

June 16, 1931.

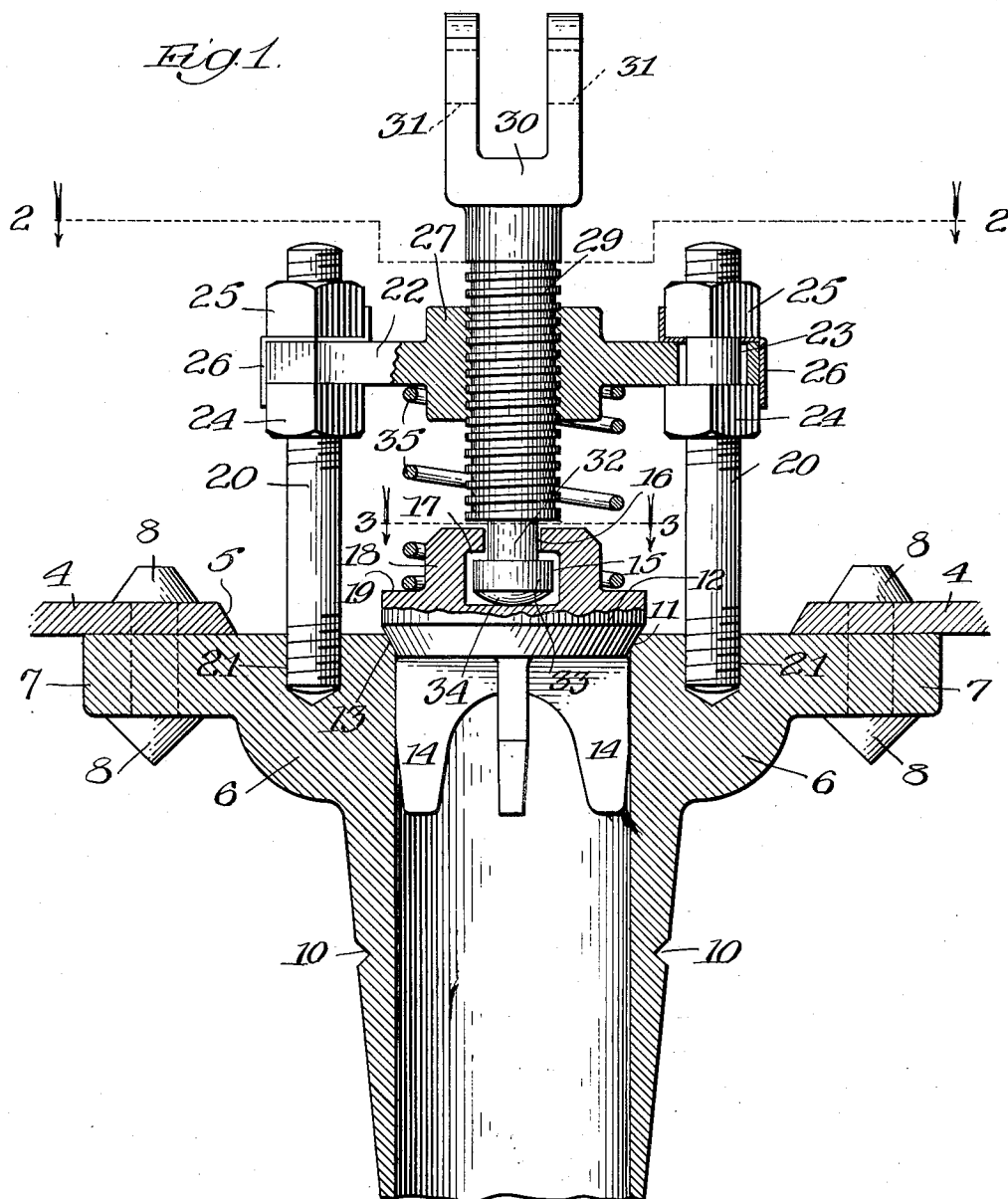
O. J. PARKS

1,810,620

OUTLET VALVE MECHANISM

Filed May 21, 1927

2 Sheets-Sheet 1



Inventor:
Ostrander J. Parks
By Durham, Lee, Christon, & Miles,
Attys.

