Aug. 4, 1936. W. A. EATON 2,049,997

TANK TRUCK

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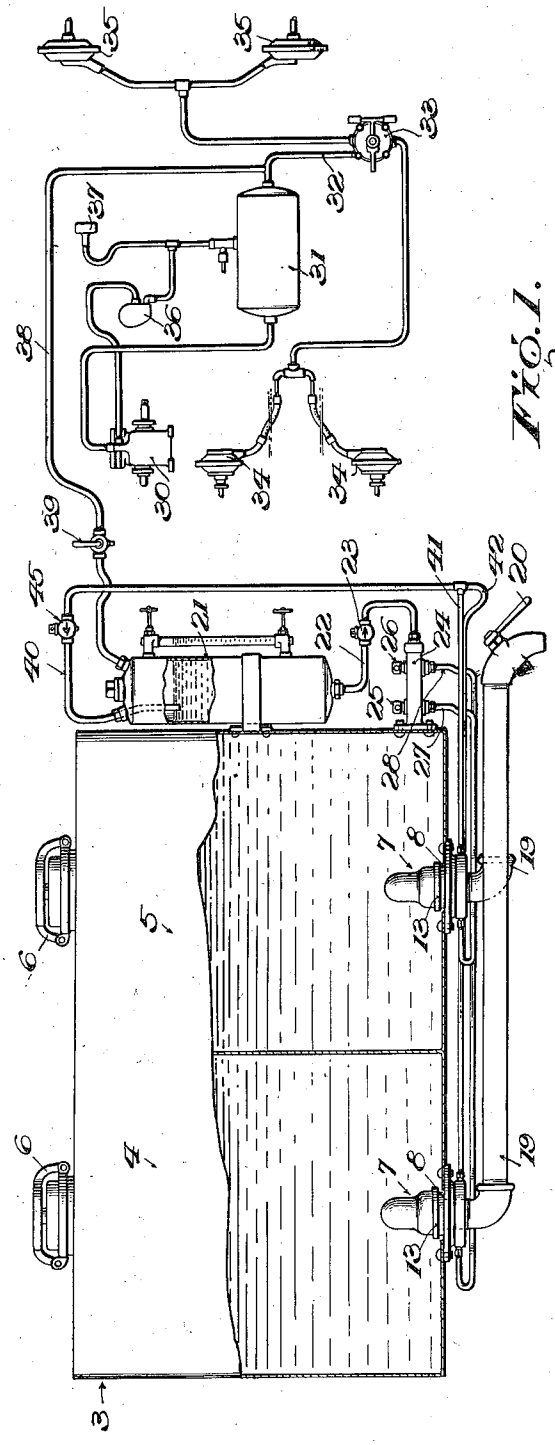


Fig. 1.

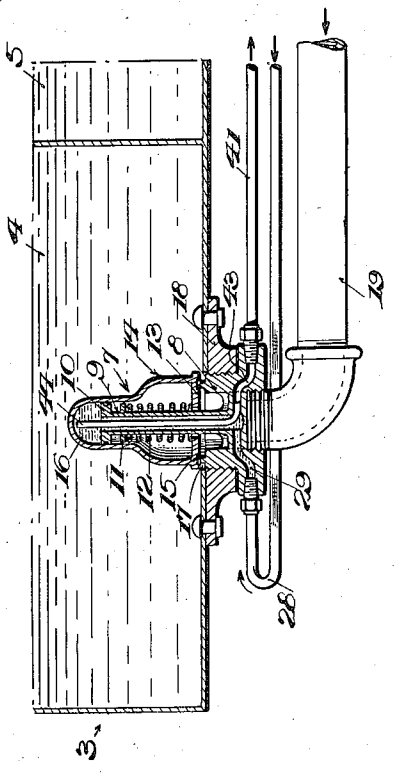


Fig. 2.

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TANK TRUCK

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8 Claims. (Cl. 137—21)

This invention relates to tank trucks and more particularly to a control mechanism for the delivery valves thereof.

