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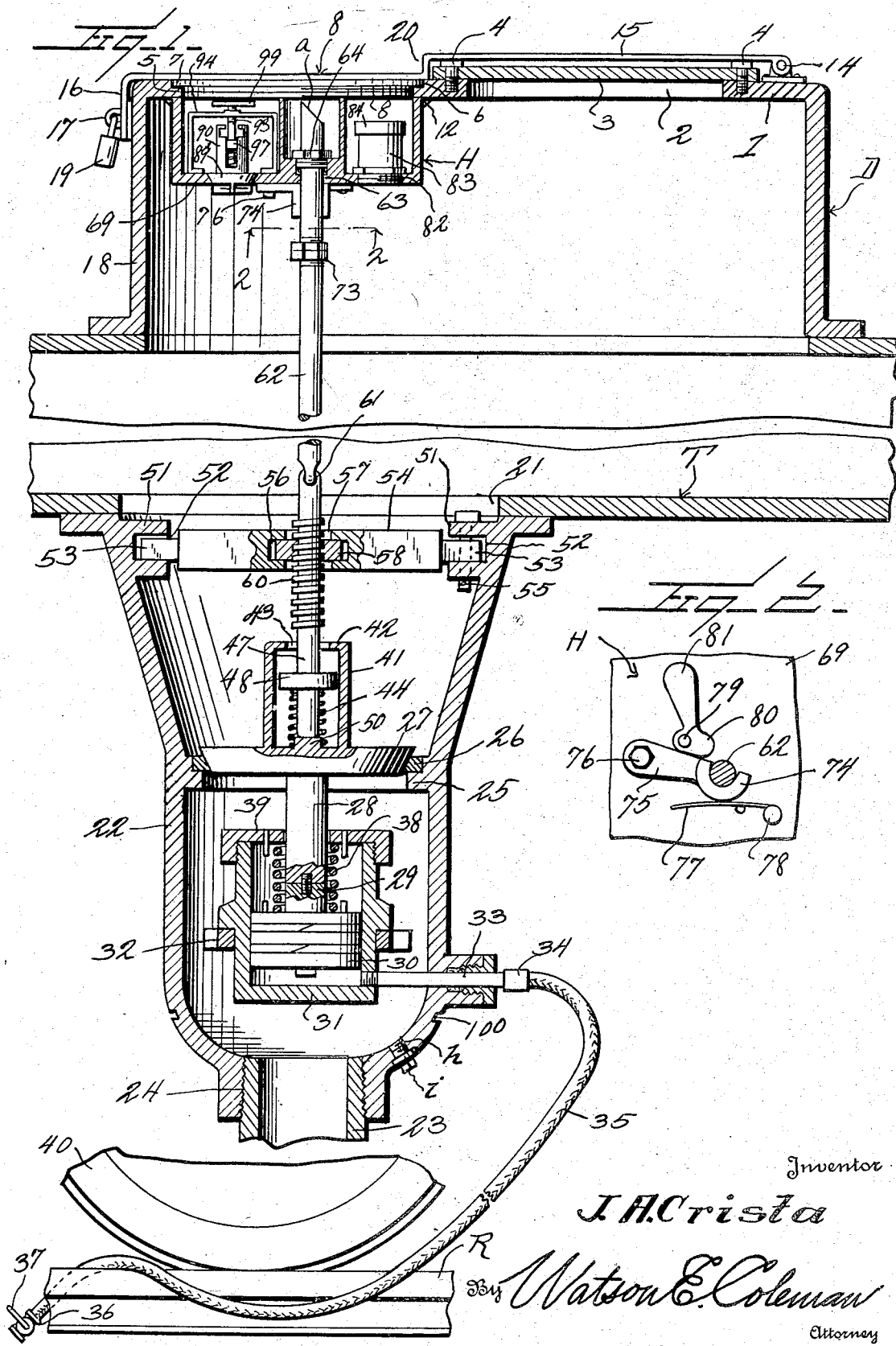
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2,301,378

