Jan. 17, 1933. V. WILLOUGHBY 1,894,652

CAR TANK CLOSURE

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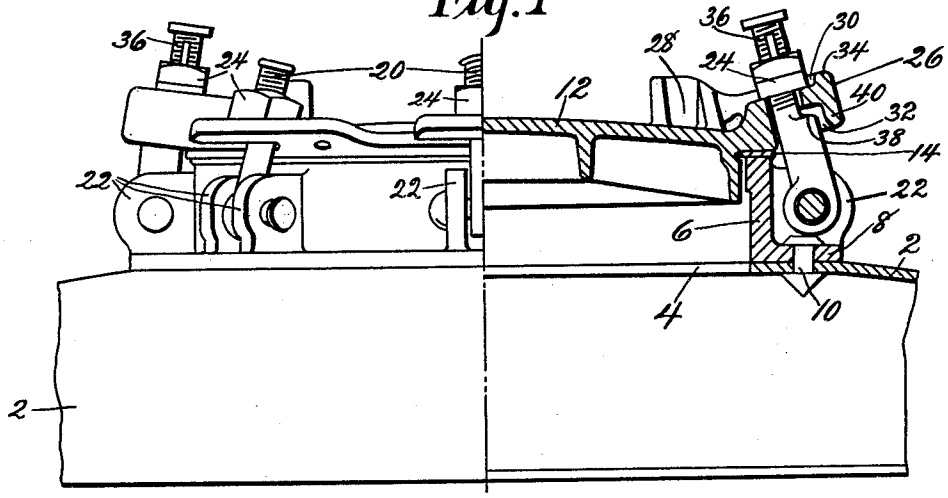
Fig. 1