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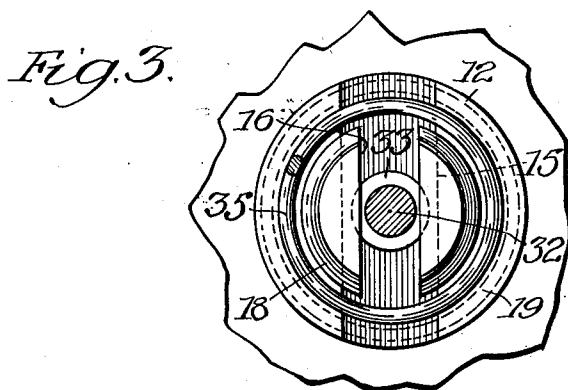
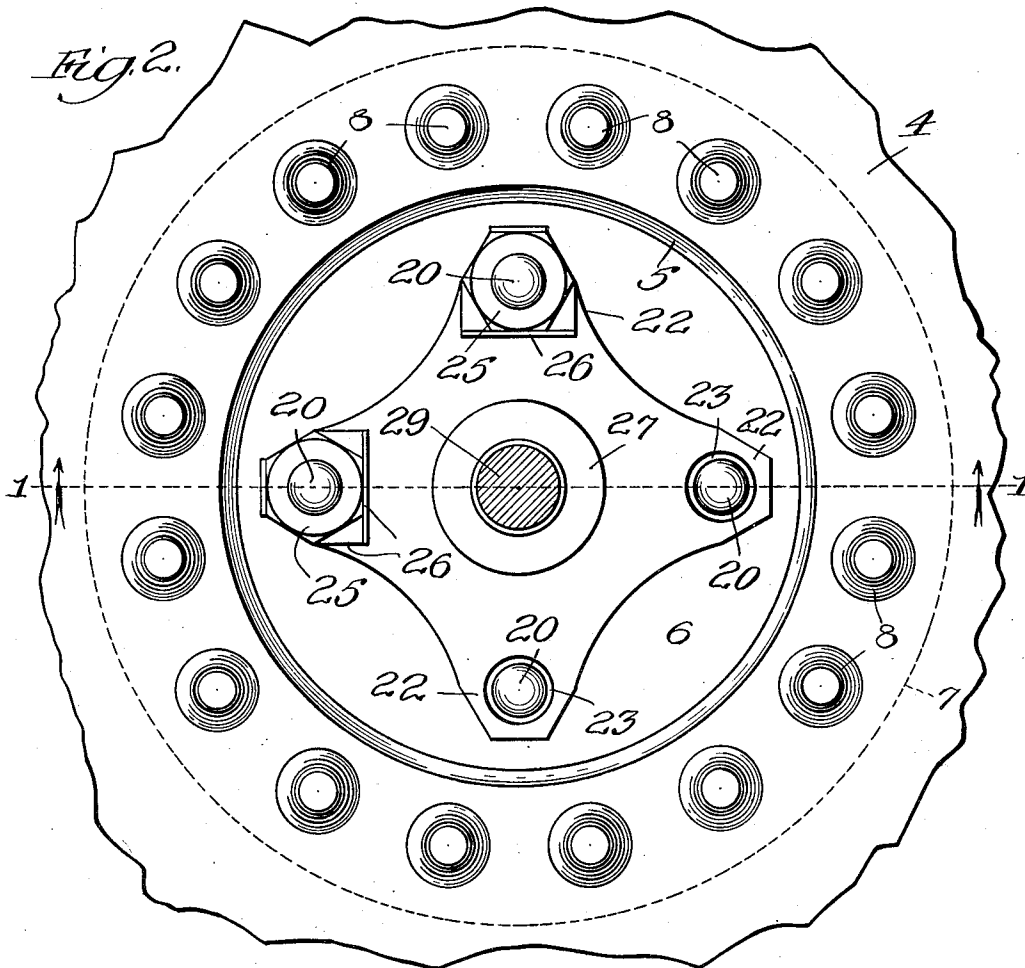
O. J. PARKS