TANK CAR

Filed Jan. 30, 1940

3 Sheets-Sheet 1



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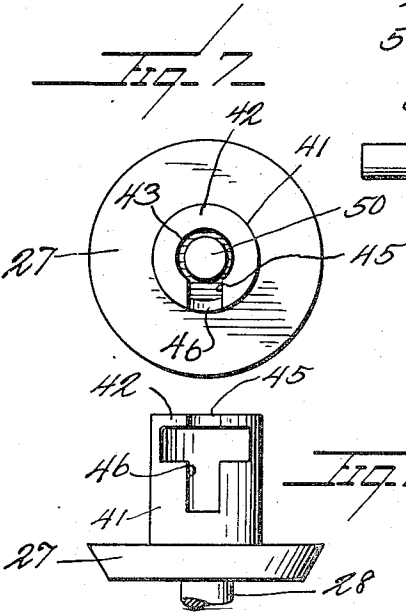
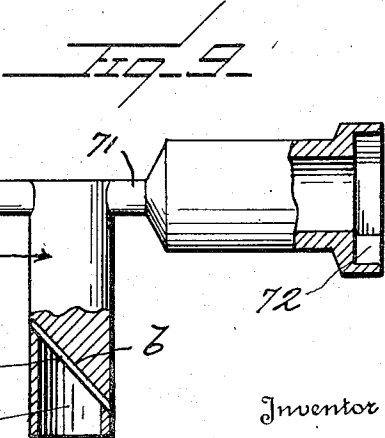
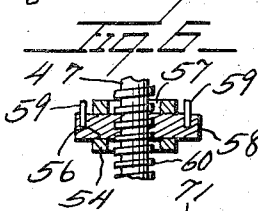
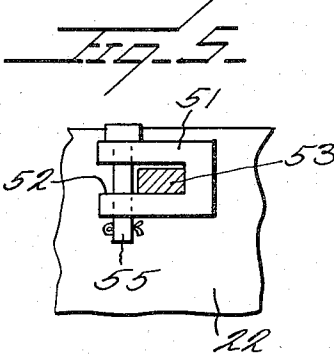
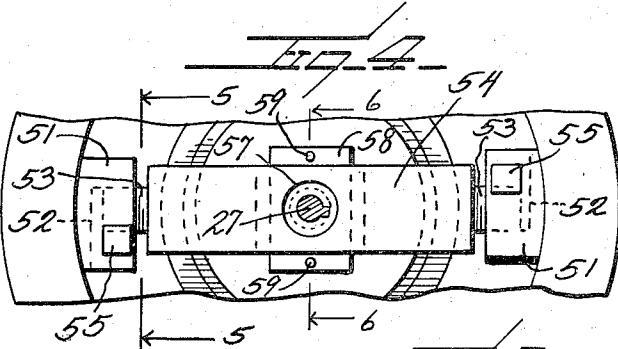
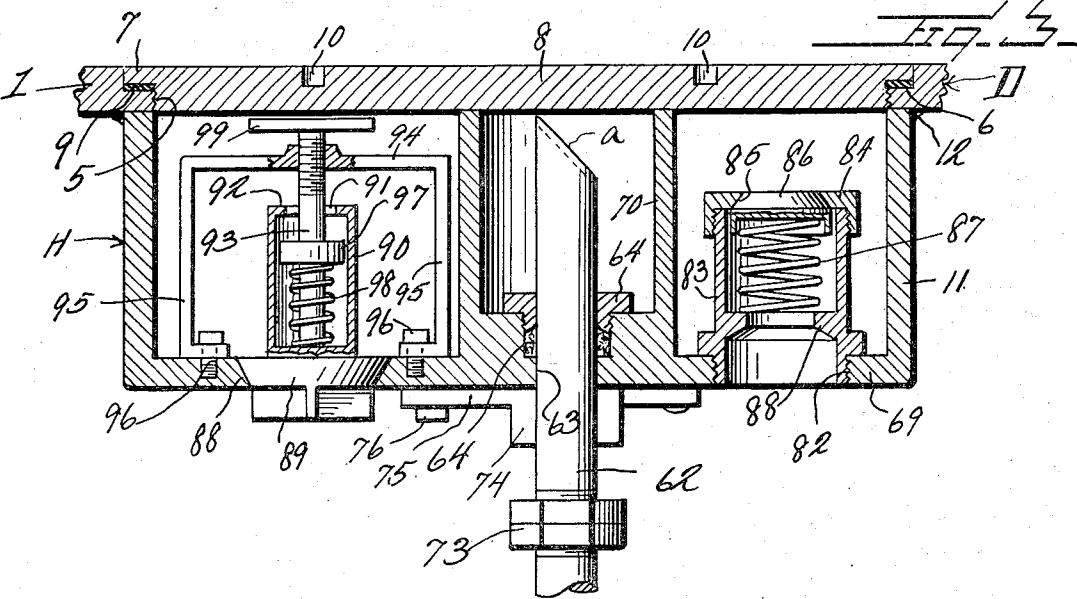
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TANK CAR