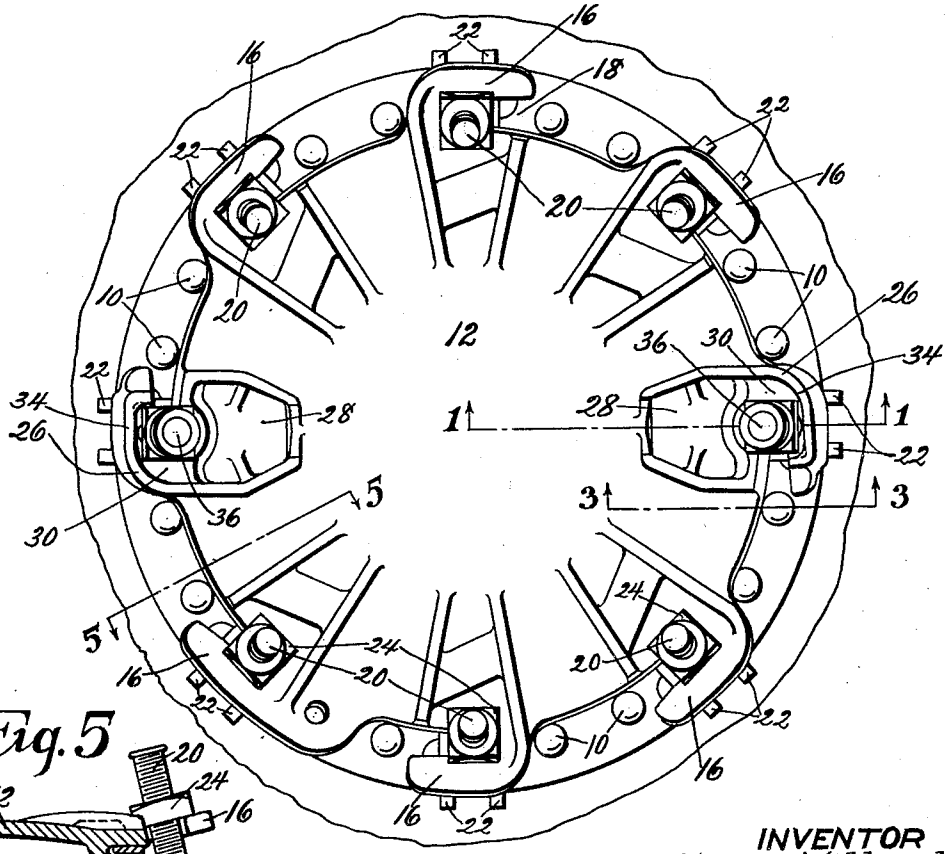


Fig. 5

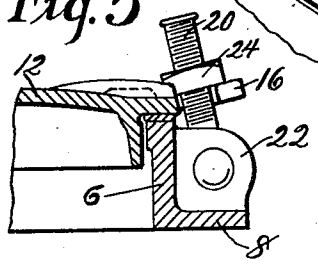


Fig. 2

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Fig. 3

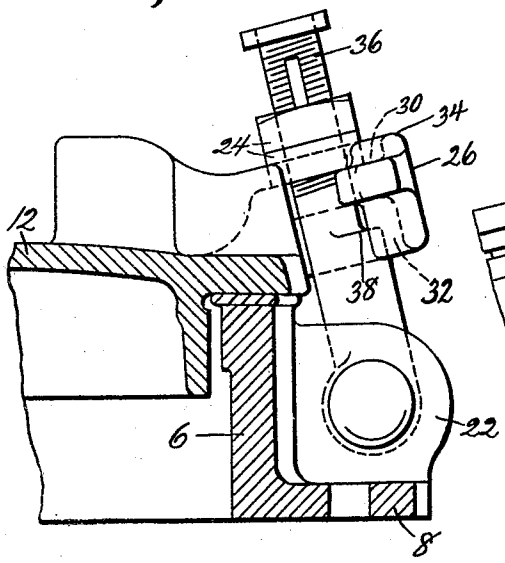
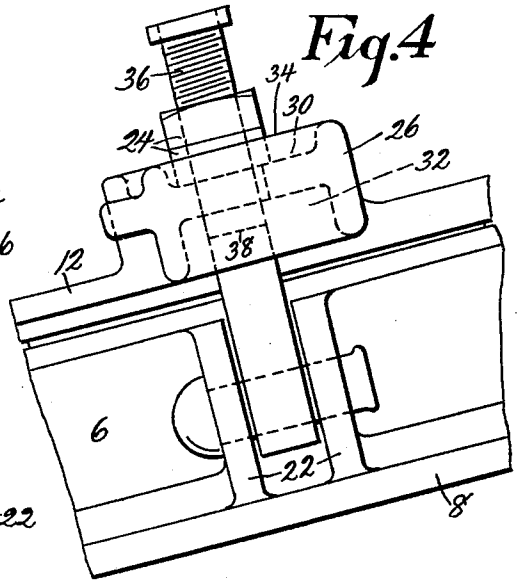


