

April 25, 1933.

R. PORTE

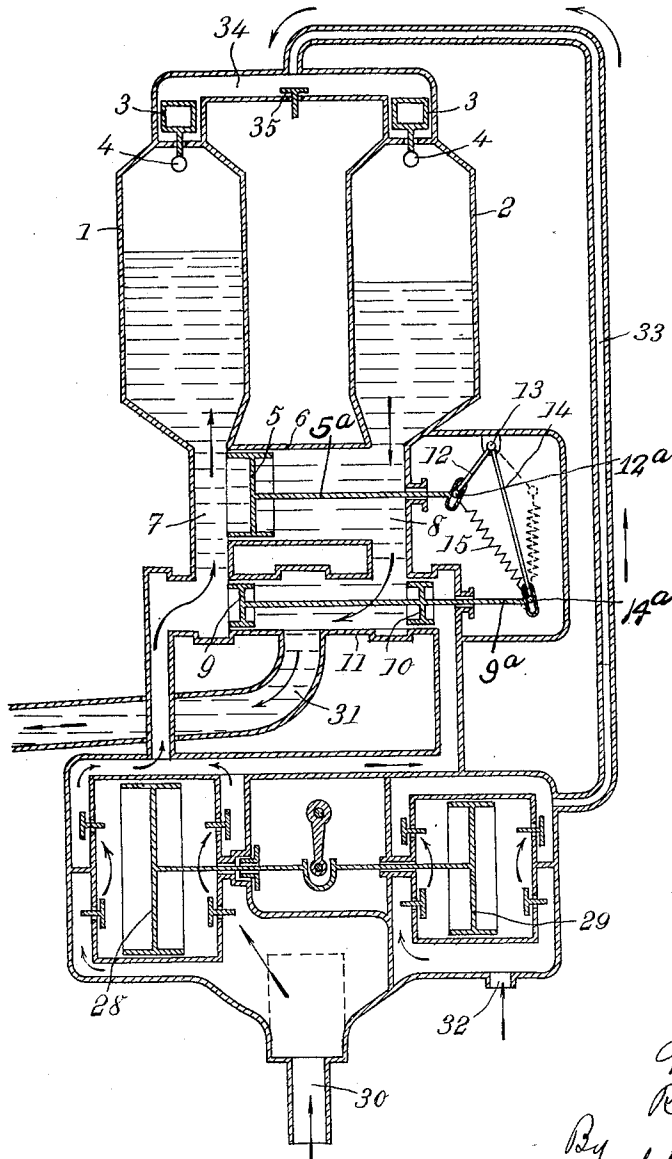
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AUTOMATIC DEVICE FOR MEASURING AND DELIVERING LIQUIDS

Filed Oct. 5, 1926

2 Sheets-Sheet 1

Fig. 1



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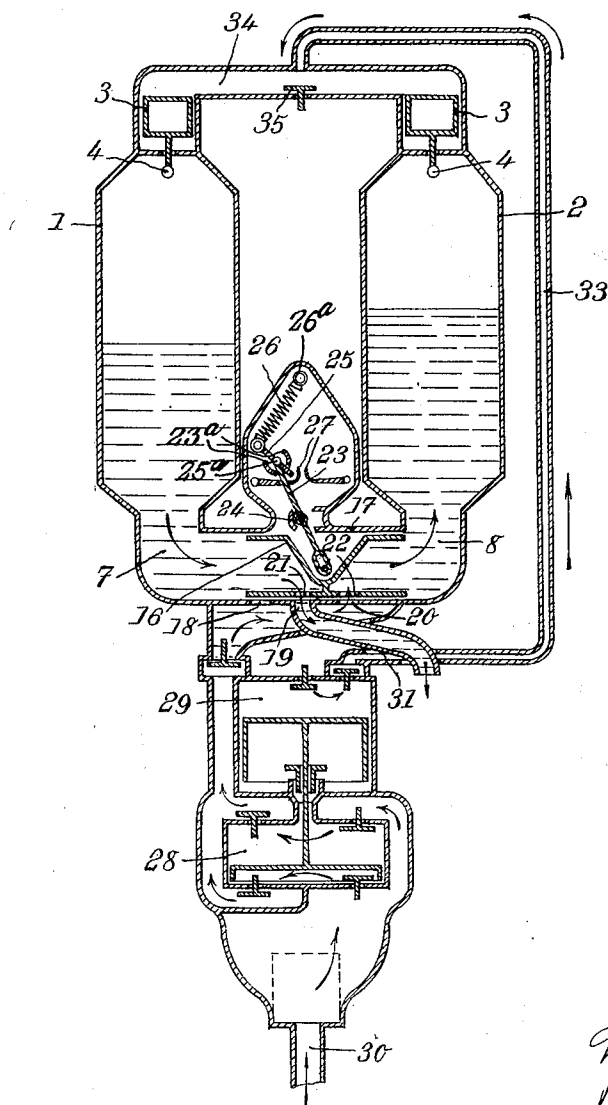
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2 Sheets-Sheet 2

