

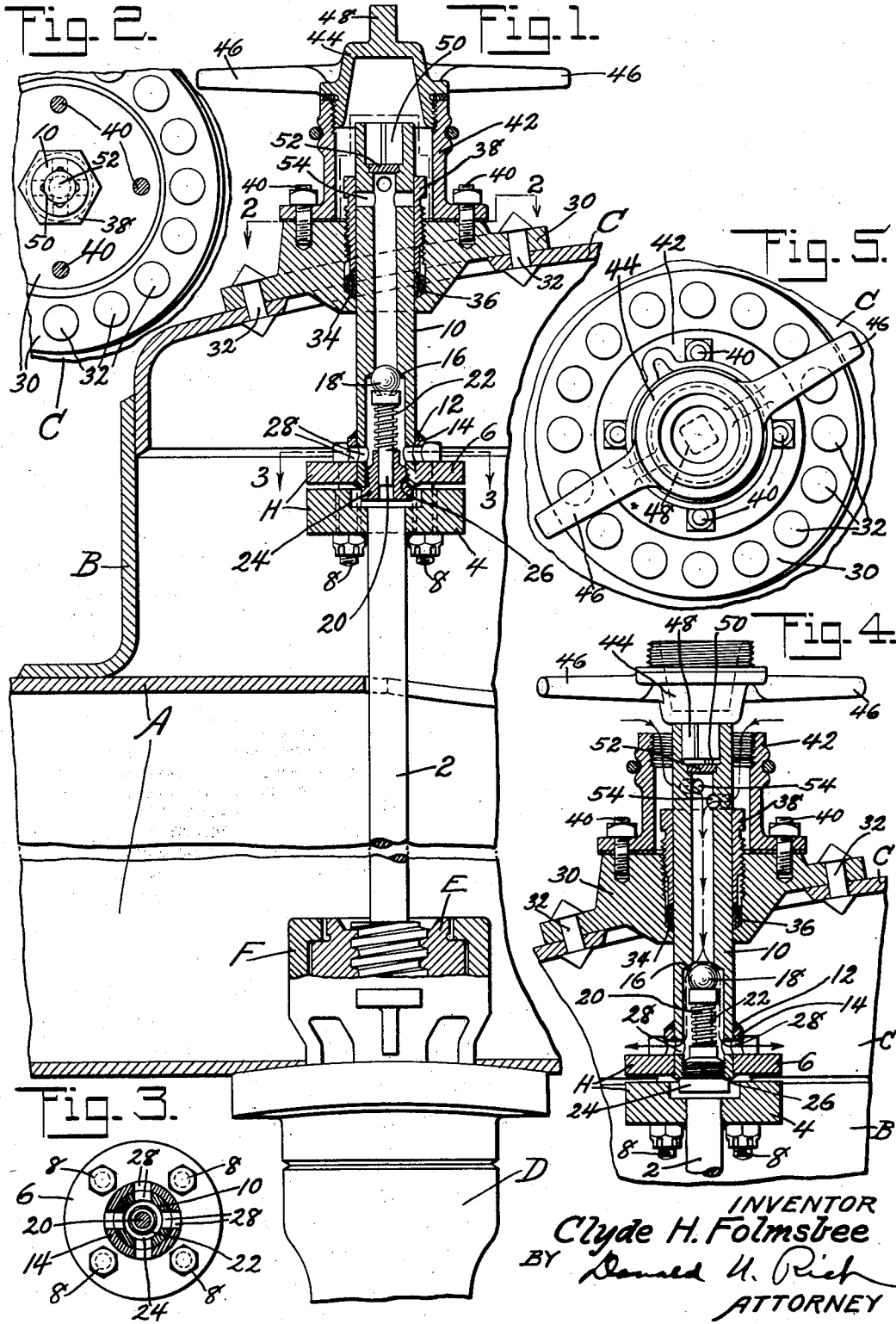
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VALVE MECHANISM FOR CAR TANKS

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VALVE MECHANISM FOR CAR TANKS

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This invention relates generally to valve mechanism for use with tanks having bottom discharge outlet valves.

One object of this invention is the provision of a combined operator for bottom discharge outlet valves and a relief valve for a car tank.

Another object of this invention is the provision of new and improved means for mounting a relief valve mechanism in a tank dome which will also provide suitable means for mounting the valve operating rod.

A further object of this invention is the provision of a unit for attachment or application to the dome of a railway car tank, which unit embodies the combination of a relief valve for the tank and an operating mechanism for the bottom discharge outlet valve of the tank.