Fig. 4



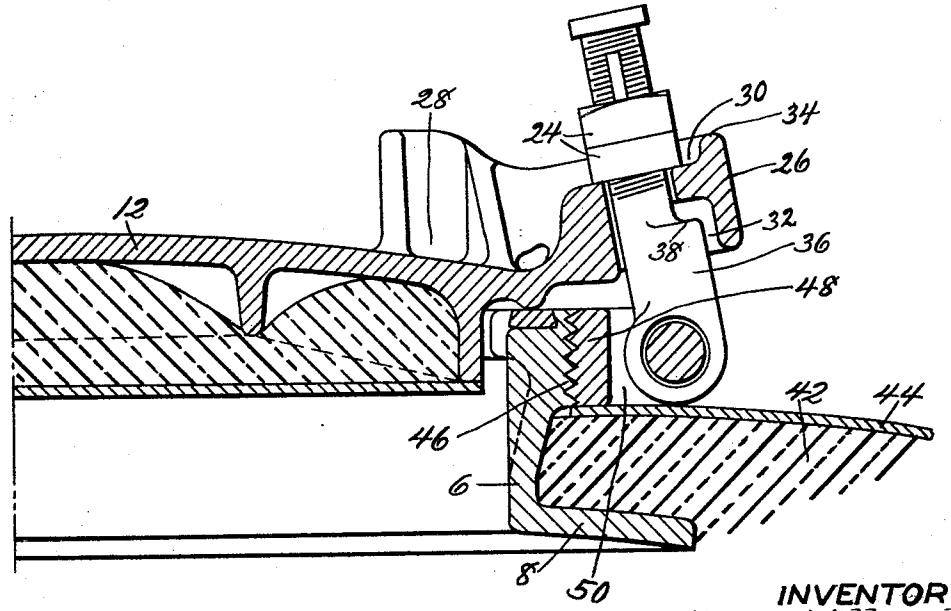


Fig. 6

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1,894,652

UNITED STATES PATENT OFFICE

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CAR TANK CLOSURE

Application filed June 11, 1931. Serial No. 543,591.

This invention relates generally to closure means for openings in tanks, containers or other receptacles and has particular reference to a new and improved closure for the domes of car tanks, and fastening means therefor.

As is well-known in the art, volatile liquids are frequently transported in car tanks, said liquids partially vaporizing in the tanks and creating excessive pressure therein. Various means have been employed for venting this pressure before the dome cover can be entirely removed whereby to avoid danger of the cover blowing off and to eliminate injury to workmen. For the greater part, these prior arrangements have been satisfactory, but have necessitated dome rings of special construction for cooperation with a special type of dome cover.

The present invention contemplates the provision of a new and improved dome cover adapted to serve as a replacement unit for covers now in use and which is adapted to cooperate with the usual and conventional dome ring, but which is so constructed that the dome cover is restrained against shifting on the dome ring and cannot be removed from the dome ring until excessive pressure within the tank has been reduced. It is not to be understood that the invention is limited to a replacement unit as obviously the construction shown and described herein may be used as original equipment.

Another object of this invention is the provision of a new and improved locking arrangement between the dome cover and dome ring which necessitates the manual lifting of the dome cover to a predetermined position in order to free the same from its securing means.

Still another object of this invention is the provision of a dome cover adapted to be rotated to be secured in position, and adapted to be rotated after it has been manually lifted to a predetermined position to be freed from its fastening means.

A further object of this invention is the provision of locking elements for the dome cover which are so arranged that excessive internal pressure in the tank will lift the dome cover to permit venting of gas from the tank, but which lifting will prevent rotation of the cover from its fastening means.

A still further object of this invention is the provision of a tank dome and dome cover therefor which is rotatable into and out of secured position, such rotation being permissible only when the cover is in a predetermined elevated position relative to the supporting or dome ring.

Other objects and advantages of this invention will be apparent from the following description taken in conjunction with the accompanying drawings in which:

Figure 1 is a partial side elevation of the dome cover applied to a dome ring, the view also showing a portion of the tank dome and said view also including a section taken on the line 1—1, Fig. 2.

Fig. 2 is a top plan view of the device of the present invention.

Fig. 3 is a sectional view on the line 3—3, Fig. 2.

Fig. 4 is a front elevation of the part of the invention illustrated in Fig. 3.

Fig. 5 is a sectional view on the line 5—5, Fig. 2, and

Fig. 6 is a sectional view showing the present invention applied to an insulated tank.

The present invention contemplates more particularly the variation and simplification of the invention shown, described and claimed in my prior Patent, No. 1,579,270, of April 6, 1926, which patent necessitated a special type of dome ring and included a direct cooperation between the dome cover and parts of the dome ring, this in contradistinction to the arrangement shown by the instant

invention in which the conventional dome ring is employed.

In the drawings, the invention is shown applied to a car tank dome having a dome head 2 provided with the usual manhole opening 4 which is surrounded by a dome ring 6, flanged as at 8, and secured to the dome head 2 by suitable fasteners such as the rivets 10.

The dome ring 6 provides a seat for a dome cover 12 which rests upon a suitable gasket 14 carried by the upper edge of the dome ring and said dome cover is provided with a plurality of radial projections 16 which are slightly inclined upwardly as shown in Fig. 5 and are provided with circumferentially arranged slots 18 to receive bolts 20 pivotally secured in ears 22 formed with the dome ring. The bolts 20 carry securing nuts 24 for engaging the projections 16 to secure the dome cover against displacement relative to the dome ring. As clearly shown in Fig. 2, while the projections 16 extend radially from the cover, they are, in effect, hook-like in shape and they necessitate partial rotation of the cover to engage or to be disengaged from the bolts 20.