Fig. 2.



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AUTOMATIC DEVICE FOR MEASURING AND DELIVERING LIQUIDS

Application filed October 5, 1926, Serial No. 139,712, and in Belgium May 22, 1926.

This invention relates to automatic devices for measuring and delivering liquids and more especially to those designed for use in connection with inflammable liquids.

5 The object of the present invention is to provide a simple structure capable of assuming rapid and automatic functioning of the measuring and delivery parts of the device.

This object is attained by means of the apparatus shown in the accompanying drawings in which:

Fig. 1 shows, diagrammatically, a vertical section of one embodiment of the invention.

Fig. 2 illustrates, diagrammatically, and also in vertical section a modified embodiment of the construction shown in Fig. 1.

Referring to the figures of the drawings, there is shown a pair of vertical measuring tanks or reservoirs 1 and 2, having the same dimensions and mounted side by side. Each tank is fitted exteriorly with a float 3 and interiorly with a valve 4. The floats 3 and valves 4 are connected by stems passing loosely through suitable openings formed in the top of each tank. As soon as one of the tanks becomes full, its float rises and moves the corresponding valve into closed position. Each tank is connected with a rapid, automatic reversing system for alternately filling and discharging the two tanks, said reversing system being automatically actuated by the pressure of the liquid contained in the tank which is full.

The reversing system comprises (1) means for controlling the alternate charging and discharging of each tank and (2) means for feeding liquid to the tank to be filled and for rapidly discharging liquid from the one already full.

40 The charge and discharge control shown in Fig. 1 comprises piston 5 sliding in horizontal cylinder 6 which is open at both ends and communicates with conduits 7 and 8 leading to each tank. The piston rod connected to piston 5 is arranged to slide through a packed opening in the wall of either conduit 7 or 8 (in Fig. 1 it is shown in connection with conduit 8). There is further provided a pair of piston valves 9 and 10, mounted in tandem to slide in a cylinder 11 having

its axis parallel to that of cylinder 6. Cylinder 11 is also open at both ends and, like cylinder 6, communicates with conduits 7 and 8. The piston rod connecting pistons 9 and 10 is packed to slide through a second opening in the wall of conduit 8. Finally, mechanism is provided connecting piston 5 and pistons 9 and 10 so that when piston 5 is displaced in one direction, pistons 9 and 10 are moved in the opposite direction. This interconnecting piston mechanism is further designed so that piston 5 during the first half of its course in either direction, stores up energy and utilizes the latter just before it reaches its dead point for completing the rest of its course. The mechanism connecting the pistons comprises a swinging link or lever pivoted at 12^a to the piston rod 5^a of the piston 5 and pivoted at 13 to a lug carried by the casing; a second lever 14 pivoted at 13 to the casing and pivoted at 14^a to the piston rod 9^a of the pistons 9 and 10, and a compression spring 15 connected at 12^a to the piston rod 5^a and at 14^a to the piston rod 9^a.