Tank trucks of the type provided with a plurality of compartments adapted for the reception of petroleum liquids have heretofore been provided with internally-disposed self-closing discharge valves, one for each compartment, the said valves communicating through separate delivery lines with a discharge nozzle positioned at the rear of the truck. In such prior installations, it has been proposed to effect a remote control of the individual discharge valves by an hydraulically-controlled pressure system, such an arrangement offering many advantages over a remotely-controlled mechanical system. When utilizing such hydraulic control equipment, it is necessary to provide an operator-controlled hydraulic pump for effecting an increase in the pressure in the hydraulic system to actuate the discharge valve mechanism, the operation of such pumps not only consuming the time but also the energy of the operator. Moreover, such pumps have been found not to be entirely satisfactory due to leakage and wearing of the pump parts. In such prior installations, it has been determined that air entrapped with the hydraulic fluid collects at the highest point of the system and that periodically it was necessary to manually bleed such entrapped air to atmosphere in order to avoid the necessity of unnecessarily operating the pump to compress such air to effect a sufficient rise of pressure in the hydraulic system to open the desired discharge valve.

It is, accordingly, one of the objects of the present invention to provide a novel control mechanism for the discharge valves of a tank truck, which mechanism shall be so constituted as to retain the advantages of an hydraulic control system but at the same time to avoid the disadvantages thereof in that the hydraulic pump is dispensed with.

Another object of the invention is to provide a novel control system of the type above referred to wherein the pressure of the hydraulic system is increased, to effect operation of the desired discharge valve, without necessitating the expenditure of undue time and energy of the operator.

Another object is to provide in a control system of the type referred to a novel arrangement whereby air under pressure is supplied to the hydraulic system to operate the tank discharge valves.

Still another object is to provide, in a combined air-hydraulic control system for tank truck valves, a novel arrangement for automatically bleeding entrapped air from the system whereby the necessity for the operator periodically bleeding the system is avoided.

A further object is to provide in a control system of the above character a means whereby the air pressure for utilization in connection with the hydraulic pressure system may be obtained from the air brake system of the tank truck, whereby the necessity of providing an additional compressor or air reservoir is avoided.

Other objects and novel features of the invention will appear more fully hereinafter from the following detailed description when taken in connection with the accompanying drawing. It is to be expressly understood, however, that the drawing is for purposes of illustration only, reference being had to the accompanying claims for a definition of the limits of the invention.

Referring to the drawing, wherein similar reference characters refer to similar parts throughout the several views:

Fig. 1 is a diagrammatic sketch, partly in section, of a tank truck equipped with an air brake system and illustrating the principles of the present invention, and

Fig. 2 is an enlarged view of one of the discharge valves associated with each tank truck compartment.

A control mechanism illustrating the principles of the present invention is shown in Figs. 1 and 2 as associated with a tank truck 3 having a plurality of similar compartments 4 and 5 adapted to receive a petroleum liquid. Each compartment is provided with the usual cover 6 and at the bottom of each compartment there is disposed an internal discharge valve 7, the valve portion of which is disposed wholly within each compartment.

As more fully disclosed in Fig. 2, the valve 7 comprises a seat 8 having an upwardly-formed tubular extension 9, the upper extremity of which has a piston 10 secured thereto. Also secured to said extension 9 is an abutment 11 for receiving one end of an expansion spring 12, the other end of said spring being adapted to seat upon the bottom 13 of the valve element 14, the latter being provided with a suitable facing 15 for cooperation with the seat 8. The upper portion of the valve element 14 is formed to provide a chamber or cylinder 16 to which fluid under pressure is adapted to be admitted to effect an upward movement of the valve element 14 to open the latter against the tension of spring 12. The entire valve

assembly is inserted bodily within a suitable opening 17 in the bottom of each tank compartment and is threadedly maintained in place by cooperation with boss 18 secured to each compartment and surrounding the opening 17. The valve when open serves to connect the interior of the compartment with a discharge line 19, it being observed from Fig. 1 that each discharge line is provided with an individual faucet 20 of well-known construction.

