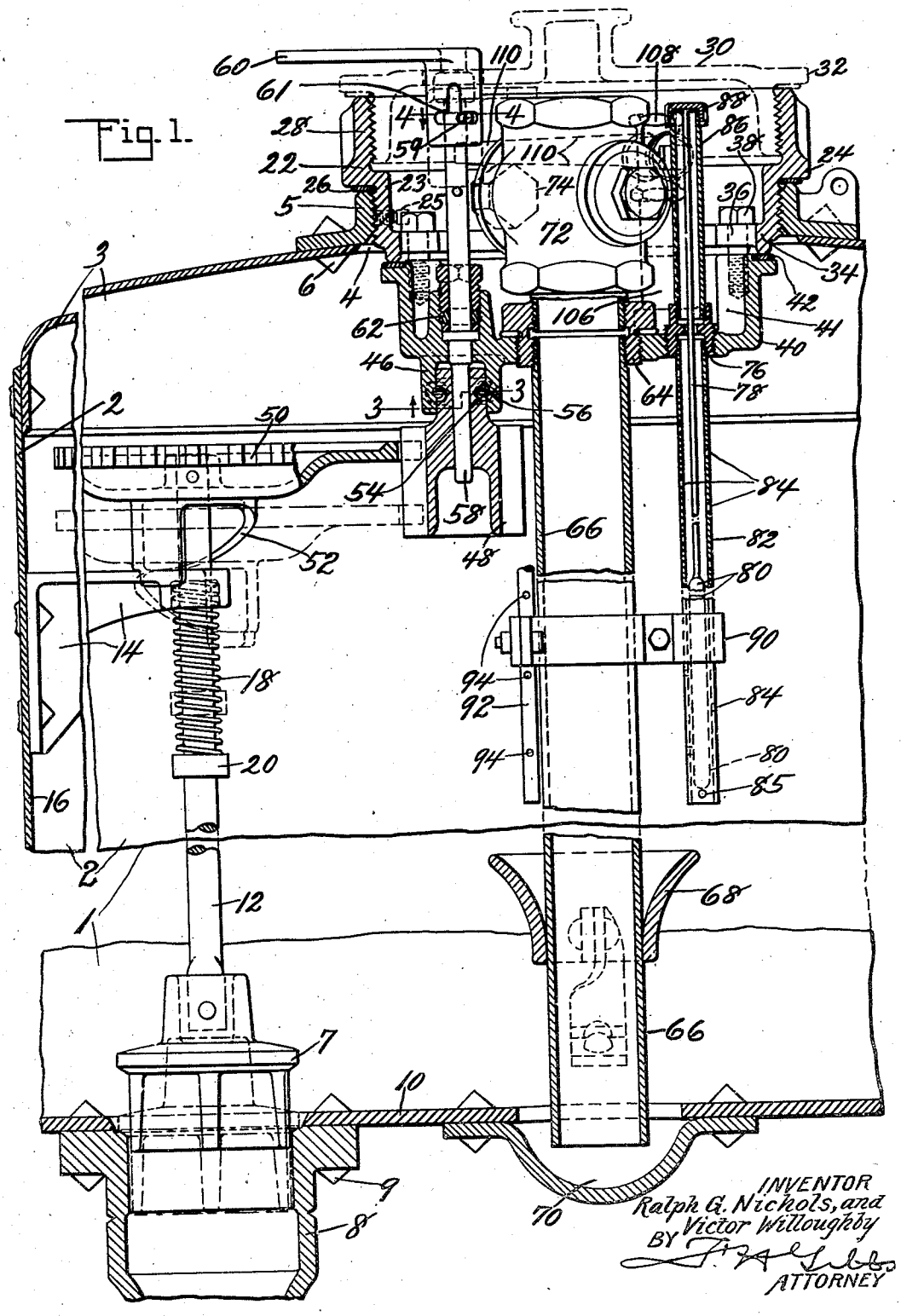
Feb. 25, 1930. R. G. NICHOLS ET AL 1,748,185

TANK DOME CLOSURE

Filed July 31, 1926 4 Sheets-Sheet 1

Fig. 1.




INVENTOR
Ralph G. Nichols, and
Victor Willoughby
BY
ATTORNEY

Feb. 25, 1930. R. G. NICHOLS ET AL 1,748,185

TANK DOME CLOSURE

Filed July 31, 1926 4 Sheets-Sheet 2

Fig. 2.

