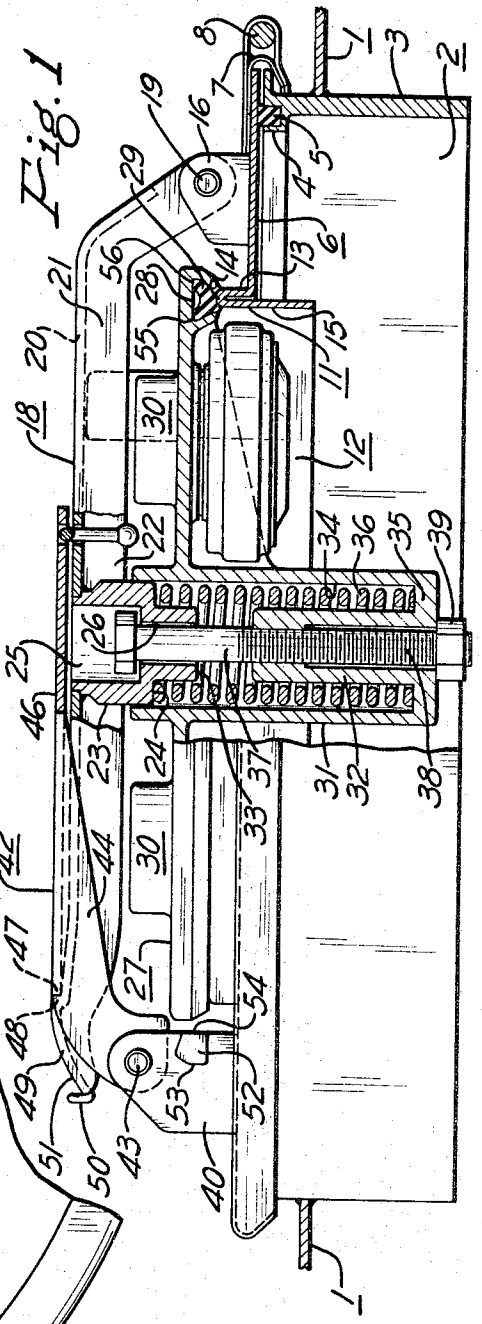


Fig. 1



INVENTOR.
JOSEPH H. DE FREES
BY
Webb, Gordon, Robinson & Webb
ATTORNEYS.

United States Patent Office 3,339,791
Patented Sept. 5, 1967

3,339,791

EMERGENCY VENTING MANHOLE COVER

Joseph H. De Frees, 414 Liberty St.,
Warren, Pa. 16365

Filed Oct. 22, 1965, Ser. No. 501,306
3 Claims. (Cl. 220—57)

This invention relates to a manhole cover for tanks, containers, storage vessels and the like which hold gasoline and other products, especially flammable liquids. In many instances, these tanks or containers are mounted upon a vehicle which is towed or travels over highways and railroad tracks.

In storage and transportation of volatile and combustible liquids, such as gasoline, the tanks and storage vessels for these liquids conventionally have manhole covers for filling and access to their interior in regard to cleaning, inspection and repair of same. It is essential to provide such containers and tanks with at least one vent which permits escape of vapors and fumes from the liquid. In many instances, these vapors and fumes continuously rise from the liquid and require venting. Failure to vent not only generates a dangerous pressure build-up within the container but also an explosive condition.

In addition to the vents, government regulations require emergency venting to handle rapid, excessive pressure build-up within the tank such as occurs from a fire and which can not be handled by the normal vents. This rapid, excessive pressure build-up is more dangerous than fire for an explosion or a rupture in the tank may result accompanied by spreading of fire in the form of a flaming liquid.

Heretofore, a substantial part of emergency venting depended upon a fusible plug or disc which melted when its temperature reached a given amount to effect the emergency venting. However, such a fusible plug has several disadvantages including dependency upon a given elevated temperature for operation. There are situations wherein rapid, excessive pressure build-up within the tank due to a fire will not generate the required elevated temperature in proximity to or at the fusible plug because of location of the fire relative to the plug. In other situations, where the tank may have fallen on its side or be upside down, the liquid therein will cover the area surrounding the fusible plug to varying depths and retard or prevent melting of the fusible plug. In such cases, the plug will not operate or its proper operation will be impaired so that emergency venting is either not effected or is retarded with dangerous consequences.

Another disadvantage of the fusible plug is replacement of same once it has melted so that repeated operation of such plug in regard to emergency venting is not possible. In this respect, substantial spillage of the liquid from the tank can occur after an emergency is over and the fusible plug has operated.