The charge and discharge control, as above constituted, operates in the following manner:—Starting with the apparatus in the position shown in Fig. 1 (pistons 5 and 9, 10 at one extreme position, tank 1 being filled and tank 2 in course of being emptied), liquid flows into tank 1 until valve 4 is lifted into closed position; the inflowing liquid, unable to escape past valve 4, exerts pressure on piston 5 and tends to move the latter towards its opposite extreme position; the motion of piston 5 is communicated by its piston rod to lever 12; said lever turning about its fixed pivot 13 and compressing spring 15 until the latter occupies the position shown in dotted lines; spring 15, in this position, is sufficiently inclined to exert a horizontal thrust on the piston rod connecting piston valves 9, 10 and moves the latter rapidly towards its opposite extreme position i. e. into the position where tank 1 discharges while tank 2 fills. In other words, when the piston rod 5^a moves to the right in Fig. 1, it will compress the spring 15, and after the point 12^a passes well beyond the dead center line between 13 and 14^a, then the spring will

become active to push on the rod 9^a, and this will move the piston rod to the left, cutting off the flow of fluid to the chamber 1 and establishing a connection between the chamber 2 and the supply conduit. The reverse action occurs when the piston rod 5^a is moved in the opposite direction. It is the carrying of the point 12^a across the line joining the points 13 and 14^a that causes the spring to become effective to move the control valve.

The charge and discharge control may also be constructed as illustrated in Fig. 2. Here a specially formed piston 16 is arranged to slide in a horizontal cylinder 17 open at both ends and communicating with conduits 7 and 8 respectively. Cylinder 17 is provided with a pair of charging apertures 18, 20 and one discharging aperture 19. Piston 16 is similarly provided with a pair of apertures 21, 22 so spaced that, at one extreme position of the piston, opening 21 coincides with discharge port 19 and aperture 22 with charge port 20, while at the other extreme position 21 and 22 coincide with 18 and 19 respectively.

The piston 16 is further provided with a mechanism in which power may be stored during the first portion of the movement of the piston which becomes effective to complete the movement of the piston. This mechanism comprises a lever 23 which is pivoted at 24 intermediate its ends to the casing. The lever is connected at its lower end to the piston 16. Said connection is both a pivoted and a sliding connection as the end of the lever moves in a curve partly about its pivot 24 as a center and the piston moves in a right line. On the other end of the lever 23 is mounted a swinging auxiliary lever 25. Said lever is pivoted at 25^a to the lever 23. Attached to this auxiliary lever 25 is a compression spring 26. Said spring is attached to the upper end of the lever, and at 26^a to the casing. The lever 23 is provided with spaced stops 23^a 23^a. On the casing are abutment members 27, 27 fixed to the casing and arranged to contact with the end of the lever 25.

The reversing operation takes place in the following way:—Starting from the position shown in Fig. 2 (piston 16 at one extreme position, tank 2 filling and tank 1 discharging), liquid flows into tank 2 until its valve 4 closes; the pressure exerted by the liquid in 2 is transmitted to piston 16 and moves it from right to left, at the same time turning levers 23 and 25 and compressing spring 26; slightly before lever 23 reaches its dead-point, lever 25 encounters the hooked portion of abutment 27 and turns on its axis; when lever 23 reaches its half-way position, spring 26 exerts a turning moment about 24 as an axis and this motion, communicated to piston 16, completes the movement of the latter towards its reversing po-

sition i. e. wherein tank 1 fills, while tank 2 empties. The operation of this reversing mechanism is very similar to that shown in Fig. 1, except for the fact that the control valve initiates the movement and stores power in the spring, which later becomes effective in completing the movement of the valve. By the use of the auxiliary lever, the spring is rendered effective before the lever 23 reaches a dead center position, for the reason that the auxiliary lever is swung by the abutment 27, and causes the connection between the spring and the auxiliary lever to pass the dead center line.

The apparatus is completed by combining means for filling and rapidly discharging the tanks with one of reversing systems above described. This means comprises, preferably, a group of two pumps mounted in tandem and having a common control, conduits for feeding and discharging liquid and conduits for carrying the air to be used in accelerating discharge.

The pumps may be arranged in various ways. For example, a pump for liquid 28, conveniently of the double effect type (Figs. 1 and 2), may be arranged in tandem with an air pump 29 which is shown, by way of illustration, in Fig. 1, as double effect and in Fig. 2 as single effect. The common rod connecting the two pump pistons may be actuated by any convenient form of motor. The two pumps should be placed so as to leave space for interposing the reversing control system between the tanks and the pump assembly.