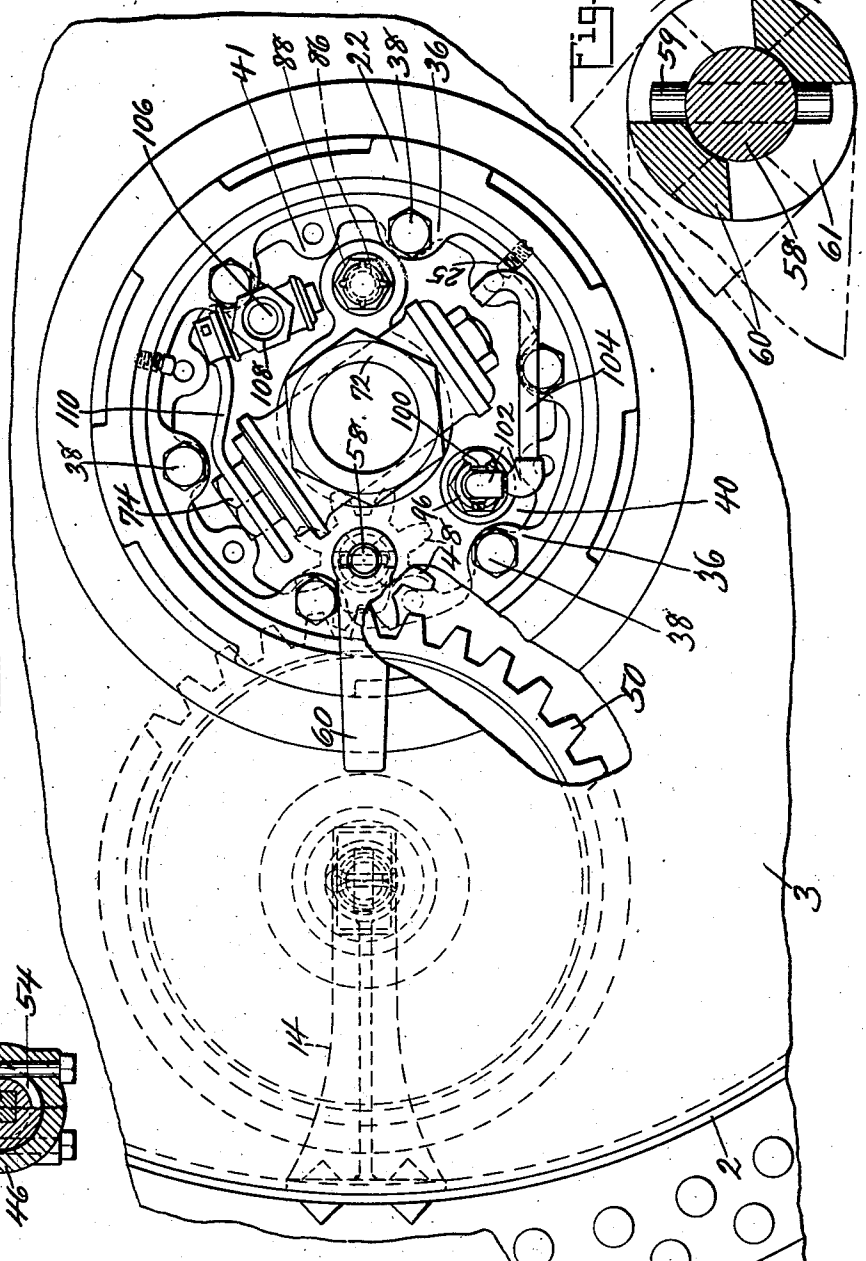



Fig. 4.




Fig. 3.

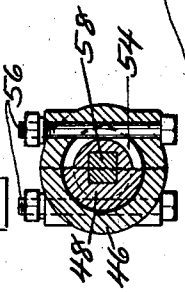
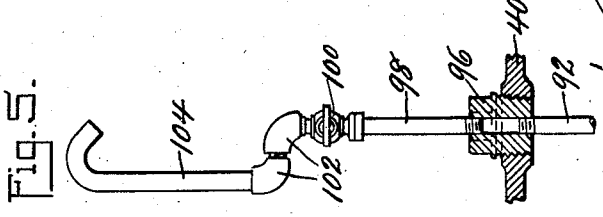



Fig. 5.