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3 Sheets-Sheet 2



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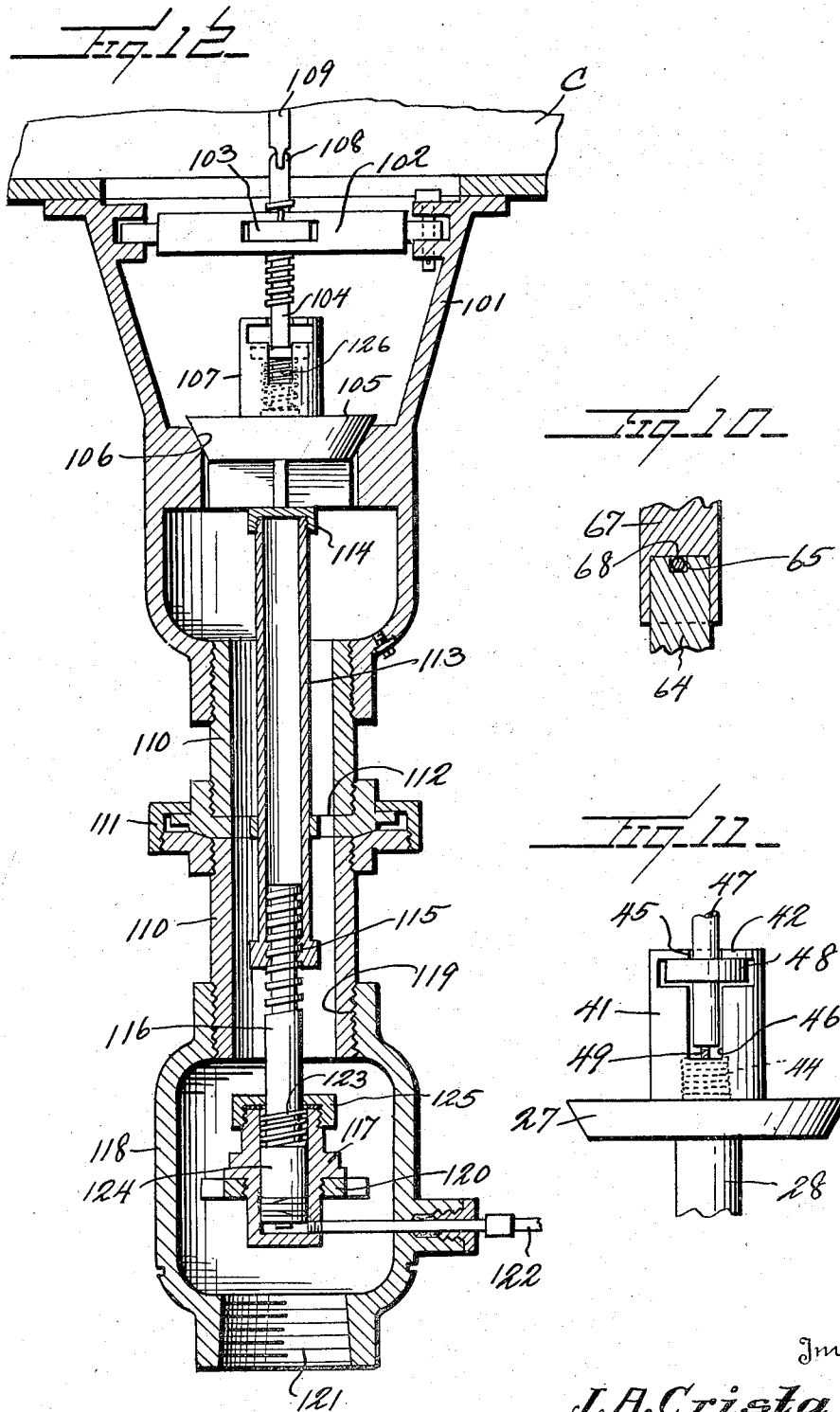
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TANK CAR

Filed Jan. 30, 1940

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,301,378

TANK CAR

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5 Claims. (Cl. 137—21)

This invention relates to a tank car, and it is a particular object of the invention to provide means whereby the tank may be drained, said drain including a valve mechanism which automatically closes upon movement of the car during the time of draining or unloading.

It is also an object of the invention to provide a tank car which substantially eliminates pilfering of the tank content and wherein the desired draining or unloading of the tank may be accomplished with the liability of fire hazard and explosion substantially eliminated.

Another object of the invention is to provide a tank car including a drain valve mechanism of a character whereby the valve member is effectively maintained in its closed or set position and particularly during such times when the valve member is subjected to vibration which would otherwise have a tendency to unseat the valve.

The invention consists in the details of construction and in the combination and arrangement of the several parts of my improved tank car whereby certain important advantages are attained and the device rendered simpler, less expensive and otherwise more convenient and advantageous for use, as will be hereinafter more fully set forth.

The novel features of my invention will hereinafter be definitely claimed.