Means are provided for remotely controlling the operation of each of the discharge valves 7, and preferably such means are of the combined air pressure hydraulic type. As shown, such means are constituted by a liquid reservoir 21 positioned at the rear of the truck and communicating through conduit 22, check valve 23 and header 24 with the valves 7. Preferably the header is connected through selectively-operable valves 25 and 26 with conduits 27 and 28 respectively, which latter communicate through a bore 29 in the member 8 with the extension 9 of each respective discharge valve. It is, therefore, apparent that the hydraulic fluid may be conveyed from the tank 21 through either of the pipes 27 or 28 into the chamber 16 for actuation of the desired valve mechanism.

One of the features of the present invention resides in the application of pressure to the hydraulic fluid within the reservoir 21, and preferably air under pressure is employed for this purpose. Referring to Fig. 1, a conventional air brake system is disclosed therein as including a compressor 30 adapted to supply air under pressure to a reservoir 31, the latter communicating through conduit 32 with a brake valve 33, which when actuated controls the flow of air under pressure to front and rear brake chambers 34 and 35 respectively. The compressor is provided with a suitable governing mechanism 36 and a pressure gauge 37 is associated with the reservoir 31. In order to utilize air under pressure from such air brake system to control the pressure of the hydraulic fluid in the valve control mechanism heretofore described, a conduit 38 is connected with conduit 32 and communicates with the top of reservoir 21 through a manually-operable three-way valve 39, which latter when in one position admits air under pressure to reservoir 21 and when in the other position vents the reservoir 21 to atmosphere. From this construction, it will be readily perceived that the control of the pressure in the hydraulic system is rendered quite simple.

In order to complete the hydraulic system and in order also to provide means for automatically venting entrapped air in the hydraulic system, a conduit 40 positioned at the top of reservoir 21 and extending just below the level of the liquid therein is provided, which conduit communicates with branch conduits 41 and 42 leading to the various valves 7. As shown in Fig. 2, each of these conduits communicates through a bore 43 in the member 8 with a tube 44 extending through extension 9 and communicating with the top of the chamber or cylinder 16. By this construction, entrapped air in the top of said cylinder will be conducted through tube 44, bore 43 and conduits 41 and 40 back to reservoir 21 and thence to atmosphere through valve 39 when the latter is turned to exhaust the air from the reservoir 21. Preferably the reservoir 21 is so located with respect to the valve 7 that the level of the liquid in the former is at a higher level than the cylinder 16, it having been found that with such an arrangement, the head of hydraulic fluid reservoir will effect such a pressure in the hydraulic system as to cause an automatic venting of the entrapped air in the cylinder of each valve at all times. Preferably the conduit 41 has a check valve 45 interposed therein which is so constituted as to permit the flow of fluid from the valve 7 to the reservoir 21 only.

From the above, it will be understood that when it is desired to dispense liquid from either of the compartments, the operator opens the desired valve 25 or 26 and then admits air under pressure from the air brake reservoir to the hydraulic reservoir 21 through valve 39. The resultant increase in pressure of the hydraulic fluid then effects an opening of the desired discharge valve 7 and the liquid may be dispensed through the proper faucet 20. After the desired amount of liquid has been dispensed, the valve 25 or 26 is closed and valve 39 is placed in exhaust position wherein the air under pressure is exhausted from the reservoir 21. The spring 12 thereupon seats the valve element 14 and since the check valve 23 will not permit the hydraulic fluid to flow back to the reservoir 21, such fluid and any air trapped in the chamber 16 will be forced through tube 44, bore 43 and conduit 40 back to the reservoir. Thus the tendency is for the air which collects in the valve chamber to be forced back to the reservoir through the tube 44. It is, furthermore, noted that since the level of the hydraulic fluid in the reservoir 21 is higher than the discharge valves, the head of fluid will tend to force the entrapped air out of the valve chamber and compress it in the tube 44 and conduits 41 or 42, which air will be automatically bled to atmosphere after a dispensing operation, as above described.

There is thus provided by the present invention a novel valve control mechanism for tank trucks embodying all the desirable features of an hydraulic system and at the same time eliminating the disadvantages thereof. The provision of the air-hydraulic system not only eliminates the hydraulic pump and its attendant high cost and operating difficulties but utilizes a source of pressure to be found on the great majority of commercial vehicles. The arrangement proposed for bleeding the system of entrapped air is unusually simple but extremely effective and secures the bleeding of air in an entirely automatic manner and without any thought on the part of the operator.

