

June 15, 1937.

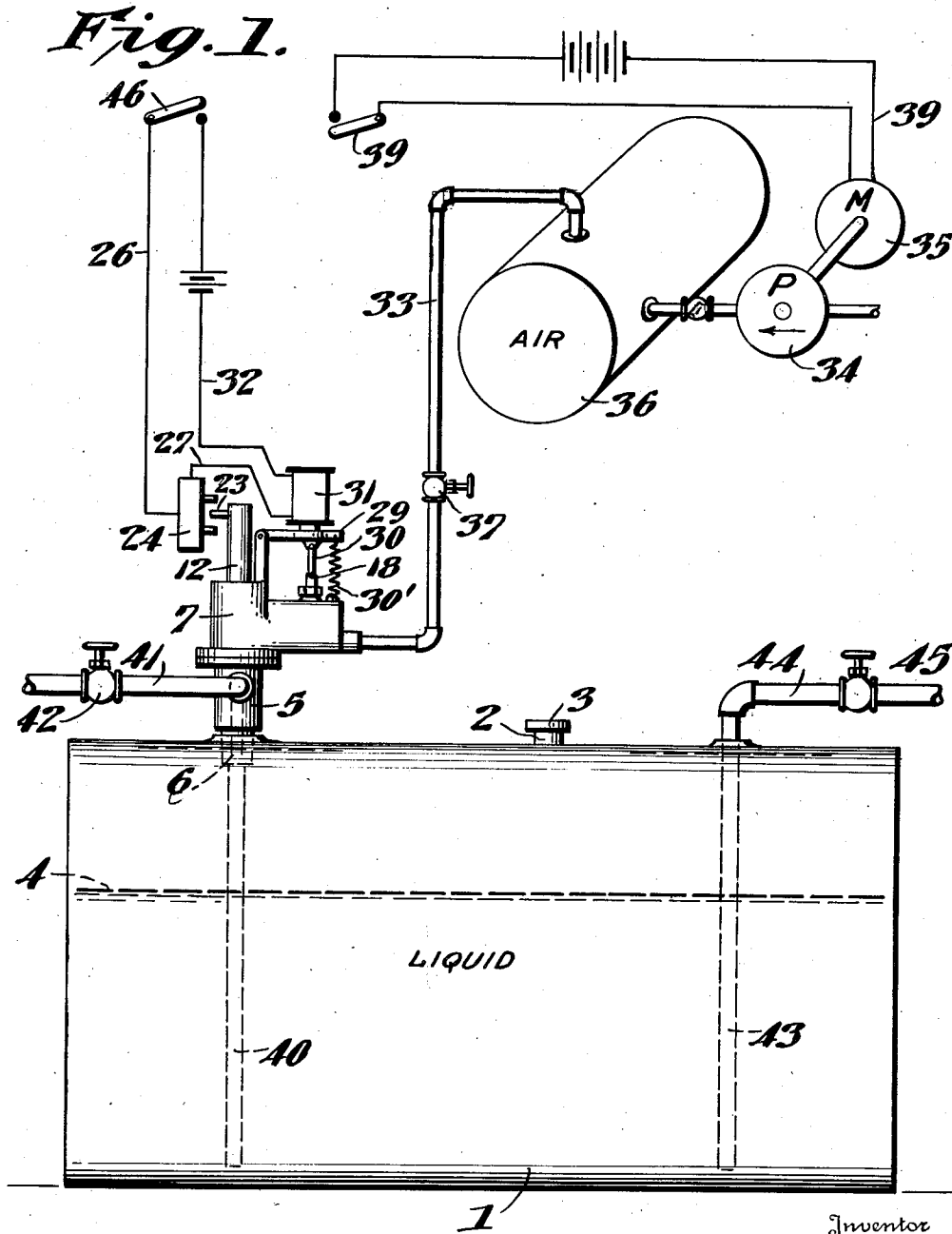
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2,083,965