In order that my invention may be the better understood, I will now proceed to describe the same with reference to the accompanying drawings, wherein:

Figure 1 is a fragmentary view partly in section and partly in elevation and of a somewhat diagrammatic character illustrating a tank car constructed in accordance with an embodiment of my invention;

Figure 2 is a fragmentary detailed sectional view taken substantially on the line 2—2 of Figure 1 looking in the direction of the arrows;

Figure 3 is an enlarged fragmentary vertical sectional view taken through the upper portion of the dome of the tank to one side of the tank cap, certain of the parts being in elevation;

Figure 4 is a fragmentary view partly in top plan and partly in section illustrating the mounting for the operating rod coacting with the valve member of the drain valve mechanism;

Figure 5 is a detailed sectional view taken substantially on the line 5—5 of Figure 4;

Figure 6 is a fragmentary detailed sectional view taken substantially on the line 6—6 of Figure 4;

Figure 7 is a view in top plan of the drain valve member;

Figure 8 is a view in side elevation of the valve member as illustrated in Figure 7 with a portion broken away;

Figure 9 is a view partly in elevation and partly in section of a member or tool for manually operating certain of the parts;

Figure 10 is a fragmentary sectional view illustrating the tool or member in working position;

Figure 11 is a fragmentary view in elevation of the drain valve member with the operating rod thereon in position for operative engagement with or removal from the drain valve member;

Figure 12 is a view partly in section and partly in elevation illustrating a drain valve mechanism constructed in accordance with another embodiment of the invention.

As disclosed in the accompanying drawings, T denotes a tank of a character comprised in a tank car structure and which includes a conventional dome D. The top wall 1 of the dome to one side of its axial center is provided with the usual filling opening 2 normally closed by a cap or cover 3 held in place by the bolts 4.

The dome D is also provided in its top wall 1 with a second opening 5, the outer portion of the side wall of which is formed to provide a surrounding rabbet 6 to provide a seat for the outstanding flange 7 carried by the marginal portion of the cap or cover 8 threading within the opening 5. Coacting with this flange 7 and its coacting seat as afforded by the rabbet 6, is a gasket 9 of desired material to assure a tight seal when the cover or cap 8 is applied.

The outer face of the cover or cap 8 is provided with the suitably positioned spaced recesses 10 in which a suitable implement is adapted to be engaged to facilitate the application or removal of the cover or cap 8.

Underlying the opening 5 is a housing H of desired dimensions and which has a side wall 11 substantially defining the opening 5 with the upper portion of said side wall 11 welded or otherwise rigidly secured, as at 12, to the under surface of the top wall 1 of the dome D.

Hingedly connected, as at 14, to the outer face of the top wall 1 to one side of the filling opening 2 is an end portion of an elongated rigid strap 15. This strap 15, which is preferably of metal, is of a length to extend radially across the applied lid or cap 3 and radially across the applied cover or cap 8. The outer or free end portion of this strap 15 terminates in an angularly

related portion 16 which engages in a conventional manner with an outstanding staple 17 carried by a side wall 18 of the dome D. A shackle lock 19 or the like is engaged through the staple 17 outwardly of the angular extension 16 whereby the strap 15 is effectively locked in a position to prevent unauthorized removal of either the lid or cap 3 or the cover or cap 8. As is clearly illustrated in Figure 1, the strap 15 when in holding position is disposed over and in direct contact with the bolts 4, and the central portion of the strap 15 is offset, as at 20, to assure proper effective coaction of the outer portion of the strap 15 with the applied cover or cap 8.

The bottom of the tank T below the opening 5 in the top wall 1 of the dome D is provided with a drain opening 21. This opening 21 discharges into a drain pipe 22 depending from the tank T and leading from this pipe 22 is a carry-off line 23 of desired length and of preferred material. The lower or outer end portion of the pipe 22 is provided with the peripheral threads 24 to permit the application of a suitable cap thereto after the line 23 has been removed and which is particularly desirable when the tank is in transit.

The pipe 22 substantially midway its ends is provided with an inwardly disposed annular flange 25 which provides a mounting for a valve seat 26. Coacting with the seat 26 is a valve member 27 which, in its opening movement, travels toward the tank T. This valve member 27 at its axial center has depending therefrom an elongated post or rod 28, the lower end of which is suitably coupled, as at 29, with a piston 30. This piston 30 snugly fits and works within a cylinder 31 supported within the lower portion of the pipe 22 by a conventional spider structure 32.

The cylinder 31 at a point at all times below or in advance of the piston 30 has in communication therewith a line or conduit 33 which extends out through the side wall of the pipe 22. The outer end portion of this pipe or conduit 33 has suitably coupled therewith, as at 34, an end portion of a flexible pipe line 35 of desired length.