The conduits for feeding and discharging liquid comprise pipe lines leading from feed conduit 30, through pump 28, to a chamber leading to conduits 7 and 8 and thence to tanks 1 and 2 respectively, and discharge conduit 31 for delivering liquid from either of said tanks.

The compressed air system for accelerating tank discharge includes an air inlet 32 leading to pump 29 which supplies air under pressure to conduit 33, and chamber 34 which latter communicates with the tops of tanks 1 and 2. Floats 3 are dimensioned to move freely in chamber 34. Preferably chamber 34 is provided with a valve 35 arranged to close tightly under pressure within the chamber and to open when this pressure diminishes below that of the atmosphere. This valve permits discharge of the tanks by gravity after the pumps have stopped functioning.

The construction thus provided operates automatically and, since each tank is emptied under pressure, measures very accurately the liquid passing therethrough.

What I claim is:—

1. In an apparatus of the class described, the combination of two measuring chambers of given capacity, means for supplying liq-

uid under pressure to said chambers, a discharge conduit communicating with said chambers, a valve mechanism cooperating with said liquid supply means and said discharge conduit and for controlling the supply to and the discharge from said chambers, means for automatically operating said valve mechanism when a chamber is supplied with a measured quantity of liquid for disconnecting said filling chamber from the supply and connecting the same to the discharge conduit therefor, said last named means including a lever attached to the valve, an auxiliary lever pivoted to the upper end of said first-named lever, a compression spring connected to the outer end of said auxiliary lever and to the casing, stops for limiting the swinging movement of said auxiliary lever and abutments carried by the casing and adapted to engage and swing said auxiliary lever whereby the connection between the compression spring and the auxiliary lever is caused to move across a dead center line during the first part of the movement of the valve, whereby said spring becomes effective to complete the movement of the valve.

2. In an apparatus of the class described, the combination of two measuring chambers of given capacity, means for supplying liquid under pressure to said chambers, a discharge conduit communicating with said chambers, a valve mechanism cooperating with said liquid supply means and said discharge conduit and for controlling the supply to and the discharge from said chambers, means for automatically operating said valve mechanism when a chamber is supplied with a measured quantity of liquid for disconnecting said filling chamber from the supply and connecting the same to the discharge conduit therefor, said last named means including a lever attached to the valve, an auxiliary lever pivoted to the upper end of said first-named lever, a compression spring connected to the outer end of said auxiliary lever and to the casing, stops for limiting the swinging movement of said auxiliary lever, an abutment carried by the casing and adapted to engage and swing said auxiliary lever whereby the connection between the compression spring and the auxiliary lever is caused to move across a dead center line during the first part of the movement of the valve, whereby said spring becomes effective to complete the movement of the valve, a conduit connecting the upper ends of the two measuring chambers, valves controlled by the liquid in the chambers associated with the conduit, and means connected to said conduit for supplying the chambers simultaneously with a gaseous fluid under pressure for retarding the flow of liquid into the filling chamber and for aiding in the discharge of the measured liquid from the discharging chamber.

3. In apparatus for measuring liquids, two receptacles each of definite capacity having inlet and outlet conduits, the former communicating with a source of liquid under pressure, distributing valve mechanism controlling said conduits for allowing the alternate filling of said receptacles by the liquid under pressure and the discharging of said liquid from said receptacles; said mechanism including a pressure actuating distributing valve, movable responsively to liquid pressure in the one or the other receptacles upon the complete filling thereof, a pivoted lever connected to the valve for moving the same, a compression spring, means connected to said lever for placing said spring under compression before the valve reaches the dead center point, said spring operating through said connecting means to complete the stroke of the distributing valve, a venting conduit for discharging atmosphere displaced by the incoming liquid, liquid level responsive means for closing said conduit when the liquid in the said receptacle has approached said level, a pump for supplying a gaseous fluid under pressure, a conduit connecting the upper ends of the two receptacles, and a second conduit connecting said pump to said conduit connected to the two receptacles for simultaneously supplying the receptacles with a gaseous fluid under pressure for retarding the flow of liquid into the filling receptacle and for aiding in the discharge of the measured liquid from the discharging receptacle.

In testimony whereof I have hereunto set my hand.

RENÉ PORTE.