COMPRESSED AIR OPERATED LIQUID DISPENSING DEVICE

Filed Aug. 12, 1935

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

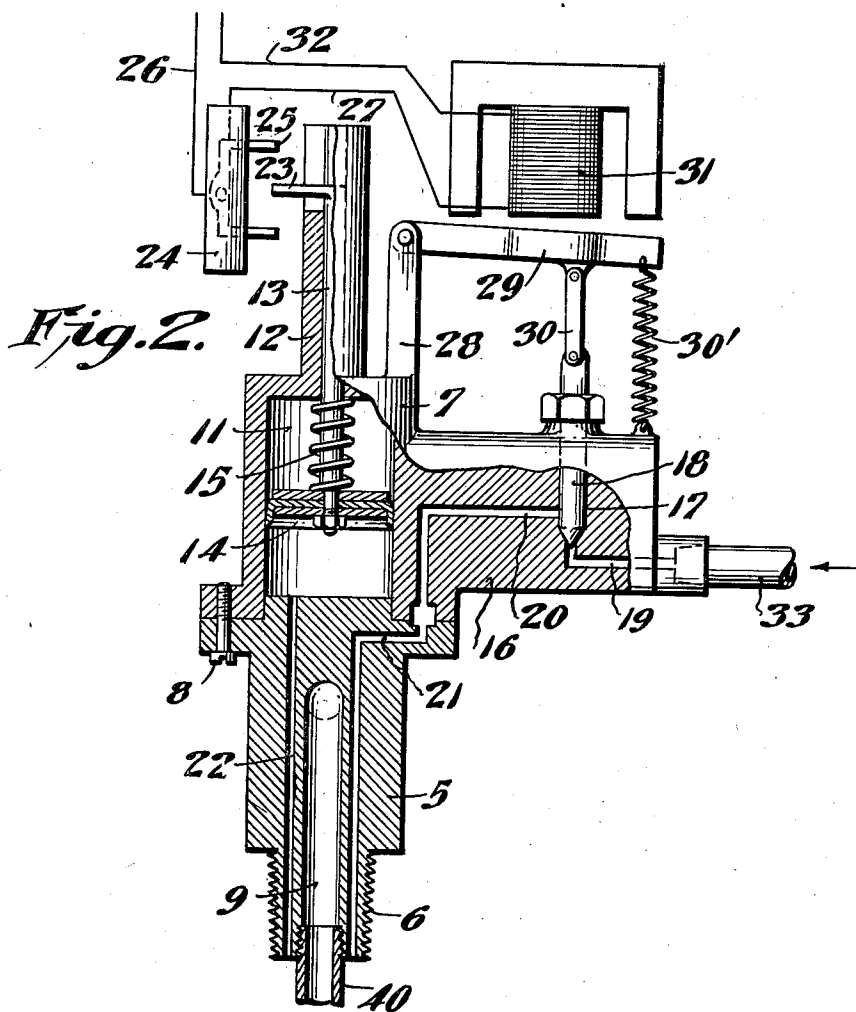
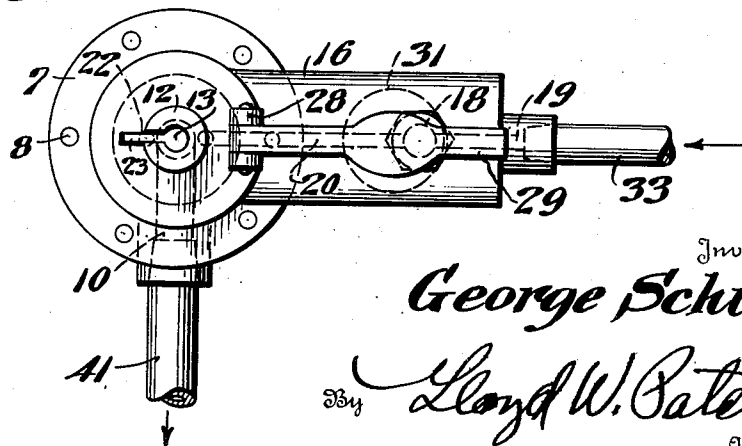


Fig. 3.



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UNITED STATES PATENT OFFICE

2,083,965

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Application August 12, 1935, Serial No. 35,842

8 Claims. (Cl. 221-77)

This invention relates and pertains to compressed air operated liquid dispensing devices, and has to do primarily with a pump structure using compressed air, or other compressed fluid pressure, for withdrawing or removing alcohol, oil, fuel liquid, and other liquids from tanks, barrels, cans, drums, or other receptacles or closed containers.

The primary object of my invention is to provide a dispensing structure which will operate upon an air pressure only sufficient to withdraw and raise the liquid to the desired elevation to which the liquid is to be discharged, and which will maintain a predetermined low pressure within the closed liquid receptacle or container, which operating pressure will not vary and fluctuate with changes in or a higher pressure from the source of air supply.