My invention provides a manhole cover having an emergency venting feature for a tank which is not dependent upon temperature for operation but upon pressure within the tank. Also, once the excessive pressure within the tank has been dissipated, the cover closes and effects a seal with the tank. More specifically, the invention relates to a manhole cover for a liquid container and comprises a seat which defines and extends completely around an opening into the container. A cover closes the opening and is positioned to move into and out of engagement with the seat. A lock arm has a pivot mounting upon the container adjacent the seat and is disposed to extend over the opening and the cover and is spaced apart from this cover. This lock arm includes a first spring mounting which extends towards the cover, and the cover includes a second spring mounting substantially in alignment with and spaced apart from the first spring mounting. Disposed between the two spring mountings is a spring.

Adjustable means extends between the two spring mountings, is connected to them and is adapted to place a predetermined load upon the spring so that the cover has a limited movement on and off the seat independently of movement of the lock arm when pressure within the container exceeds a given amount. This adjustable means also effects an attachment of the cover to the lock arm.

Movable into engagement with the lock arm is a latch for maintaining the arm extended across the opening to position the cover opposite the seat.

In a modification of my invention there is an upstanding lip adjacent the end of the lock arm opposite its pivot mounting. This lip is positioned to engage the latch when the cover has raised off the seat due to pressure within the cotnainer and the latch has been disengaged from the lock arm. This upstanding lip provides a safety feature for the cover.

In the accompanying drawings I have shown a preferred embodiment of my invention in which

FIGURE 1 is a side elevation view, partially in section of the manhole cover; and

FIGURE 2 is a fragmentary plan view of the manhole cover of FIGURE 1.

Referring to FIGURES 1 and 2, a tank shell **1** has an opening **2** therethrough and an annular, vertically disposed collar **3** welded to that part of the shell which defines the opening. The upper portion of the collar includes an interiorly located channel **4** which supports a gasket **5** therein. Positioned upon the gasket is a circular coverplate **6** which extends radially inwardly from the collar **3** and is attached to it to form a fluid-tight seal by a circular channel clamp **7** in combination with a bolt **8**, washer **9** and nut **10**, which engage the ends of the clamp. The coverplate has an upstanding circular seat **11** on its end opposite the channel clamp **7** which seat defines an aperture **12** into the tank. This seat is formed by an upwardly extending part **13** integral with the coverplate, a rounded top part **14** connected to the upwardly extending part and a depending flange **15** joined to the top part at substantially a right angle. The combination of the upwardly extending part **13**, the rounded top **14** and the depending flange **15** impart substantial strength to the seat.

Mounted upon the coverplate is a pair of vertical lugs **16** and **17** which support a lock arm **18** upon a pivot pin **19** carried by the lugs. This lock arm, in the position shown in FIGURE 1, extends horizontally across the aperture **12** and is swingable about the pivot pin **19** to a vertical position whereat it does not project over the aperture. The arm includes a flat top member **20** from whose lateral edges depend side members **21** and **22**.

Affixed to the lock arm **18** is a depending sleeve **23** which includes a circular exterior shoulder **24** which forms a spring seat at its lower portion. This sleeve has a well **25** in its upper portion with an opening opposite the lock arm and an inner central bore **26** extending through its lower part.

Positioned upon the upstanding seat **11** is a circular cover **27** with an annular peripheral groove **28** on its underside for housing a dovetailed gasket **29** which engages the seat **11** to form a seal therewith. This cover completely encloses the aperture.

As shown in FIGURES 1 and 2, the cover mounts conventional vents **30** which permit escape of vapors which may continuously rise from the liquid within the container but which cannot handle an emergency venting. These vents are arranged on the cover **11** so that they lie beneath the lock arm **18** and between the planes of its side members **21** and **22**.

The cover **27** has a centrally located, depending receptacle **31** which is open at the top and is in alignment with the sleeve **23** of the lock arm **18** so that a portion of the sleeve extends down inside an upper part of the receptacle. In the lower end of the receptacle is a vertical post **32** spaced apart from the bottom end **33** of the sleeve **23** and from the interior receptacle walls **34** to form with a bottom closure plate **35** a second spring seat.

Located between the first and second spring seat is a low-rate spring **36** which is subjected to a preload by a bolt **37** which extends through the bore **26** of the sleeve into engagement with threads **38** of the post **32** and through the bottom end of the plate **35** to a nut **39**. By turning the bolt in engagement with the threads **38** of the post, the cover **27** is advanced towards the lock arm **18** and the spring is preloaded a given amount. Then, the cover is forced down upon the seat **11** by the cam action of latch **44** and further compresses spring **36**.

On a diametrically opposite side of the coverplate from the lugs **16** and **17** is a second pair of lugs **40** and **41** which support a latch **42** upon a hinge pin **43**. This latch is in alignment with the lock arm **18** when both are horizontally disposed with the latch extended over the lock arm and towards the lugs **16** and **17**. In such position the latch covers the opening into the well **25** thereby preventing entry of water and foreign material into same.