A still further object of this invention is the provision of a device of the character described which is strong and durable in operation and easy to manufacture.

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

Figure 1 is a broken vertical section of a portion of a car tank showing in section the present invention applied thereto;

Fig. 2 is a sectional view on the line 2—2, Fig. 1;

Fig. 3 is a sectional view on the line 3—3, Fig. 1;

Fig. 4 is a detail sectional view showing the device of the present invention in elevated position; and

Fig. 5 is a top plan view of the invention.

Referring now more particularly to the drawing, in which similar characters of reference designate similar parts in the several views, Figure 1 shows a portion of a railway car tank having a body A provided with a dome indicated generally at B and having a head portion C. The tank further is provided with a discharge outlet D controlled by a discharge valve of the rotary type mounted on the lower end of rod 2. The rod 2 adjacent the valve is provided with threads which engage the internal threads of the member E non-rotatably carried in the cage F. The valve is adapted to be operated by a valve rod 2, the upper end portion of which is arranged within the dome B and connected in any suitable or desired manner with the base member 4 of a flexible coupling indicated generally at H. The coupling H also includes an upper member 6 bolted as at 8 or otherwise suitably connected with the base member 4 and having tubular valve rod extension 10 welded as at 12 to an upright flange

14 formed on said member 6 all as clearly shown in Figs. 1 and 4. This flexible coupling is provided to take care of any misalignment in the rod 2 and extension 10.

The internal diameter of the valve rod extension 10 is enlarged at the lower end portion thereof to provide an internal seat 16 for a ball valve 18 supported by a plunger or stem 20. The plunger or stem 20 is constantly urged upwardly to force valve 18 against seat 16 by means of a spring 22 surrounding the stem 20 and, at its lower end portion, bearing against a tubular spring seat member 24 through which the stem 20 is movable; said spring seat 24 being threadedly connected as at 26 within the lower end portion of the valve rod extension 10.

The flange 14 and valve rod extension 10 are provided with registering ports 28, the purpose of which will be hereinafter described.

The valve rod extension 10 extends longitudinally upward through and above a fitting 30 secured to the upper surface of the dome head C by suitable fasteners such as the rivets 32, and the fitting, to accommodate the valve rod extension, is formed with a longitudinal opening, the lower end portion of which is reduced in diameter to provide an annular shoulder 34 surrounding and substantially engaging the valve rod extension 10; said shoulder 34 constituting a part of a stuffing box and serving to support suitable packing 36. The upper portion of the opening in the fitting 30 is interiorly threaded to secure a tubular gland 38 which bears against the packing 36 and surrounds the valve rod extension 10. It will be apparent that the construction just described provides a combined stuffing box and guide for the valve rod extension 10.

Secured to the upper surface of the fitting 30 by suitable fasteners such as the bolts 40 is a housing member 42 which surrounds the upper end portion of the extension 10. The housing member 42 has its upper end portion interiorly threaded to receive and hold an end closure cap 44. As clearly shown in the drawing, the end closure cap is provided with oppositely extending handle elements 46 and with an upright lug 48 which is adapted, upon removal of the cap 44, to be received within a squared recess 50 formed in the upper end portion of the valve rod extension 10. To close the upper end of the passageway through the valve rod extension 10 a sealing plate 52 is provided as clearly shown in Figs. 1 and 4.

Below the sealing plate 52 the valve rod ex-

tension 10 is provided with longitudinally staggered air intake ports 54 which, when the discharge valve is seated to close the outlet D, are covered and effectively sealed by the close fitting gland 38.

In use, to discharge lading from the tank body A, the cap 44 is removed and then inverted so that the lug 48 will engage within the recess 50. The member E being fixed against rotation in the cage F it is obvious that rotation of the valve rod extension 10 in one direction by operation of the cap 44 actuates the valve rod 2 causing elevation of the valve together with the rod 2 and extension 10. Elevation of the extension 10 causes the ports 54 to be progressively opened in proportion to the degree of opening of the discharge valve. Discharge of lading from the tank through the outlet D tends to create a vacuum within the tank which, if not relieved, might result in the collapse of the tank. When this condition arises; that is, upon the tendency of creation of a vacuum within the tank, the air admitted to the interior of the valve rod extension through the ports 54 which are uncovered will cause unseating of the ball valve 18 and permit passage of the air into the interior of the tank through the registering ports 28 in direct proportion to the rate of discharge and thus tend to equalize the pressure.