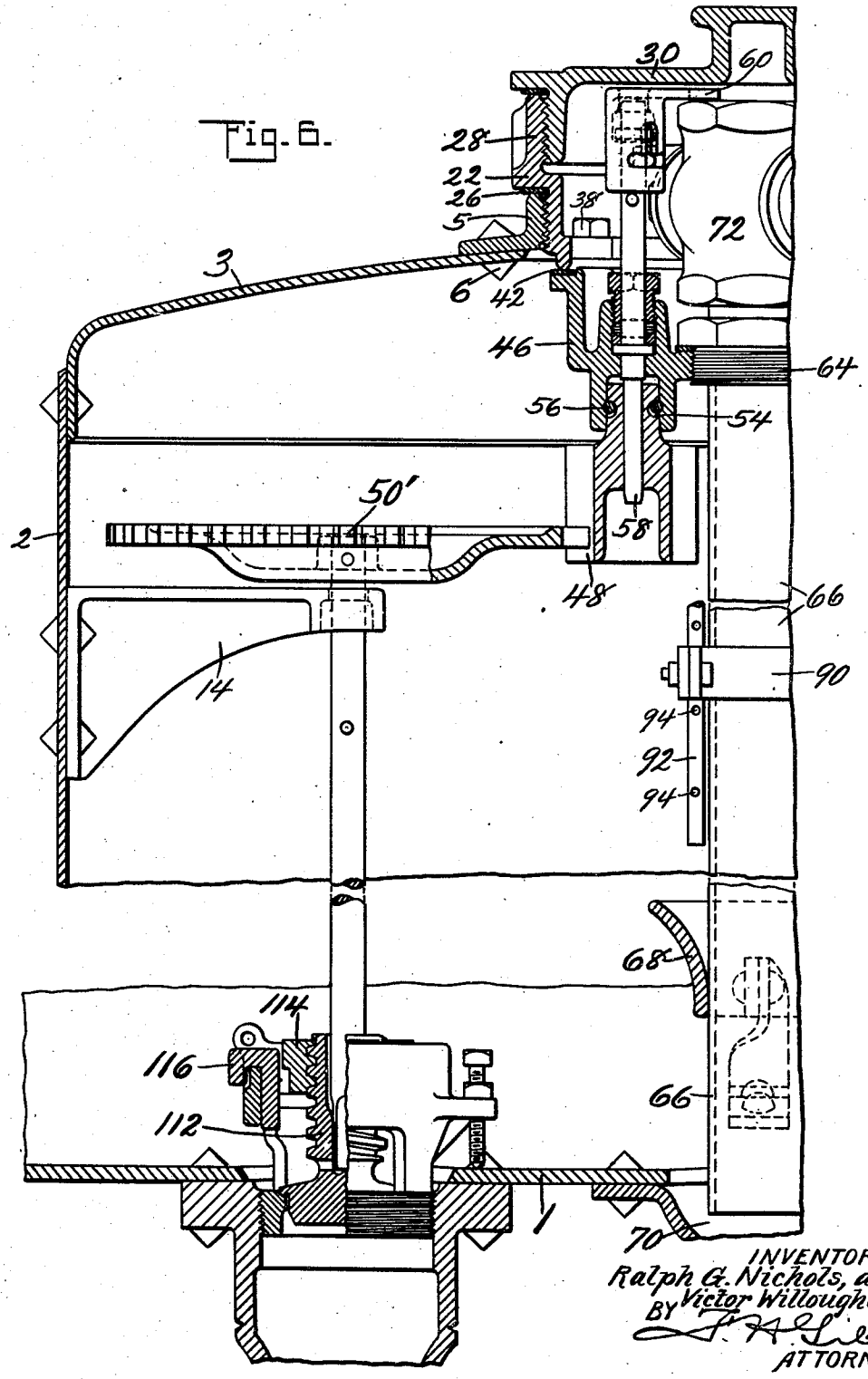

INVENTOR
Ralph G. Nichols, and
Victor Willoughby
BY
ATTORNEY

Feb. 25, 1930. R. G. NICHOLS ET AL 1,748,185

TANK DOME CLOSURE

Filed July 31, 1926 4 Sheets-Sheet 3

Fig. 6.




INVENTOR
Ralph G. Nichols, and
BY Victor Willoughby
ATTORNEY

Feb. 25, 1930. R. G. NICHOLS ET AL 1,748,185

TANK DOME CLOSURE

Filed July 31, 1926 4 Sheets-Sheet 4

Fig. 7.