While one embodiment of the invention has been shown and described herein, it is to be expressly understood that the same is not limited thereto but may be embodied in various forms as well understood by those skilled in the art without departing from the spirit of the invention. Reference will, therefore, be had to the appended claims for a definition of the limits thereof.

What is claimed is:

1. In combination with a tank having a plurality of separate compartments for the reception of liquid, discharge lines communicating with said compartments, internal valves inserted within each compartment and communicating with each discharge line, an hydraulic pressure system communicating from the exterior of the compartment to the said valves within said compartments for actuating the valves, said hydraulic pressure system being closed from access to the liquid within the compartments, a source of air under pressure, manually-operable control means for controlling the flow of air under pressure from

said source to said hydraulic system to thereby effect an increase of the pressure of the latter to operate said valves, and means for automatically bleeding entrapped air from said system to said source.

2. In combination with a tank, a reservoir of air under pressure, a plurality of separate compartments adapted to receive a liquid, an hydraulically-operated self-closing valve positioned in the bottom of each compartment for controlling the delivery of liquid therefrom, a discharge line communicating with each compartment, an hydraulic pressure system including a reservoir communicating from the exterior of each compartment to within each valve for applying fluid pressure to said valves to operate the same, said system being closed from access to the liquid within each compartment, means for controlling the flow of air under pressure from said reservoir to said hydraulic system reservoir to operate said valves, and means for automatically bleeding entrapped air from said valves to said hydraulic system reservoir.

3. In combination with a compartment for liquid having an internally-mounted self-closing valve positioned in the bottom thereof, a discharge line for said compartment communicating with said valve, an hydraulic pressure system communicating with said valve for actuating the same, a system for supplying air under pressure to said hydraulic system to apply pressure thereto, and means for automatically bleeding entrapped air from said first named system into said second named system.

4. In combination with a compartment for liquid having an internally-mounted self-closing valve positioned in the bottom thereof, a discharge line communicating with said valve, an hydraulic pressure system including a reservoir having an hydraulic fluid therein for operating said valve, means for supplying air under pressure to said reservoir, and means in constant communication with said valve and reservoir for automatically bleeding entrapped air from said hydraulic system.

5. In combination with a tank, an internal discharge valve positioned wholly within the tank, means within the valve for normally maintaining the valve closed, a liquid reservoir, a conduit between the reservoir and the valve and closed from access to the fluid within the tank, means for controlling the flow of air under pressure to said liquid reservoir to increase the pressure therein to operate said valve, and means including a conduit connecting said valve and said reservoir for automatically bleeding entrapped air from said valve.

6. In combination with a tank, an internal discharge valve positioned wholly within the tank, means within the valve for normally maintaining the valve closed, a liquid reservoir, a conduit between the reservoir and the valve and closed from access to the fluid within the tank, a check valve in said conduit, means for controlling the flow of air under pressure to said reservoir to increase the pressure therein to operate said valve, and means including a conduit connecting said valve and said reservoir for automatically bleeding entrapped air from said valve, said conduit containing a check valve permitting flow of fluid from said first named valve to said reservoir only.

7. In combination with a tank, a reservoir of air under pressure, a compartment for receiving liquid, an internal discharge valve positioned wholly within the compartment, means associated with the valve for normally maintaining the valve closed, a liquid reservoir, a conduit between the reservoir and the valve and closed from access to the liquid within the tank, said conduit including a check valve permitting the flow of liquid from said reservoir to said valve only, means for admitting air under pressure from said reservoir to said liquid reservoir to control the operation of said valve, and means including a conduit connecting said valve and said liquid reservoir for automatically bleeding entrapped air from said valve and said first named conduit.

8. In combination with a tank, an internal discharge valve positioned wholly within the tank, means within the valve for normally maintaining the same closed, a chamber associated with said valve for receiving a liquid under pressure for actuating the valve, a liquid reservoir positioned at a higher level than said valve, means for supplying air under pressure to said reservoir, means for connecting said reservoir and said chamber, and a conduit connecting said chamber with said reservoir at a point higher than said valve whereby entrapped air in said chamber will be automatically bled into said reservoir.

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