A further object is to embody air pressure control means which will insure maintenance of a low operating pressure within the receptacle or container and which will automatically control the discharge of air into the container from the source of compressed air supply.

Another object is to provide a device of this character including electrically energized means controlled from an energizing circuit which can be extended to or arranged in any desired manner and location to thus permit distant control of the pump means.

Yet another purpose of my invention is to provide a pressure air operated liquid dispensing device which will operate and function within a predetermined low pressure area, and with which the pressure air supply is automatically and fully opened when the minimum operating pressure is reached and the pressure air supply is automatically and immediately closed when a maximum air pressure has been attained within the container or receptacle, the operation of the parts being positive and automatic to fully open and fully close the pressure air supply line as distinguished from a slow and gradual opening and closing.

With these and other objects and purposes in view, which will be apparent to those skilled in the art, my invention includes and embraces certain novel features of construction and connection and arrangement and assembly of parts, which will be hereinafter more fully set forth in connection with the drawings and then pointed out in the claims.

In the drawings:

Figure 1 is a view in elevation, and somewhat

schematically illustrated, showing one embodiment and installation of my present invention.

Fig. 2 is a vertical sectional view taken through the structure.

Fig. 3 is a top plan view of the structure.

As the parts are shown in Figure 1, the pump structure is adapted for use in dispensing or pumping or withdrawing or removing liquid from a liquid storage tank as used upon a submarine or other boat or vessel, for pumping fuel oil for a domestic or commercial heating plant, or for other like installations, or in fact for any use where it is desired to withdraw or discharge any flowable liquid from a closed container under a predetermined pressure induced by the introduction of compressed air, or other pressure fluid, into the upper part of the closed container.

As here illustrated, the container 1 is of the closed type adapted to be filled from a filler opening 2, or in any other desired manner, and a cap 3, or other closure, is provided to close the tank or container so that it will be not only liquid but air tight. Liquid will be filled or supplied or stored within the container or tank 1 to any desired height or depth that will leave a slight air space in the upper part of the tank or container, the liquid level in the present instance being indicated at 4, but it of course being understood that this liquid level will vary at all times during use. A pump base 5 is provided with an externally screw threaded end 6 to be turned and screwed into a correspondingly threaded bushing or other opening in the top of the tank or container 1, and this base has mounted thereon a case 7 which is secured to and rigidly mounted upon the base 5 by means of cap screws or other suitable fastenings 8. The base 5 is here illustrated as having a liquid discharge passage 9 formed therein and opening laterally, as at 10, below the point of connection with the case 7.

The case 7 has a cylinder opening 11 formed therein, and here for convenience illustrated as substantially aligned with the liquid discharge passage 9, but in any event not in any wise communicating with said passage 9 or the discharge outlet 10 thereof. Within the cylinder opening 11 a sleeve 12 extends from the case 7 with its opening aligned with the center of the cylinder opening 11, and a piston rod or stem 13 is slidably received within this sleeve 12. A piston structure 14 is mounted on the inner end of piston rod or stem 13 within the cylinder opening 11, and a coil spring 15 is fitted around the rod or stem 13 between the piston 14 and the upper end of the cylinder opening 11 so that the piston is nor-

mally resiliently urged toward the lower end of the cylinder opening 11.

The case 7 has a lateral extension 16 at one side which extension is provided with a valve opening 17 in which the valve 18 is mounted for reciprocatory movement. A pressure air inlet port 19 leads from the exterior to connect with this valve opening 17, and a pressure air conducting passage 20 leads from the valve opening 17 at a point spaced from the connection of the pressure air supply passage 19 therewith. The pressure air supply passage 19 is shown connected with one end of the valve opening 17, and the adjacent end of the valve is made of tapered or substantially conical form to thus reduce any piston effect that might otherwise be exerted upon this valve by the pressure of compressed air through supply passage 19, and the valve 18 is packed or is grounded or lapped in so that there will ordinarily be no leakage of air when the valve is closed. While I have shown the pressure air supply passage 19 connecting with the end of the valve opening 17, this point of connection can be varied and the form and type of the valve can also be changed, the primary purpose being to provide a reciprocating valve structure capable of fully opening and fully closing to thus accomplish a quick connection of air supply and a quick and substantially instantaneous closing of the pressure air supply.