The outer end portion of this line 35 carries a coupling 36 whereby the line 35 may be connected to a suitable source of fluid pressure when it is desired to move the piston 30 in a direction to lift the valve member 27 from its seat 26 to permit the content of the tank T to drain or be discharged out through the line 23. The coupling 36 includes a normally closed valve generally indicated at 37, whereby the desired pressure is retained within the cylinder 31 to maintain the valve 27 in lifted or open position. When it is desired to reseal the valve 27 the valve 37 is manually opened whereupon the valve 27 will return to its seat under the action of the expansible coil spring 38 within the cylinder 31 and interposed between the piston 30 and the upper head 39 of the cylinder through which the post or rod 28 passes. This spring 38 surrounds the post or rod 28. The line 35 is of such length that it can be placed across the rail R of a trackway immediately adjacent to a wheel 40 of the tank car so that in case the car should inadvertently move the line 35 will become mutilated and thus relieve the fluid pressure within the cylinder 31 to permit substantial instantaneous closing of the valve member 27 under the action of the spring 38.

The valve member 27 at its axial center is

provided with an upstanding cylindrical boxing 41 of desired dimensions and having a top head 42 provided in its axial center with a relatively large opening 43 to permit the passage thereof of an expansible coil spring 44.

The head 42 is provided with an entrance slot 45 radial to the opening 43 and which communicates with the upper central portion of a T-slot 46 as is particularly illustrated in Figures 8 and 11 of the drawings.

Associated with the valve member 27 and more particularly with the boxing 41 thereof is an operating rod 47. This rod 47 adjacent to its lower end is provided with a circular enlargement or head 48 of a diameter in excess of the diameter of the opening 43 but which can readily pass within the boxing 41 through the upper part of the T-slot 46. The lower or stem portion of this slot 46 allows for the ready passage of the portion of the rod 47 below the enlargement or head 48.

In connecting the rod 47 with the valve member 27 the spring 44 is first applied and an elongated shank 49 is inserted through the slot 46 above the initially applied spring 44 and through the medium of this shank or suitable tool 49, the spring 44 will be sufficiently compressed as illustrated in Figure 11 to allow the desired application of the rod 47 to the housing 41 as illustrated in Figure 11. After the application of the rod 47 the shank or tool 49 is removed whereupon the spring will expand for contact from below with the enlargement or head 48.

As illustrated in Figures 1 and 7, the valve member 27 at the axial center of the boxing 41 and directly below the applied rod 47 is provided with an upstanding lug 50 to provide an effective mounting for the lower end portion of the spring 44.

The pipe 22 closely adjacent to its top is provided with the diametrically opposed and inwardly directed bosses 51. These bosses 51 in their opposed faces are provided with the sockets 52 which also open through side faces of the bosses. It is to be particularly noted that the socket 52 of one of the bosses opens through the side thereof remote from the side through which opens the socket 52 of the second boss 51. These sockets 52 receive the outstanding trunnions 53 carried by the opposite ends of an elongated bearing block 54. These trunnions 53 are each angular in cross section so that the block 54 will be supported in position across the upper part of the pipe 22 without rotation, and it is believed to be obvious that the trunnions 53 will be readily engaged within the sockets 52 upon proper swinging of the block 54. After the trunnions 53 have been engaged within the sockets 52 said trunnions are held therein by the releasable pins 55 which extend through the bosses 51 at the open side portions of the sockets 52 as particularly illustrated in Figures 4 and 5 of the drawings.

The central portion of the bearing block 54 has disposed therethrough a slot 56 extending lengthwise of the block 54 and the block 54 at its central portion is also provided with an opening 57 intersecting the slot 56. Disposed through the slot 56 is an elongated nut 58. This nut 58 has limited movement lengthwise of the slot 56 and also limited movement transversely of the slot. This last named movement is limited by the pins 59 carried by the portions of the nut 58 extending beyond opposite sides of the bearing block 54.

Threading through the nut 58 is the upper por-

tion of the rod 47 and it is to be stated that the extent of sliding movement of the nut 58 in any direction is insufficient to allow the threaded portion 60 of the rod 47 to contact with the block 54. Upon turning of the rod 47 in one direction the lower end thereof will have contact with the valve member 27 and thereby positively lock or hold the valve member 27 to its seat 26. When in this position, as illustrated in Figure 1, the enlargement or head 48 is spaced a material distance below the top head 42 of the boxing 41. This contact of the rod 47 with the valve member 27 serves to prevent accidental raising of the valve member 27 and particularly when the tank T is in transit. Upon proper turning of the rod 47 the same may be moved upwardly away from the valve member 27 to allow unseating of the valve member by the fluid pressure exerted upon the piston 30.