Theoretically, the nuts 24 and the bolts 20 may be considered adequate securing means for the dome cover, but in actual practice, due to vibrations of the tank when in service, it is possible that the dome cover 12 may partially rotate on the dome ring 6, even to a point such that excessive gas pressure within the tank will serve to blow the cover from its supporting ring. Especially is this so should workmen not be particularly careful in securing the nuts 24 tightly against the projections 16. The present invention eliminates any possibility of accidental rotation of the cover on the dome ring, as hereinafter more particularly pointed out.

The dome ring is conventional in the art and in order that such conventional dome rings may be employed, the dome cover is provided with means which are adapted to cooperate with means carried by the dome ring for restraining the cover against rotation when it is seated on the dome ring and also when it has been lifted as the result of gas pressure within the tank, and now, referring to Fig. 2, at diametrically opposite points on the dome cover special type projections or supplemental retaining means are provided as indicated generally at 26, said retaining means comprising radial projections having upright portions 28 at their rear ends and having their forward ends provided with socketed upper and lower surfaces as shown at 30 and 32, respectively; the projections 26 also having circumferential slots formed therein and the upper socketed face 30 being defined by an upwardly extending rib 34 which continues rearwardly, as shown in Fig. 2, to define the upright portion 28. As clearly shown in Figs. 1, 3 and 4, the nuts 24 carried by the bolts 36, when in cover securing position, prevent rotation of the cover 12.

The bolts 36 which engage the slots in the projections 26 are of a special type and the shanks thereof are provided with shoulders 38 which engage within the sockets 32 formed in the under-surfaces on the projections 26, the sockets 32 being defined by downwardly extending ribs 40.

In the operation of the invention shown in the drawings, with the bolts all secured tightly against the dome cover projections, in order to remove the cover it is first necessary to release the nuts on said bolts, backing the same on the bolts, until they are freed from engagement with the projections. Should there be excessive pressure in the tank, the cover will be lifted due to such pressure and obviously cannot be rotated because of the engagement of the nuts 24 in the socketed upper surfaces 30 of the projections or supplemental retaining means 26. After the excess gas has been vented the cover will be seated on the dome ring and to remove the cover from the dome ring it is manually lifted to a predetermined position such that upon rotation thereof the shoulders 38 will not interfere with the downwardly extending ribs 40 of the projections 26 and the elevation of the cover is at a predetermined position such that the upper ribs 34 will clear the lower ends of the nuts 24. After such partial rotation as before mentioned, the cover without further rotation may be bodily removed from the tank dome. It is obvious that to apply the cover to the dome it must be held in a position elevated with respect to the upper edge of the dome ring to permit rotation and engagement of the bolts in the slots formed in the several projections on the cover. Should the dome cover and the dome ring be sealed or stuck, so that actuation thereof is difficult, the cover 12 may be partially actuated by using a suitable tool engaged against portions 28 of the supplemental retaining means; the tool acting as a wrench.

In the construction shown in Fig. 6, the present invention is shown as applied to an insulated tank; the figure disclosing insulation 42 at the dome head, covered by a sheathing 44, while the dome ring is provided with an external threaded portion 46 which receives an annulus 48 provided with a plurality of pairs of ears 50 which carry the securing bolts.

It is obvious from the above description that the invention shown herein may be easily and quickly applied to car tanks now in general use, as it requires no modification or rebuilding of the dome ring; the invention being effected as far as car tanks in present-day use are concerned by substituting for two

of the usual bolts, two special bolts such as shown at 36 in the drawings, these special bolts being adapted to cooperate with a special type dome cover such as shown and described herein.

The drawings disclose one embodiment of the invention, but it is to be understood that they are for illustrative purposes only and various changes in the form and proportions of the construction illustrated may be made within the scope of the appended claims without departing from the spirit of the invention.