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2 Sheets-Sheet 2



Inventor:
Ostrander J. Parks
By *Dyrenforth, Lee, Christon, & Wills,*
Attys.

UNITED STATES PATENT OFFICE

OSTRANDER J. PARKS, OF RIVER FOREST, ILLINOIS, ASSIGNOR TO GENERAL AMERICAN TANK CAR CORPORATION, OF CHICAGO, ILLINOIS, A CORPORATION OF WEST VIRGINIA

OUTLET VALVE MECHANISM

Application filed May 21, 1927. Serial No. 193,313.

My invention relates more particularly, though not exclusively, to outlet valve mechanisms for tank cars and my primary object generally stated, is to provide improvements in valve mechanisms of the type in which the position of the valve proper is controllable through a positive direct connection therewith, whereby the valve will be caused to function with a maximum degree of effectiveness, be positive in operation, and in its use in connection with a tank car meet the many requirements demanded of valve mechanism in such construction.

Certain of the objects more specifically stated, are to provide a construction of tank-outlet valve mechanism whereby the minimum obstruction of the flow of the contents of the tank to the valve, is presented; to provide a construction of such mechanism whereby distortion of the tank, produced as for example in the case of a wreck, will not result in the opening of the valve and thus loss of the contents of the tank through the outlet is prevented; to provide in a valve mechanism provided with means for positively operating the valve, means whereby should these positive means fail in the position thereof for holding the valve closed, nevertheless the valve will remain in closed position; to provide in such a structure for the holding of the valve against vibration when in partially released position thereby avoiding undue wear of the valve and the seat and to provide for the centering of the valve in its travel toward the valve seat; to provide a construction of valve mechanism whereby the valve proper may be readily ground on its seat when such operation becomes advisable and without requiring the removal of the valve; to provide a construction whereby the minimum opportunity for leakage at the joints between the tank and valve mechanism, is presented; to provide as a unitary structure, separate from the tank walls proper, the valve mechanism and its operating parts to ensure against unseating of the valve in the event of distortion of the bottom sheet of the tank and in this connection to provide for such flexibility of the structure that such distortion will be ineffective to produce opening

of the valve or undue strains thereon; and other objects as will be manifest from the following description.

Referring to the accompanying drawings:

Figure 1 is a view in vertical sectional elevation of the outlet portion of a tank car showing it as equipped with valve mechanism constructed in accordance with my invention, this view being taken at the line 1—1 on Fig. 2 and viewed in the direction of the arrows. Figure 2 is a plan sectional view taken at the irregular line 2—2 on Fig. 1 and viewed in the direction of the arrows; and Figure 3, a plan sectional view taken at the line 3—3 on Fig. 1 and viewed in the direction of the arrows.

In the particular construction shown 4 represents the bottom sheet of a tank car containing an opening 5 at which the valve-equipped tank-outlet member hereinafter described is located.

Fitting flatwise at its upper surface against the underside of the bottom sheet 4 to extend entirely across the opening 5, is the tank-outlet member 6 above referred to and in the form of an outlet-leg shown as formed with an annular flange portion 7 which underlaps the annular wall portion of the opening 5 and to which it is rigidly secured as by rivets 8 to form a tight joint, the depending discharge tubular portion of the leg 6 being represented at 9 and containing a peripheral breakage groove 10 as is common in constructions of this character.