Hingedly or pivotally connected, as at 61, with the upper end portion of the rod 47 is the lower end portion of a second rod 62. This rod 62 is of a length to extend upwardly through a suitably positioned opening 63 within the housing H and to have its upper end portion closely adjacent to the under surface of the applied cover or lid 8 when the rod 47 is in its adjusted position to hold the valve member 27 as illustrated in Figure 1 of the drawings. Associated with the portion of the rod 62 passing through the opening 63 is a conventional gland packing 64.

It is believed to be obvious that before the valve member 27 can be released for opening member, it is first necessary to remove the cover or cap 8 so that the rods 47 and 62 may have desired upward movement.

The rod 62 has its upper end beveled and with its beveled face *a* provided therealong with a groove or channel 65. This upper or beveled end portion of the rod 62 is to be received within the socket 66 of a wrench 67 of a type as illustrated in Figure 9 or otherwise as may be preferred. The inner end of the socket 66 is on a bevel *b* complementary to the beveled end *a* of the rod 62 and extending from this beveled inner end *b* of the socket 66 is a rib 68 which engages within the groove or channel 65 along the beveled end *a* of the rod 62, thus assuring effective engagement with the wrench 67 for turning the rod 62 together with the rod 47 in the direction desired.

The bottom wall 69 of the housing H through which the opening 63 is disposed, is provided with an upstanding sleeve 70 concentric to the opening 63 and of a length to be contacted by the applied cover or cap 8. This sleeve 70 serves as a guard to prevent application of an ordinary wrench to the upper end portion of the rod 62 but makes it necessary that a special wrench be employed.

The wrench 67 at the outer end thereof is provided with the laterally directed opening bars or handles 71 and the outer end portion of one of these bars or handles 71 is formed, as at 72, to provide a supplemental socket wrench to be engaged with the nut of the gland packing 64 whereby said nut may be tightened when desired or removed.

To prevent unintentional manual unseating of the valve member 27, the rod 62 is provided at its upper portion with a surrounding enlargement 73 which, in the present embodiment of the invention, contacts with a stop member 74 carried by the under surface of the bottom wall 69 of the housing H. The enlargement 73 contacts with the stop member 74 before the rod 62 has been

moved upwardly a distance sufficient to cause the enlargement or head 48 to contact from below with the top head 42 of the boxing 41.

The enlargement 73, as herein disclosed, comprises a plurality of nuts threaded upon the bar 62, said nuts permitting the positioning of the enlargement 73 on the bar 62 to be varied within certain limitations as the requirements of practice may prefer.

The stop member 74 is substantially semi-circular in cross section and of desired length. This stop member 74 is carried by the free end portion of an arm 75 having its opposite end portion pivotally connected, as at 76, to the under surface of the bottom 69 of the housing H. The stop member 74 is normally maintained in a position straddling the rod 62 by a conventional type of leaf spring 77 suitably anchored, as at 78, to the under surface of the bottom 69 of the housing H. The free end portion of this spring 77 bears against the stop member 74 and constantly urges the same toward the rod 62 and to maintain the same in contact therewith.

Pivotally mounted, as at 79, on the under surface 69 of the housing H and adjacent to the arm 75 is a cam member 80 carrying an operating handle 81.

When it is desired to manually unseat or open the valve member 27, the lid or cap 3 is removed to allow the hand of a person to grasp the handle member 81 to swing the same in a direction to cause the cam member 80 to contact with the arm 75 to swing the contact member 74 against the tension of the spring 77 and for a distance to free the stop member 74 from the rod 62 and out of the path of travel of the enlargement 73. In swinging the handle member 81 beyond its center, the cam member 80 will operate to maintain the stop member 74 in its inoperative or outward swinging adjustment until the handle member is swung back to return the cam member 80 to a position permitting the spring 77 to swing the stop member 74 in straddling or embracing position upon the rod 62.

The bottom 69 of the housing H is provided with a port 82 into which threads a sleeve 83 within the housing H. The upper end of this sleeve 83 has mounted thereon a removable head 84 provided with an inwardly facing valve seat 85 with which engages from below an inwardly opening valve member 86. This valve member 86, as herein disclosed, is normally maintained in contact with its seat 85 through the medium of the expansible coil spring 87 interposed between the valve member 86 and an inwardly directed annular flange 88 carried by the lower portion of the sleeve 83.

With the cover or cap 8 removed, any vacuum created within the tank T above the liquid level within the tank will cause the valve member 86 to open and thus permit outside air to enter the tank T to break the vacuum.