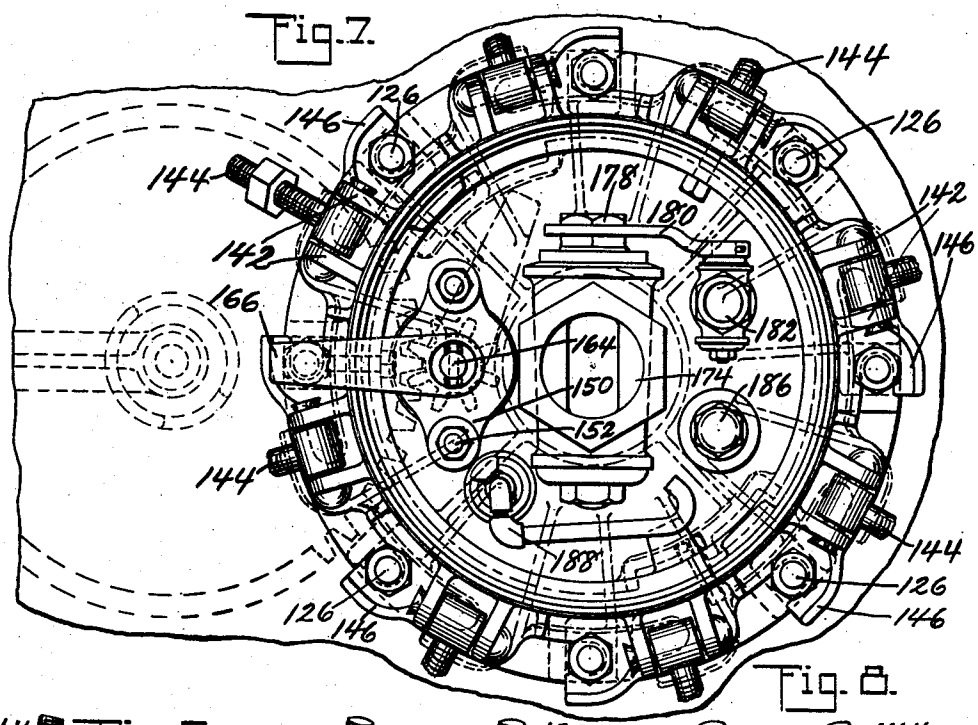



Fig. 8.

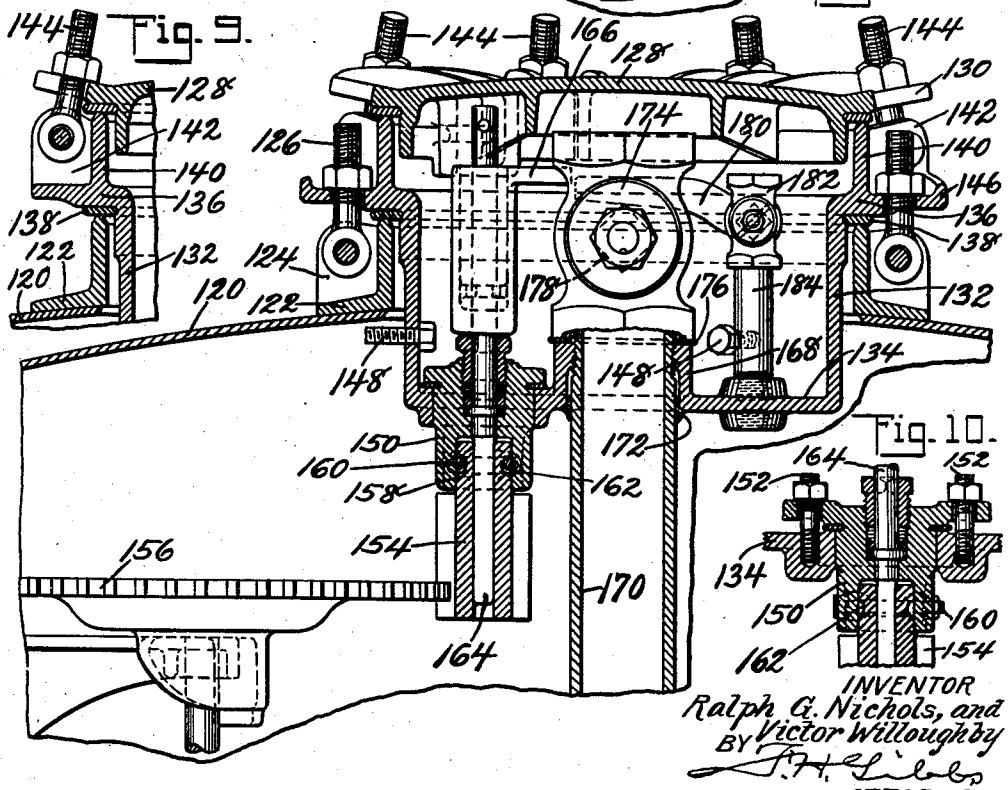



Fig. 9.