The outlet leg 6 is provided at its upper end portion with a seat 11 shown as of mitre form with which cooperates the valve proper 12 of the outlet valve-mechanism. The valve proper 12 is shown as provided with a peripheral mitred seating surface 13 at which it engages the seat 11 and is formed with depending guide wings 14 which extend into the bore of the leg 6. The valve proper 12 contains an upwardly opening, transversely extending slot 15 restricted at its upper portion as represented at 16 and providing the parallel shoulder surfaces 17, the upper portion of the valve proper 12 being of reduced diameter to provide the reduced portion 18 surrounded by the annular shoulder 19.

Rising from, and rigidly secured to, the leg 6 within the confines of the opening 5 in the tank, is a series of screw bolts 20, forming studs, four of these studs arranged in a rectangular formation comprising the series in the particular construction shown, though the number and arrangement thereof may be varied as desired, these studs screwing into the threaded upwardly opening sockets 21 in the body portion of the leg 6. The studs 20 serve as a support for a nut 22 shown as of spider form, this spider nut containing openings 23 at its marginal edge portion to receive the upper ends of the studs 20 provided with nuts 24 between which and nuts 25 on the upper ends of the studs, the nut 22 is firmly clamped in position, the nuts 24 and 25 being held against turning by means of nut-locks 26.

The spider nut 22 at its central threaded portion is vertically thickened as shown to form a hub-portion 27 substantially in vertical alignment with the valve proper 12.

Screwing in the hub-portion 27 is a threaded rod 29 the upper end of which may be of yoke form as represented at 30 to interlockingly receive the lower end of a rod (not shown) which would extend at its upper end to a point accessible for rotation by the operator in accordance with well-known practice, the upwardly extending legs of the yoke 30 containing aligning apertures 31 to receive a pin for connecting together the yoke 30 and the operating rod above referred to. The rod 29 a short distance above its lower end is of reduced diameter to provided a neck portion 32 terminating in a head 33 the under surface of which is in the form of a segment of a sphere as represented at 34. The parts of the valve proper and the rod 29 are so proportioned and arranged as shown that when these parts are assembled into operative position, as shown in the drawings, the head portion 33 will loosely extend into the lower, larger, portion of the slot 15 and the neck portion 32 will loosely extend into the restricted portion 16 of this slot, and when the valve proper 12 is forced into tight engagement with its seat 11 by the rod 29 there will be a clearance between the upper surface of the valve proper and the under surface of the threaded part of the rod 29 and between the upper surface of the head 33 and the shoulders 17. The valve mechanism also comprises a coil spring 35 which surrounds the threaded portion of the rod 29 and the portions 18 and 27 of the valve 12 and nut 22, respectively, and bears at its opposite ends against the shoulder 19 of the nut 12 and the underside of the spider nut 22, this spring being under compression and tending to hold the valve 12 firmly against the seat 11.

The openings 23 in the spider nut 22 are slightly larger than the studs which permit, by reason of the adaptability for transverse

adjustment of the spider nut, of the accurate aligning of the nut proper 27 and the rod 29 relative to the valve 12.

As will be understood from the foregoing description the actuating rod 29 serves, by its cooperation with the spider nut 22, as a means for unseating the valve 12 and positively forcing it against the seat 11, under the control of the operator. When the rod 29 is rotated in counterclockwise direction in Fig. 3 the engagement of its head 33 with the shoulders 17 positively raises the valve proper 12 against the action of the spring 35 to open the outlet. When this rod is rotated in a clockwise direction in this figure, the valve proper 12 is forcibly pressed against the valve seat 11 by the engagement of the head 33 with the bottom of the slot 15.