In addition to this automatically operating valve member 86 it is of advantage to provide a manually operated means to place the interior of the tank in communication with the outside atmosphere to break up any vacuum within the tank T. As herein disclosed, the bottom 69 of the housing H is provided with a second port 88 which is normally closed by the upwardly opening valve member 89. This valve member 89 at its axial center carries a boxing 90 of a type similar to the boxing 41 hereinbefore referred to. Extending inwardly from above within the boxing 90 through the central opening 91 in the top

head 92 thereof is a rod 93. This rod 93 is threaded through the upper or cross member 94 of a frame of an inverted U type. This frame straddles the boxing 90 and the lower or free extremities of the side arms 95 of the frame are suitably anchored, as at 96, to the bottom 69 of the housing H with the cross member 94 disposed radially across and above the upper end of the boxing 90. This rod 93 is adapted to be screwed down into contact with the valve member 89 for positively locking the valve member in closed position upon its seat 88. However, upon upward movement of the rod 93 the valve member 89 will be raised into open position by contact of the enlargement 97 from below with the top head 92 of the boxing 90. This enlargement 97 is carried by the portion of the rod 93 within the boxing 90 and interposed between this enlargement 97 and the valve member 89 is an expansible coil spring 98 which encircles the rod 93. This spring 98 serves to prevent chattering of the valve member 89 and also provides means for returning the same to its seat 88 when the rod 93 is moved downwardly for locking or holding engagement with the valve member 89. The rod 93 above the bar 94 is provided with a cross handle 99 or other suitable means whereby the rod 93 may be rotated in a direction to either raise or lower the rod.

The pipe 22 in its lower portion has disposed circumferentially therearound a groove 100 whereby the pipe 22 is materially weakened at such point so that the pipe, or housing as it may also be called, may readily break.

By having the nut 58 capable of movement lengthwise and transversely of the bearing block 54 together with the connection 61, the rods 47 and 62 are capable of relative movement to compensate for any tendency of misalignment of these rods 47 and 62. It is also to be particularly pointed out that the bosses 51 are of such length, when engaged within the sockets 52 of the bosses 51, to allow the bearing block 54 to have slight endwise play to further assure the proper alignment of the valve member 27 with its seat and which seating of the valve member 27 is further facilitated by the movement of the nut 58.

It is also to be pointed out that the relative diagonal arrangement of the pins 55 is such that the load will not be on the pins but on the closed sides of the bosses 51 when the valve rod 27 is turned in the direction to close the valve member 27.

While in this embodiment of my invention I include the spring 38, it is to be stated that this spring 38 can be omitted and the spring 44 relied upon not only to maintain the valve member 27 closed but to assure the return movement of the piston 30.

It is required under the present regulations that the lower or discharge end of the pipe 22 be open during the filling of the tank T so that it can be readily determined whether or not the valve member 27 is tight upon its seat 26 to prevent flow thereby. The lower portion of the pipe 22 is provided with a drain opening *h* normally closed by a plug *i* threading therein. This opening *h* provides means, when the plug *i* is withdrawn, to indicate whether or not the valve member 27 is leaking to an extent to be dangerous to remove the cap or plug at the lower end of the pipe 22. If there should be such a leakage past the valve member 27, the tank T must be

pumped empty through the opening or manhole 2 in the top wall of the dome D.

The pipe 22 and the parts associated therewith embodies what may be termed a permanent structure. In Figure 12 of the drawings is embodied what may be designated as a temporary structure. In this embodiment of the invention as illustrated in Figure 12, C denotes a tank which has depending therefrom and in communication therewith a drain pipe 101 having within its upper portion a bearing block 102 constructed and mounted in substantially the same manner as the bearing block 54 hereinbefore referred to. Threading through this block 102, or more particularly the sliding nut 103 carried thereby, is the operating rod 104 for the valve member 105 which coacts with the internal valve seat 106 provided within the pipe 101. The rod 104 coacts with a boxing 107 in the same manner as has hereinbefore been set forth in detail with respect to the boxing 41 and the rod 47. The upper end portion of the rod 104 is operatively engaged, as at 108, with an upper supplemental rod 109 which is to be arranged and operated in the same manner as hereinbefore set forth in detail with respect to the rod 62.