The air conducting passage 20 of the case 7 connects and joins with an air discharge passage 21 formed through the base structure 5, out of communication with the liquid passage 9, and opening through the lower end of the threaded extension 6, to thus be in full and direct communication with the upper part of the interior of the closed tank or container 1. A control air supply passage 22 is provided through the base structure 5, out of communication with both the air discharge passage 21 and the liquid discharge passage 9, this control air passage 22 opening at one end through the inner end of the threaded extension 6 to thus be in communication with the upper part of the closed tank or container 1, and at its other end opening into the cylinder opening 11, on the lower side of the piston 14. Through this control air passage 22, a direct connection is provided from the upper part of the tank or container 1 into the cylinder opening 11.

To accomplish substantially instantaneous movement of the valve 18 to opened and closed positions, I provide electrically energized means, the circuit wires of which can be extended to any desired point and location to thus permit distant control of the mechanism, either automatically or manually, and by substantially any desired means. The stem 13 has thereon an extension 23 traveling through a slotted opening formed in the sleeve 12, and a toggle switch 24 has the arms 25 thereof disposed substantially within the path of movement of the lateral extension 23 on the piston rod of stem 13. The arrangement of the parts is such that the toggle switch 24 is normally closed to thus complete the circuit through wires 26 and 27, and the spring 15 normally urges piston 14 to such a position that the extending arm 23 on the stem 13 is not effective to open the switch 24. However, when pressure is accumulated through passage 22 within the cylinder opening 11 on the lower side of piston 14 sufficient to overcome the resilient pressure of spring 15, the piston will be moved upwardly within the cylinder opening 11 and as the piston stem or rod 13 is carried upwardly with the piston the

extending arm 23 thereof will engage with the arm 25 of the switch 24 and will consequently cause the switch to be opened to break the circuit through wires 26 and 27.

Upon case 7 I provide a bearing standard 28 in which a valve operating arm 29 is swingably mounted to thus be disposed in a position substantially over and spaced from the outer end of the valve 18. This arm 29 is made in the form of an armature, and a link 30 is provided to establish connection between the arm 29 and the valve 18, so that as the arm 29 is swung upwardly valve 18 will be raised from its seat and will be moved to a position to establish direct and complete communication between pressure air supply passage 19 and air conducting passage 20, and as the arm 29 is swung downwardly the valve 18 will be moved to a seated position and communication will be immediately and completely cut off between the passages 19 and 20. A coil spring 30' is provided to normally resiliently swing the armature bar 29 to a position in which the valve 18 is closed.

An electromagnet 31, of any desired type and construction, is mounted on the outer side of the armature bar or arm 29 and is spaced therefrom when the arm is in the valve closing position. The circuit wire 37 from switch 24 is connected with the electromagnet 31, and a circuit wire 32, paired with circuit wire 26 and from any suitable source of supply, is also connected with this electromagnet.

In the present instance I have shown a compressed air supply pipe 33 leading to and connected with the case 7 in communication with the pressure air supply passage 19, and schematically I have illustrated an air pump 34 operated by a motor 35 to store air under pressure within a tank 36 from which the pressure air supply pipe 33 leads. A pressure air supply valve 37 is provided in pipe 33, and any suitable control switch means 38 can be provided in the circuit 39 by which the air compressing motor 35 is operated.

A pipe 40 can be connected with the liquid discharge passage 9 and be extended below the level of the liquid within the tank or container 1, and a liquid discharge pipe 41 can be connected with the branch 10 thereof and can be extended to any point where it is desired that the liquid shall be discharged. Suitable control of the discharge pipe 41 can be accomplished through valve 42, or in any other desired manner.

As the discharge of liquid is accomplished through the storing of air or other fluid pressure within the upper part of the closed tank or container 1, it will be appreciated that the liquid withdrawal and discharge can be arranged at some point separated from the connection of the base 5 with the tank or container, and in the present instance I have illustrated pipe 43 extending into the tank or container and having connected at its outer end a liquid discharge pipe 44 controlled by valve 45. Thus it will be seen that the liquid can be withdrawn and discharged from the closed tank or container 1 through passages 9 and 10 of the base 5, or through independent and separately installed discharge outlet connections.

Current can be supplied to the circuit 26—32 from any suitable source, the source of supply to this circuit and to circuit 39 being schematically illustrated in Figure 1 as being independent batteries, and as has been stated, the circuit wires can be extended to any desired and convenient point to there be controlled by any automatic,

manual or other switch or control means. In the present instance I have illustrated a switch 46 in the circuit 26—32, for manual control of the parts.