From the above description it is believed that the construction and operation of the present invention will be fully apparent to those skilled in the art. The drawing shows a certain embodiment of the invention but it is to be understood that it is for illustrative purposes only and various changes in the form and proportions of the construction may be made within the scope of the appended claims without departing from the spirit of the invention.

What is claimed is:

1. In a car tank having a bottom discharge outlet valve, a valve rod therefor, and a combined valve rod actuator and relief valve mechanism comprising a fitting secured to said tank, a tubular valve rod extension flexibly connected at one end portion with the valve rod and having its opposite end portion extending through said fitting, a relief valve in the lower portion of said extension, air inlet ports in the upper portion of the extension, and a housing secured to the fitting and normally covering said extension.

2. In a car tank having a bottom discharge outlet valve, a valve rod therefor, and a combined valve rod actuator and vacuum relief mechanism comprising a fitting secured to said tank, a tubular valve rod extension flexibly connected at one end portion with the valve rod and having its opposite end portion extending through said fitting, a guide secured in the fitting and surrounding the valve rod extension, air inlet ports in the upper portion of the extension normally closed by said guide, and means within said extension operative when said outlet valve is open to control the passage of air through the ports to equalize the pressures inside and outside of the tank.

3. In a car tank having a bottom discharge outlet valve, a valve rod therefor, and a combined valve rod actuator and relief valve mechanism comprising a fitting secured to said tank, a hollow valve rod extension flexibly connected at one end portion with the valve rod with its opposite end portion projecting through said fitting, a relief valve in the lower portion of said extension, air inlet ports in the upper portion of said extension, and a guide secured within the fitting with

which said extension is slidably associated and which normally covers said ports.

4. In a car tank, a bottom discharge outlet valve, a valve rod extending therefrom, a combined relief valve mechanism and valve rod actuator comprising a tubular valve rod extension slidably associated with and having one end portion projecting outside of the tank and with which the valve rod is flexibly connected to be actuated thereby, a relief valve in said extension, and a housing normally covering the outer end portion of the extension.

5. In a car tank, a bottom discharge outlet valve, a valve rod extending upwardly therefrom, a combined relief valve mechanism and valve rod actuator comprising a tubular valve rod extension having its upper end portion extending outside of the tank and having its opposite end portion flexibly connected with said valve rod to be supported thereby, a relief valve in said extension, a housing surrounding the upper end portion of said extension, and a cap normally covering said housing and having means formed thereon for actuating the valve rod extension.

6. In a car tank, a vertically reciprocable bottom discharge valve and means for actuating the valve to and from closed position comprising, a valve rod, a tubular valve rod extension connected to said valve rod and provided with a relief valve in its lower end portion, a tubular guide member for the upper end portion of said extension, air inlet ports in the upper end portion of said extension normally covered by said guide member, and means for actuating the extension to lift the discharge valve, valve rod and valve rod extension to uncover the air inlet ports whereby to permit entrance of air through the extension and past the relief valve into the tank.

7. A relief valve mechanism and valve rod actuator for car tanks having a vertically reciprocable bottom discharge outlet valve and valve rod, comprising, a fitting secured to the tank, a tubular valve rod extension rotatable therein and flexibly supported by the valve rod, air inlet ports in one end portion of said extension and a relief valve in the opposite end portion thereof, a guide member in said fitting surrounding the extension and normally closing said ports against entrance of air, and means enclosing the valve rod extension including a cover removable to permit rotation of said extension to lift said valve, valve rod and extension and open said ports whereby to permit entrance of air into the tank to equalize the pressures inside and outside thereof.

8. A combined relief valve mechanism and valve rod actuator for car tanks comprising, a fitting secured to the tank, a tubular valve rod extension slidably associated with the fitting and flexibly supported by the valve rod, and a relief valve within said extension.

9. In a car tank having a bottom discharge outlet valve, a valve rod therefor, means for actuating said valve rod and relieving vacuum within said tank comprising, a tubular valve rod extension, a flexible coupling member connecting adjacent end portions of said valve rod and valve rod extension, said extension having ports for admitting air thereto upon actuation of the extension to open said outlet valve, and means including a relief valve supported by said coupling member and arranged within said extension for controlling the flow of air from the extension into said tank to relieve vacuum created within the latter.