The latch has two side plates **44** and **45** which engage the hinge pin **43** and which extend to and are connected to a flat upper horizontal blade **46** which is wider than the lock arm **18** and whose end **47**, adjacent the hinge pin **43**, engages a vertical shoulder **48** of the top member **20** near its outer end when the lock arm projects horizontally across the cover **27** and the aperture **12**. Engagement of the end of the blade with the shoulder maintains the lock arm in position across the aperture with the cover opposite the seat **11**.

When raising the cover from its seat **11** the latch **42** is first swung upwardly to disengage the end **47** from the shoulder **48**. Then, the lock arm is swung upwardly carrying the cover with it for access to the interior of the tank.

Extending towards the outer end of the lock arm from the shoulder **48** is a downwardly running, arcuate tongue **49** which terminates in a vertical lip **50**. Thus, when the latch is swung upwardly to release top member **20** cover pressure, if present, within the tank urges the cover and the lock arm upwardly, the end **47** of the latch rides the upper surface **51** of the tongue to the vertical lip **50** and further movement of the latch and the lock arm and cover is arrested. Then, when the pressure within the tank has dissipated, the cover and lock arm lower and the latch may be swung over the lip. Accordingly, the vertical lip prevents unrestrained, sudden opening of the cover such as may injure a workman.

The lug **40** includes a stop **52** whose one end **53** engages the latch to limit its counterclockwise movement. The opposite end **54** of the stop likewise engages the latch to restrain clockwise travel and protect the seat from impact by the latch.

The dovetailed gasket **29** has its two spaced apart ears **55** and **56** which effect an excellent seal when inserted in groove **28**. This gasket design reduces the pressures usually required for sealing which in turn results in a larger venting capacity. This dovetailed gasket **29** remains in place without other attachment.

In some instances, government regulations require that emergency venting be effected when the pressure within the tank reaches 3–5 pounds per square inch. Thus, the low-rate spring is preloaded an amount such that the cover is urged upon the seat with a force which is overcome and an emergency venting commences when internal tank pressure rises above 3 p.s.i. and such venting is achieved before the pressure exceeds 5 p.s.i.

FIGURE 1 shows that the vents **30** are spaced from the underside of the top member **20**, and the top of the cover **27** is spaced from the underside of the depending flanges of the lock arm a given and the same amount. In the particular cover of FIGURE 1, the spacing is ¾" whereby the cover may rise no more than ¾" off its seat for the emergency venting. Such movement of the cover is independent of any travel of the lock arm. When pressure within the tank is exhausted, the cover falls back urged by spring **36** onto the seat and effects a seal therewith, and opening and closing of the cover can take place repeatedly without replacement of a part or any adjustment of a component of the manhole cover.

My invention has important advantages which include ability to effect emergency venting of the tank within internal tank pressure limits prescribed by governmental regulations. Also, emergency venting is not dependent upon temperature for operation and the opening and closing of the cover for this emergency venting is effected repeatedly.

While I have shown and described a preferred embodiment of my invention, it may be otherwise embodied within the scope of the appended claims.

I claim:

1. A manhole cover for a liquid container comprising

(a) a seat which defines and extends completely around an opening into said container,

(b) a cover which closes said opening and is positioned to move into and out of engagement with said seat,

(c) a lock arm with a pivot mounting upon said container adjacent said seat and disposed to extend over said opening and said cover and being spaced apart from said cover,

(d) said lock arm including a first spring mounting which extends towards said cover,

(e) said cover including a second spring mounting substantially in alignment with and spaced apart from said first spring seat,

(f) spring means disposed upon said two spring mountings,

(g) adjustable means extending between said two spring mountings, being connected to each and adapted to place a predetermined load upon said spring so that said cover has limited movement on and off said seat independently of movement of said lock arm when pressure in said container exceeds a given amount, said adjustable means effecting an attachment of said cover to said lock arm,

(h) latch means movable into engagement with said lock arm for maintaining same extended across said opening to position said cover opposite said seat.

2. The cover of claim **1** wherein said lock arm includes an upstanding lip adjacent that end opposite said pivot mounting and positioned to engage said latch means when said cover has raised off said seat due to pressure within said container and said latch means has been disengaged from said lock arm.

3. The cover of claim **1** wherein said cover includes a dovetailed gasket positioned for engagement with said seat.

References Cited

UNITED STATES PATENTS

2,529,329	11/1950	De Frees	220—44
3,179,285	4/1965	De Frees	220—89
3,292,814	12/1966	Krone	220—57

THERON E. CONDON, *Primary Examiner.*

G. T. HALL, *Assistant Examiner.*