By providing the spring 35 as described, the valve proper 12 is steadied against vibration tending to be produced in the partially open condition of the valve 12 and which if not avoided produces objectionable wear of the valve proper or the seat with which it cooperates, or both. Furthermore, this spring assists in holding the valve proper 12 to travel in properly centralized position; and also serves to press the valve proper 12 against the seat 11 with a force sufficient to prevent unseating of this valve should the rod 29 become backed off or so impaired that it ceases to exert sufficient pressure against the valve 12 to firmly hold the latter against the seat. One of the purposes, therefore, of this spring is to afford a safety means to prevent accidental unseating of the valve proper 12 in the event of the impairment of the positive valve positioning means.

The feature of providing a series of studs 20 as described is of advantage inasmuch as the minimum resistance to the flow of the contents of the tank to the outlet, is presented, and by providing these studs on the outlet leg provision is made for supporting the operating-rod-engaging nut without requiring a joint which in case of impairment would produce a leakage of the tank contents there-through.

Another advantage of constructing the valve mechanism as described to form a unitary structure is that danger of unseating the valve, should the lower portion of the outlet leg become broken off at the breaking groove 10, is obviated and distortion of the walls of the tank, as for example as sometimes occurs in case of a wreck, will not cause the valve to become unseated. Furthermore, the provision of the jaw forming yoke 30 above the spider nut 22 affords such flexibility that should the tank become distorted the valve device will not be subjected to strains which otherwise may be imposed on it.

Still another advantage resulting from my improved construction is the adaptability of the mechanism for regrinding of the valve

seat without removal of the valve which may be effected by blocking up the spring in a position in which its pressure against the valve is relieved and thereupon rotating the valve on its seat as by operating in alternate directions a rope, or wire, wound around the portion 18 in accordance with the well-known cord-wire method of grinding valves to their seats.

While I have illustrated and described a particular construction embodying my invention, I do not wish to be understood as intending to limit it thereto as the same may be variously modified and altered without departing from the spirit of my invention, and as an example of a modification thereof, with the spring feature omitted, it may be stated that if desired the head 33 instead of being cylindrical as shown may be of rectangular shape in cross section and of such width that it will engage the side walls of the groove 15 when the rod 29 is rotated whereby the valve 12 would rotate against the seat 11 to closed position.

What I claim as new, and desire to secure by Letters Patent, is:

1. In a tank structure, a tank having an opening in its lower wall, and a valve and outlet-assembly comprising a member extending across said opening and secured to said wall and containing a passage therethrough forming an outlet for the tank, a valve controlling said outlet, a series of upwardly extending studs connected with said member and grouped around said outlet, a nut carried by said studs and vertically spaced from said member and an operating rod for said valve engaging said nut, fastening means on said studs securing said member thereto for adjustment along the studs with respect to said opening, said assembly being adapted for assembly with, and removable from, said tank, as a unit.

2. In a tank structure having an outlet in its lower portion and provided with a valve seat, a valve cooperating with said seat for controlling said outlet, means for pressing said valve to said seat having lost motion connection with said valve and with which said valve loosely engages to permit said valve to tilt in a plurality of directions relative to said means and adjust itself to said seat, said means engaging said valve at the center of the latter, and a spring exerting closing pressure against said valve and operating to prevent rattling of said valve on said seat or on said means when the pressure of said means against said valve forcing the latter to said seat is released.

3. In a tank structure having an outlet in its lower portion and provided with a valve seat, a valve cooperating with said seat for controlling said outlet, a spring exerting closing pressure against said valve, means for opening said valve against the resistance of

said spring and for applying closing pressure to said valve comprising an actuating element having lost motion connection with said valve and with which said valve is loosely engaged to permit said valve to tilt in a plurality of directions relative to said element and adjust itself to said seat, said actuating element being threaded and engaging said valve at the center of the latter, and a stationary threaded member with which said element has threaded engagement.