Fig. 10.




INVENTOR
Ralph G. Nichols, and
BY Victor Willoughby
ATTORNEY

Patented Feb. 25, 1930 1,748,185

# UNITED STATES PATENT OFFICE

RALPH G. NICHOLS, OF JEFFERSONVILLE, INDIANA, AND VICTOR WILLOUGHBY, OF RIDGEWOOD, NEW JERSEY, ASSIGNORS TO AMERICAN CAR AND FOUNDRY COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY

## TANK-DOME CLOSURE

Application filed July 31, 1926. Serial No. 126,315.

Reference is had to the accompanying drawings which illustrate the preferred form of the invention, though it is to be understood that the invention is not limited to the exact details of construction shown and described, as it is obvious that various modifications thereof within the scope of the claims will occur to persons skilled in the art.

In said drawings:

Fig. 1 is a broken partial vertical central section of a car tank equipped with a dome closing means constructed in accordance with this invention, the cock in the discharging pipe and the bottom discharge valve being shown in elevation and the outer cover being shown in dotted lines.

Fig. 2 is a top plan view of the structure shown in Fig. 1, the outer cover being removed and part of the dome head being broken away to show other parts more clearly.

Figs. 3 and 4 are sections taken on the lines 3—3 and 4—4, respectively, of Fig. 1.

Fig. 5 is a view showing the upper portion of the sampling means and its connection to the inner cover.

Fig. 6 is a partial view similar to Fig. 1 and showing the invention applied to a car tank having a bottom discharge valve of different construction.

Fig. 7 is a top plan view of car tank dome equipped with a dome closing means of modified construction.

Fig. 8 is a partial vertical section of the structure shown in Fig. 7.

Fig. 9 is a fragmentary section showing the manner of securing the outer cover; and

Fig. 10 is a fragmentary vertical section taken at right angles to the section of Fig. 8 and showing the manner of securing the operating mechanism for the bottom discharge valve to the inner cover.

This invention relates to closures for car tank domes and it is an object of this invention to provide an improved closure equipped with top filling and discharging means and with venting, gauging and sampling means which may be applied as an inner dome cover to tank domes of the usual construction without necessitating any changes in the structure of the dome. It is also an object of this invention to provide a dome closure of the type described which is provided with means for operating the usual bottom discharge valve so that the bottom discharge valve is still available for use and may be operated without removing the inner dome and it is also an object of this invention to provide an improved closure of the type described which receives as an outer cover the usual closure of the tank to which it is applied. It is also an object of this invention to provide a closure of the type described which may be applied to the tanks now in use without necessitating extensive changes to the structures of said tanks. A further object of the invention is the provision of a box-like construction for attachment to a tank dome or the like, the construction comprising in effect inner and outer closures for said dome, the inner closure serving as a supporting means for tank fittings such as filling means, gauging means, discharge means, etc., which fittings are normally enclosed by the outer closure.

Another object of the invention is the provision of a box for closing the manhole opening in a tank dome, which box is detachably connected to the usual dome ring whereby to be capable of easy removal therefrom without affecting the dome ring, said box including an adapter for supporting the normal dome cover and also including a bottom plate, or what may be termed an inner closure, which bottom plate or inner closure supports tank fittings. With such a construction, it will be apparent that upon removal of the box from the manhole opening the tank fittings are withdrawn from the door, thereby permitting easy access to the interior of the tank.

In Figs. 1 to 5 inclusive, of the drawings, a tank dome closure constructed in accordance with this invention, is shown in connection with a tank 1 having a dome 2 provided with the usual dome head 3 having the usual man-hole opening 4 surrounded by a flanged dome ring 5 secured to the dome head 3 by rivets 6. The dome ring 5 is threaded to receive the standard screw type dome cover now in use. In Figs. 1 to 5, the tank 1 is shown provided with a common type of bottom discharge valve 7 which engages a seat in a discharge outlet casing 8 which is secured by the rivets 9 to the bottom sheet 10 of the tank. The valve 7 is operated by a valve rod 12 which is guided in a bracket 14 secured to the dome sheet 16 and a compression spring 18 is mounted on the rod 12 between the bracket 14 and a collar 20 fixed upon the rod 12.