The outer or lower portion of the pipe 101 has threading therein an end portion of a tubular member 110 of desired length. This member 110, as herein disclosed, is sectional and has its adjacent end portions suitably coupled, as at 111, such coupling including a member having a spider 112 intersecting the bore of the member 110 and providing a guide for an elongated sleeve 113. The upper end of this sleeve 113 is closed by a cap 114 which has direct contact from below with the valve member 105. The opposite or lower end of this sleeve 113 has threading therein, as at 115, the upper end portion of a plunger 116. The lower portion of the plunger 116 works within a cylinder 117 within a casing 118 having its upper portion in threaded engagement, as at 119, with the lower extremity of the tubular member 110. The cylinder 117, as herein disclosed, is positioned within the casing 118 at substantially the center thereof by the spider 120 and the lower portion of the casing 118 is provided with a threaded opening 121 to permit the connection with said casing of a suitable delivery or carry-off line.

The cylinder 117 at a point at all times below or in advance of the plunger 116 has in communication therewith a flexible line 122 such as the line 35 hereinbefore referred to and for the same purpose.

The threaded connection 115 between the sleeve 113 and the plunger 116 allows for relative endwise adjustment of these parts to assure proper and effective contact of the cap 114 from below with the valve member 105.

In this embodiment of my invention it is essential that there be provided means associated with the plunger 116 to retract the same. As is illustrated in Figure 12 the portion of the plunger 116 within the cylinder 117 is surrounded by an expansible coil spring 123 which is interposed between the piston 124 carried by the plunger 116 within the cylinder 117 and the upper head 125 of the cylinder 117 through which the plunger 116 passes.

The valve member 105 is normally urged to its seat 106 by the spring 126 in the same manner as has hereinbefore been set forth with respect to the spring 44 comprised in the first embodiment of my invention.

From the foregoing description it is thought to be obvious that a tank car constructed in accordance with my invention is particularly well adapted for use by reason of the convenience and facility with which it may be assembled and operated, and it will also be obvious that my invention is susceptible of some change and modification without departing from the principles and spirit thereof and for this reason I do not wish to be understood as limiting myself to the precise arrangement and formation of the several parts herein shown in carrying out my invention in practice except as hereinafter claimed.

I claim:

1. In combination with a tank structure having an outlet opening, a valve member normally closing said opening and moving inwardly of the tank to open the outlet opening, a rod extending into the tank and having endwise movement, said rod when in one position holding the valve member to its seat, said rod when moved into a second position away from the valve seat permitting said valve member to move into open position, an enlargement carried by the rod, an arm pivotally mounted within the tank structure at a point adjacent to the enlargement on the rod, said arm having swinging movement toward or from the rod, a stop member carried by the arm constructed to partially surround the rod when the arm is at the limit of its swinging movement toward the rod, means for normally maintaining the arm in such position, and means for swinging the arm away from the rod to make the stop on the arm ineffective with respect to the enlargement on the rod.

2. In combination with a tank structure having a drain pipe leading therefrom, said drain pipe having an internal valve seat, a valve member coacting with said valve seat and closing flow through the drain pipe, a bearing block supported within the drain pipe above the valve member, a nut carried by the bearing block and having movement lengthwise and transversely of the bearing block, a rod threading through said nut, said rod when turned in one direction contacting with the valve member to hold the same to its seat, said bearing block having endwise movement.

3. In combination with a tank structure having a drain pipe leading therefrom, said drain

pipe having an internal valve seat, a valve member coacting with said valve seat and closing flow through the drain pipe, a bearing block supported within the drain pipe above the valve member, a nut carried by the bearing block and having movement lengthwise and transversely of the bearing block, a rod threading through said nut, said rod when turned in one direction contacting with the valve member to hold the same to its seat, said bearing block having endwise movement, said rod and valve member having coacting means for lifting the valve member from its seat upon rotation of the rod in the opposite direction.

4. In combination with a tank structure having a drain pipe leading therefrom, said drain pipe having an internal valve seat, a valve member coacting with said valve seat and closing flow through the drain pipe, a bearing block supported within the drain pipe above the valve member, a nut carried by the bearing block and having movement lengthwise and transversely of the bearing block, a rod threading through said nut, said rod when turned in one direction contacting with the valve member to hold the same to its seat, said bearing block having endwise movement, and means for moving the valve member into open position upon threading of the rod thru the nut in a direction to move the rod away from the valve member.

5. In combination with a tank structure having a drain pipe leading therefrom, said drain pipe having an internal valve seat, a valve member coacting with said valve seat for controlling flow through the drain pipe, inwardly disposed bosses carried by the pipe, said bosses in their opposed faces being provided with sockets opening through side faces of the bosses, said sockets being reversely related, a bearing block intersecting the pipe and having its extremities received within the sockets of the bosses, means for holding said extremities of the block within the sockets, and a rod threading through the block, said rod when moved in one direction contacting with the valve member to hold the same to its seat, movement of the rod in the opposite direction permitting the valve member to move into open position.

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