4. In a tank structure having an outlet in its lower portion, a valve controlling said outlet, a spring exerting closing pressure against said valve, and means for opening said valve against the resistance of said spring and for applying closing pressure to said valve, said spring being so arranged as to prevent rattling of said valve on said seat or on said means when the pressure of said means against said valve forcing the latter to said seat is released, said valve containing a transversely disposed upwardly opening recess opening through a side of the valve and having a constricted upper portion the lower portion of said means comprising a neck portion terminating at its lower portion in a head, said neck portion extending loosely into the constricted portion of said recess and movable lengthwise therein and said head extending loosely into the larger portion of said recess, said valve and said means being adapted for assembly by relative movement of said valve and said means in a direction crosswise of these parts.

5. In a tank structure having an outlet in its lower portion, a valve controlling said outlet, a spring exerting closing pressure against said valve, and rotary means for opening said valve against the resistance of said spring and for applying closing pressure to said valve, said spring being so arranged as to prevent rattling of said valve on said seat or on said means when the pressure of said means against said valve forcing the latter to said seat is released, said valve containing a transversely disposed upwardly opening recess opening through a side of the valve and having a constricted upper portion, the lower portion of said means comprising a neck portion terminating at its lower portion in a head, said neck portion extending loosely into the constricted portion of said recess and movable lengthwise therein and said head extending loosely into the larger portion of said recess, said valve and said means being adapted for assembly by relative movement of said valve and said means in a direction crosswise of these parts.

6. In a tank structure having an outlet in its lower portion and provided with a valve seat, a valve cooperating with said seat for controlling said outlet, a spring exerting closing pressure against said valve, and means for opening said valve against the re-

- sistance of said spring and for applying closing pressure to said valve comprising an actuating element, said spring being so arranged as to prevent rattling of said valve on said seat or on said means when the pressure of said means against said valve forcing the latter to said seat is released, said valve containing a transversely disposed upwardly opening recess opening through a side of the valve and having a constricted upper portion, the lower portion of said actuating element comprising a neck portion loosely extending into the constricted portion of said recess and terminating at its lower end in a head extending into the larger portion of said recess, said neck being longer than the depth of said constricted portion of said recess and said head being shorter than the depth of the larger portion of said recess, whereby the valve is connected with said actuating element by a lost motion connection and the valve is adapted to tilt on said element to permit the valve to adjust itself to said seat.
7. In a tank structure having an outlet in its lower portion and provided with a valve seat, a valve cooperating with said seat for controlling said outlet, a spring exerting closing pressure against said valve, and means for opening said valve against the resistance of said spring and for applying closing pressure to said valve and comprising an actuating element having lost motion connection with said valve and with which said valve is loosely engaged to permit said valve to tilt in a plurality of directions relative to said element and adjust itself to said seat, said element engaging said valve at the center of the latter and said spring being so arranged that when said valve is not pressed against said seat it yieldingly holds said valve in a fixed position on said means.
8. In a tank structure, a tank having an opening in its lower wall, and a valve and outlet assembly comprising a member extending across said opening and secured to said wall and containing a passage therethrough forming an outlet for the tank and terminating at its upper end in a seat, a spring controlled valve controlling said outlet and adapted to engage said seat, and a series of upwardly extending studs connected with said member and grouped around said outlet, a nut carried by said studs and vertically spaced from said member and an operating rod for said valve engaging said nut, nuts on said studs above and below said member and adjustable along the studs to vary the position of said member to thereby tension the spring of the valve, said assembly being adapted for assembly with, and removable from, said tank, as a unit.
9. In a tank structure having an opening in its lower wall, a member extending across said opening and secured to said wall in a position to engage the underside of said wall, said member containing a passage therethrough forming an outlet for the tank terminating at its upper end in a seat, a spring controlled valve controlling said outlet and adapted to engage said seat, a series of upwardly extending studs screwed at their lower ends into said member and grouped around said outlet and extending through said opening, a nut carried by said studs and vertically spaced from said member and an operating rod for said valve engaging said nut, nuts on said studs above and below said member and adjustable along the studs to vary the position of said member to thereby tension the spring of the valve.
- OSTRANDER J. PARKS.