Threaded into the dome ring 5 is a box-like construction indicated generally at A and which comprises a flanged dome cover holder or adapter 22 having an annular portion 23 exteriorly threaded to engage with the threads on the dome ring 5 and an outwardly projecting shoulder 24 provided with a packing 26 which engages the upper edge of the dome ring 5 to prevent escape of gases from the tank. Set screws 25 threaded into the annular portion 23 and engaging the dome ring 5 prevent unscrewing of the cover holder 22 from the dome ring. The cover holder 22 is also provided with an upwardly projecting flange 28 which is interiorly threaded, the threads being the same as the threads of the dome ring 5 so that the cover 30 used with the dome ring 5 will fit the flange 28 of the cover holder 22. The cover 30 is provided with an outwardly projecting flange 32 which engages the upper edge of the flange 28 and has a gas tight engagement therewith. The dome cover holder 22 is also provided with an inwardly projecting flange 34 and with inwardly projecting lugs 36 having openings to receive tap bolts 38 which engage in threaded openings in the pan-shaped inner cover 40 and serve to secure the inner cover 40 to the dome cover holder 22, the cover 40 being provided with a packing 42 so as to make a tight joint with the flange 34 of the holder 22.

The cover 40 is provided with inwardly projecting lugs 41 having threaded openings which receive the tap bolts 38 and with a depending journal box 46 in which is journaled a pinion 48 which meshes with a gear 50 fixed on the rod 12, the gear 50 being provided with cam 52 which engages with the bracket 14 when the gear 50 is rotated, the cam 52 serving to lift the valve 7 and open the discharge outlet. The pinion 48 is secured in the journal box 46 by bolts 56 which extend through openings in the journal box 46 and engage in the groove 54 in the pinion. The pinion is also provided with a square central opening into which extends an operating rod 58 which projects through an opening in the cover 40 and provided at its upper end with an operating handle 60 connected by a pin 59 and an inverted T slot 61 to the rod 58 so that the handle may be raised to operate the pinion 48 and valve 7 in either direction or dropped on the rod 58 so as to permit of placing the cover 30 on the flange 28. Leakage past the rod 58 is prevented by a packing 62. The inner cover 40 is also provided with a threaded opening having threaded therein a bushing 64 in which is threaded a filling and discharge pipe 66 which extends to the bottom of the tank, being guided near its lower end by a funnel shape guide bracket 68 and having its lower end projecting into a sump 70. Also secured to the bushing 64 is a cock 72 to which the filling and discharge pipes may be connected, the cock 72 being operated by application of a wrench or other suitable means to the angular end 74 of the valve plug. Also mounted in the cover 40 is a bushing 76 having a small opening therein in which travels a rod 78 having secured to its lower end a float 80 which travels in a pipe 82 threaded in the bushing 76, the pipe 82 being open at its lower end and provided with suitable number of small openings 84 throughout its length. A pin 85 inserted in openings in the pipe 82 retains the float 80 in the pipe when the tank is empty. To the bushing 76 there is also secured a pipe 86 which encloses the rod 78 and projects above the cover 40 and it is provided at its top with a cap 88 which retains the float in its lowered position and prevents leakage from the tank through the opening in the bushing. The lower portion of the pipe 82 is supported by a bracket 90 which is carried by the pipe 66 and which also serves to support the lower end of the sampling device which comprises a small pipe 92 having openings 94 therein at its lower end and having its upper end mounted in a bushing 96 threaded in the cover 40. Mounted in the bushing 96 is the pipe 98 having a stop-cock 100 connected thereto and extending through L's 102 to the bent pipe 104, the bent pipe serving as an outlet through which a sample of the contents of the tank may be discharged when there is pressure in the tank and the L's serving to make a flexible joint which will permit of the pipe being raised for a discharge of the contents of the tank into the sampling vessel and being lowered to permit of placing the cover 30 in position.

In the cover 40 there is also mounted a pipe 106 which does not project below the cover 40 and which is provided at its upper end with a cock 108 having an operating handle 110, the cock 108 and handle 110 being so arranged that when the cock 108 is closed the handle 110 rests upon the angular portion 74 of the plug in the cock 72 rendering it impossible to operate the plug of cock 72 until the handle 110

is raised to a position in which the cock 108 is opened. The cock 108 is so arranged that the handle 110 may not be turned more than 90 degrees and it is impossible to move the cock 108 to closed position with the handle 110 in any position other than in engagement with the angular portion 74 of the plug of cock 72.