10. In a car tank, a vertically reciprocable out-

let valve, a valve rod therefor, and a combined outlet valve operator and relief valve means comprising, a fitting secured to the tank, a tubular guide member secured in said fitting, a hollow
 5 valve rod extension rotatably slidable in said guide member, a coupling member flexibly connecting adjacent end portions of said rod and extension, and means including a relief valve supported by the coupling and operative in said
 10 extension upon actuation of the latter to admit air to the tank whereby to prevent creation of a vacuum therewithin.

11. A combined relief valve mechanism and valve rod actuator for car tanks comprising, a
 15 tubular valve rod extension, a fitting including a stuffing box secured to the tank and in which the valve rod extension is slidably mounted, air inlet ports in the upper end portion of the extension, said stuffing box including a guide member for said extension, and a relief valve within
 20 said extension.

12. In a car tank, a discharge outlet valve, a valve rod therefor, a tubular valve rod extension flexibly connected with the valve rod and having
 25 its upper end portion arranged outside the tank, said extension having air inlet ports adjacent its upper end portion and outside the tank, a guide member surrounding the upper end portion of the extension and normally covering the inlet ports,
 30 a relief valve at the lower end portion of the extension, and means for shifting the valve rod and valve rod extension longitudinally to open the outlet valve and to uncover the inlet ports to permit entrance of outside air into the tank.

13. In a car tank, a discharge outlet valve, a valve rod therefor, a tubular valve rod extension flexibly connected with the valve rod and having
 35 its upper end portion arranged outside the tank, said extension having air inlet ports adjacent its upper end portion and outside the tank, and air outlet ports at its lower end portion, a guide member surrounding the upper end portion of
 40 the extension and normally covering the inlet ports, a relief valve at the lower end portion of the extension, and means for shifting the valve rod and valve rod extension longitudinally to open the outlet valve and to uncover the inlet ports to permit entrance of outside air into the tank.

14. In a car tank having a bottom discharge outlet valve, a valve rod therefor, and a combined
 50 valve rod actuator and relief valve mechanism comprising a fitting secured to said tank, a hollow valve rod extension flexibly connected at one end portion with the valve rod with its opposite end portion projecting through said fitting, a relief valve in the lower portion of said extension,
 55 a plurality of longitudinally staggered air inlet ports in the upper portion of said extension, and a guide secured within the fitting with which said extension is slidably associated and which normally covers said ports.

15. In a car tank, a vertically reciprocable bottom discharge valve and means for actuating the valve to and from closed position comprising, a valve rod, a tubular valve rod extension connected to said valve rod and provided with a relief valve in its lower end portion, a tubular guide member for the upper end portion of said extension, a plurality of longitudinally staggered air inlet ports in the upper end portion of said extension normally covered by said guide member, and
 10 means for actuating the extension to lift the discharge valve, valve rod and valve rod extension to progressively uncover the air inlet ports whereby to permit entrance of air through the extension and past the relief valve into the tank.

16. In a car tank, a discharge outlet valve, a valve rod therefor, a tubular valve rod extension flexibly connected with the valve rod and having its upper end portion arranged outside the tank, said extension having staggered air inlet ports
 20 adjacent its upper end portion and outside the tank, a guide member surrounding the upper end portion of the extension and normally covering the inlet ports, a relief valve at the lower end portion of the extension, and means for shifting the valve rod and valve rod extension longitudinally to gradually open the outlet valve and to progressively uncover the inlet ports thereby permitting entrance of outside air into the tank in proportion to the opening of the outlet valve.

17. In a car tank having a bottom discharge outlet valve and valve rod therefor, a valve rod actuator supported by said valve rod, and means associated with and effective upon operation of the valve rod actuator to admit air into said tank.

18. In a car tank having a bottom discharge outlet valve, a valve rod, a valve rod actuator supported by said valve rod, and relief valve mechanism including air inlet ports associated with said valve rod actuator, said inlet ports being
 40 so formed and arranged as to effect admission of air into the tank upon operation of said valve rod actuator to open the outlet valve.

19. In a car tank having a bottom discharge outlet, a valve assembly comprising a valve for said outlet, a valve rod, a valve rod actuator supported by the valve rod, and air inlet means formed in said valve rod actuator and effective upon operation thereof to admit air into said tank to relieve vacuum created therewithin.

20. In a car tank, a discharge outlet valve, a valve rod therefor formed of a plurality of sections, one of said sections extending through the wall of said tank and being formed with a duct communicating with the atmosphere above and below said tank wall, a relief valve arranged in said duct, and means operable upon movement of said rod for effecting the opening and closing of said duct outside of said tank.

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