What is claimed is:

1. A tank having an opening, a cover therefor adapted to have partial rotation about the axis of said opening preparatory to removal of the cover, bolts carried by the tanks, ears carried by said cover and through which said bolts project, said bolts and ears having provision whereby said cover must be in a partially open position prior to partial rotation of the cover.

2. A tank having an opening and a cover therefor, bolts carried by said tank, said bolts having offset and enlarged portions, and ears carried by said cover, the offset portion of the bolts extending through said ears and each of said ears having a flange adapted to engage the enlarged portion of said bolt to prevent rotation of said cover.

3. A tank having an opening, a cover therefor adapted to have partial rotation preparatory to removal thereof, bolts carried by said tank, nuts carried by said bolts, said bolts having reduced and enlarged portions, and ears carried by said cover through which said bolts extend, said ears each having upper and lower flanges, said flanges being respectively so arranged that one thereof is adapted to engage the enlarged portion of the bolt and the other is adapted to engage the bolt nut.

4. A tank having an opening, a cover therefor adapted to be partially rotated preparatory to removal thereof, bolts pivotally carried by said tank for movement outwardly from said opening, ears carried by said cover, said ears and bolts having provision whereby said cover must be in a partially raised position in order to permit partial rotation thereof and outward movement of the bolts away from the cover in order to release the same.

5. A tank dome closure comprising a dome ring, a dome cover to seat on said ring, pivoted securing bolts carried by the ring and adapted to be engaged with said cover upon partial rotation of the latter, and restraining means on said cover for cooperation with said bolts for restraining the cover against rotation on the ring and being so formed as to permit rotation of the cover only when the latter is raised to a predetermined position.

6. In a closure construction for tanks, a ring having peripherally spaced flap bolts, a cover having arcuate slots to receive said bolts upon relative rotation of the ring and cover, and means at the place of association between the bolts and the cover preventing relative rotation of the ring and cover except when the cover is partly withdrawn axially from the ring.

7. In a closure construction for tanks, a ring having a bolt, a removable closure member having a hook adapted upon relative rotation of the closure member and the ring to receive the bolt, and cooperating means on the cover and bolt requiring a spacing of the closure member axially from the ring to permit relative rotation of the closure member and the ring.

8. In a closure construction for tanks, a dome ring having circumferentially spaced flap-bolts with nuts, a closure member with slots arranged to receive said bolts as the closure member is rotated, and means at the connection between the closure member and the bolts and nuts having provision for preventing rotation of the closure member until after it has been raised partly from the tank.

9. In combination with a tank dome and dome ring, a cover supported by the dome ring, and fastenings for securing the cover engageable with and disengageable from the cover upon rotation of the latter, said fastenings being so formed and arranged relative to the cover as to cooperate with the latter to restrain said cover against rotation until it has been raised from the dome ring.

10. A dome closure means comprising, in combination, a dome cover, fastening means therefor brought into and out of operative position by rotation of the cover, and means carried by said fastening means adapted to cooperate with the cover to prevent rotation of the cover until the latter is raised from its normal closed position.

11. A tank dome closure means comprising, in combination, a dome cover, fastening elements for said cover brought into operative position by rotation of the cover, and means carried by said fastening elements arranged in the path of rotation of the cover to prevent operative engagement of the fastening elements and cover until the latter is raised to a predetermined position.

12. In combination, a dome ring surrounding an opening, a dome cover to seat on said ring to close the opening, and pivoted fasteners normally holding the cover in seated position engageable with and disengageable from the cover upon rotation of the latter, said fasteners and cover being relatively so formed as to cooperate in a manner such as to necessitate raising of the cover from the dome ring a predetermined amount to permit complete removal of the cover.

13. In combination, a dome ring surrounding an opening, a dome cover to seat on the

ring to close the opening, and pivoted fasteners normally holding the cover in seated position engageable with and disengageable from the cover upon rotation of the latter, said fasteners and cover being relatively so formed as to be interengaged when the cover is in seated position, said interengagement being such as to necessitate raising the cover a predetermined amount from the dome ring to permit complete removal thereof.

In witness whereof I have hereunto set my hand.

VICTOR WILLOUGHBY.