In Fig. 6 the dome cover shown in Figs. 1 to 5 is shown applied to a car tank in which a modified type of discharge valve is used. In Figs. 1 to 5 the gear 50 and rod 12 are raised by the cam 52 in order to raise valve 7 while in Fig. 6 the gear 50′ is raised by the engagement of the threaded valve stem 112 with the sleeve 114 in the valve cage 116. Otherwise the construction shown in Fig. 6 is identical with that of Figs. 1 to 5.

In the construction shown in Figs. 7 to 10 inclusive, the dome closure is shown in connection with a tank dome 120 having a dome ring 122 secured thereto in any desired manner and provided with spaced projecting lugs 124 to which are pivotally secured the bolts 126, a construction which is commonly used in order to bolt to the ring 122 a cover, such as the cover 128, having radially projecting slotted lugs 130. Mounted in ring 122 is a dome cover holder 132 having formed integrally therewith an inner cover 134 and having an outwardly projecting shoulder 136 provided with a packing 138 which rests upon the upper edge of the dome ring 122. The holder 132 is also formed with an integral upwardly projecting flange 140 which receives the cover 128 and with outwardly projecting lugs 142 to which are pivotally secured the bolts 144 which engage in the slots in the lugs 130 of the cover 128 securing the cover 128 to the flange 140. The holder 132 is also provided with radially outwardly projecting slotted lugs 146 which receive the bolts 126 to secure the cover holder 132 to the dome ring 122. The holder 132 is provided with threaded openings in which are fitted bolts 148 which prevent the removal of the cover holder from the dome ring 122 upon loosening of the bolts 126.

The inner cover 134 is provided with an opening in which is mounted a bushing 150 secured to the cover by tap bolts 152 which pass through openings in flanges on the bushing and engage in tapped openings in the cover 134. The bushing 150 is provided with an inwardly opening journal box in which is rotatably mounted a pinion 154 which meshes with the gear 156 to operate a bottom discharge valve as in Fig. 1. The pinion 154 is formed with a hub 158 which fits in the journal box of the bushing 150 and is held therein by the bolts 160 which engage in openings in the bushing and in a groove 162 in the hub of the pinion. The pinion 154 is operated by a rod 164 which engages in the hub of the pinion and projects through an opening in the bushing 150 and is provided at its upper end with an operating handle 166 as in Fig. 1. Formed integral with the inner cover 134 is an outwardly projecting annular flange or collar 168 which is interiorly threaded to receive a filling and discharge pipe 170 which is also welded to the inner cover 134 as at 172. The upper end of the pipe 170 projects beyond the collar 168 and receives a cock 174 which engages with the collar 168. A packing 176 provides a tight joint between the cock 174 and the collar 168. As in Figs. 1 to 6, the cock 174 is provided with a valve plug having an angular operating projection 178 which is engaged by an operating handle 180 of a cock 182 which is carried by a pipe 184 mounted in a threaded opening in the cover 134. The cover 134 is also provided with a device 186 and with a sampling device 188, both being of a construction identical with the construction of the corresponding devices shown in Figs. 1 to 5 inclusive.

It will be noted that the dome cover described provides a means by which a top filling and discharging device may be applied to tank cars having a bottom discharge valve and in which the dome cover is of the usual threaded or bolted type and that the improved dome cover may be applied to such tank cars without any alteration of the dome and with only a minor alteration of the tank in order to provide for the proper guide and support of the filling and discharging pipe and to provide a sump to permit of the complete discharge of the contents of the tank.

What is claimed is:

1. In a car tank having a dome provided with a man-hole opening, a dome ring about said opening, a dome cover holder mounted in said ring and inner and outer dome covers carried by said holder.

2. In a car tank having a dome provided with a man-hole opening, a dome ring about said opening, a dome cover holder mounted in said ring, an inner dome cover carried by said holder, filling and discharge means mounted in said inner dome cover and an outer dome cover carried by said holder.

3. In a car tank having a dome provided with a man-hole opening, a dome ring about said opening, a dome cover holder mounted in said ring, an inner dome cover carried by said holder, a bottom discharge valve for said tank, valve operating means mounted in said inner dome cover and an outer dome cover carried by said holder.

4. In a car tank having a dome provided with a man-hole opening, a dome cover for said opening, a bottom discharge valve for said tank, an operating rod for said valve, a gear fixed on said rod, a gear rotatably mounted on said cover and meshing with the gear on said rod and operating means for said second gear mounted in said cover.

5. In a car tank having a dome provided

with a dome cover and having a man-hole opening, a cover for said opening, a bottom discharge valve for said tank and operating means for said valve comprising means rotatably mounted on said cover.

6. In a car tank having a dome provided with a man-hole opening, a dome ring about said opening, a dome cover holder mounted in said ring, a dome cover carried by said holder, a bottom discharge valve for said tank, valve operating means mounted in said cover and filling and discharge means mounted in said cover.

7. In a car tank having a dome provided with a man-hole opening, a dome ring about said opening, a dome cover holder mounted in said ring and a dome cover carried by said holder, said dome cover fitting said ring upon removal of the holder.

8. In a car tank having a dome provided with a man-hole opening, a dome ring about said opening and an annular dome cover holder fitting said ring, said dome cover holder having a portion to receive a cover fitting said ring.

9. In a car tank having a dome provided with a man-hole opening, a dome ring about said opening, a dome cover holder having a portion engaging said ring and flanges projecting from said portion and covers carried by said holder in engagement with said flanges.

10. In a car tank having a dome provided with a man-hole opening, a dome ring about said opening, an upwardly flanged dome cover holder fitting said ring, a cover carried by said holder in engagement with the flange, means for controlling the tank contents, and means for supporting said controlling means from said cover holder.

11. In a car tank having a dome provided with a man-hole opening, a dome ring about said opening and adapted to receive a cover, a flanged annular dome cover holder adapted to fit said ring and receive the cover for said ring on a flange, and an inner cover carried by said cover holder.

12. In a car tank having a dome provided with a man-hole opening and a dome ring adjacent thereto, a cover for said man-hole opening, an outer cover for said dome, and a holder removably secured to said dome ring and supporting said outer cover and the cover for said man-hole opening.

13. In a car tank having a dome provided with a man-hole opening and a dome ring adjacent said opening, a dome cover holder carried by said dome ring and having an upwardly extending portion and a depending portion, a dome cover mounted on said upwardly extending portion and a man-hole closure carried by said depending portion.

14. In a car tank having a dome provided with a man-hole opening and a dome ring adjacent said opening, a dome cover holder secured to said dome ring and having an upwardly extending portion and a depending portion, a man-hole closure carried by said depending portion, filling and discharge means connected to said man-hole closure, and a dome cover carried by said holder.

15. In combination, a tank dome comprising a head provided with a manhole opening, a box closing said opening and having an attaching flange intermediate its ends by which it may be secured to the dome, said box having a bottom plate positioned in the dome, tank fittings supported by the bottom plate, and an outer cover.

16. In combination, a tank dome comprising a head provided with a manhole opening, a box secured to the dome and arranged in the opening, said box being provided with an outer cover and an inner cover arranged within the dome, and tank fittings supported by the inner cover.

17. In a car tank having a dome provided with a manhole opening, an internal closure for said opening, a bottom discharge valve for said tank, a valve stem for operating the valve, and rotatable valve stem engaging means secured to the internal closure and connected to the valve stem to actuate the latter.

18. In combination, a tank dome having a dome ring, and means for providing a housing in said dome for supporting tank fittings while at the same time permitting use of the normal dome cover, comprising an extension ring having a lower end for attachment to the dome ring, and an upwardly extending flange for receiving and holding the dome cover.

19. In combination, a tank dome having an opening, a ring surrounding the opening, an adapter secured to the ring for supporting the dome cover normally supported by the ring, an internal closure for the opening secured to the adapter, and tank fittings supported by the internal closure.

20. In combination, a tank dome having an opening, a dome ring surrounding the opening, an adapter detachably secured to the ring for supporting the dome cover normally supported by the ring, and means for supporting tank fittings comprising an internal closure for the opening supported by the adapter.

21. In combination, a tank dome having an opening, a dome ring surrounding the opening, a box detachably connected to the dome ring and closing the opening, said box including a bottom plate and a dome cover, and fittings for the tank passing through the bottom plate.

22. In combination, a tank dome having an opening, a dome ring surrounding the opening, and means for providing a housing in the dome for supporting tank fittings while at the same time permitting use of the normal dome cover, comprising an adapter detacha-

bly secured to the dome ring and provided with a bottom plate in which the tank fittings are mounted, said adapter having an upwardly extending flange for receiving and holding the dome cover.

In witness whereof I have hereunto set my hand.

RALPH G. NICHOLS.

In witness whereof I have hereunto set my hand.

VICTOR WILLOUGHBY