5 While I have referred to the circuit 24 as being of the toggle switch type, it will be appreciated that many forms and types of switch means can be employed in this connection, and that operating association with the piston 14 can be accomplished in many other manners than the specific form illustrated, the primary object and purpose being to associate with the moving piston 14 some switch or circuit control means which will be ordinarily closed and will complete the circuit 10 when the pump mechanism is in operation, and which upon accumulation of the maximum desired working pressure within the closed container will be actuated by movement of the piston 14 to break the circuit and consequently permit closing of the valve 18, which valve is normally held in open position through the attraction of armature arm 29 by electromagnet 31, while the pump is in operation.

From the foregoing it will be seen that I have 25 provided an air pressure control for air operated liquid pumps which is extremely sensitive and which is positive and almost instantaneous in its actuation and operation to maintain a pumping pressure within a closed container between predetermined maximum and minimum limits. The maximum and minimum, and the working pressure, can be governed by changing the spring 15, or otherwise changing the parts so that the piston 14 will be responsive to other pressures accumulated within the upper part of the container 30 which has the passage 22 leading therefrom to the piston opening 11.

While I have herein shown and described only certain specific embodiments of my invention and 40 have suggested only certain possible installations and uses, and forms and constructions and arrangements and assemblies of the parts, it will be appreciated, and is consequently to be understood, that many changes and modifications can be 45 made, to suit particular installations and conditions of use, without departing from the spirit and scope of my invention.

I claim:

1. A control means for an air operated liquid 50 dispensing device comprising with a closed liquid container, a case connected with said liquid container having a compressed air supply passage therethrough, a valve controlling said compressed air passage, electrically energized means 55 including an electric circuit associated with said valve to open the same to permit supply of compressed air to the container, fluid pressure actuated means within the case to break the circuit upon attainment of a maximum desired pressure within the container, and an air course through the case opening at one end to the pressure actuated means and at its other end to the container.

2. A compressed air operated liquid dispensing device comprising with a closed liquid container, 65 a case connected with said liquid container having a compressed air supply passage therethrough and provided with a liquid outlet passage, a valve controlling said compressed air passage, electrically energized means including an electric 70 circuit associated with said valve to open the same to permit supply of compressed air to the container, air pressure actuated means to break the circuit upon attainment of a maximum desired pressure within the container, said case having an 75 air passage leading from the air space of the

liquid container to the air pressure actuated means, and means to normally close said valve.

3. A compressed air operated liquid dispensing device comprising, with a closed liquid container, a case connected with said container 5 having a compressed air passage leading to the container and provided with a liquid outlet passage, a valve in said compressed air passage, electrically energized means to open said valve, said case having an air passage therein leading 10 from the container, and piston actuated means in communication with said passage operated upon attainment of a predetermined pressure within the container to render the electrically energized means inoperative to thus permit closing of the valve and consequent cutting off of 15 the compressed air supply.

4. A compressed air operated liquid dispensing device for use with a closed liquid container comprising, a casing connected with the upper part 20 of the container and having a compressed air supply passage therethrough, a liquid discharge pipe leading from the lower part of the container, a valve in said compressed air supply passage, a cylinder opening in said casing having a passage therefrom communicating with the interior 25 of the container, a piston in said cylinder opening, electrically energized means including an energizing circuit associated with said valve to open the valve and permit passage of air when the electrical means is energized, and switch 30 means associated with said piston to break the circuit upon attainment of a predetermined maximum air pressure within the container.

5. A compressed air operated liquid dispensing 35 device comprising, a casing to be connected with a closed liquid container and having a compressed air supply passage therein, a liquid discharge pipe; a valve in said passage to control the supply of air therethrough, electrically energized means 40 to fully open said valve, means to fully close said valve when said electrical means is de-energized, a circuit to said electrically energized means, a switch in said circuit, means actuated by attainment of a predetermined maximum pressure 45 within the container to throw said switch to break the circuit and de-energize the electrical means to permit closing of the valve, and an air passage in said casing leading from the container to said last mentioned means. 50

6. A compressed air operated liquid dispensing device comprising, a casing to be connected with a closed liquid container and having a compressed air supply passage therein, a liquid discharge pipe leading from said container, a valve 55 in said passage to control the supply of air therethrough, electrically energized means to fully open said valve, means to fully close said valve when said electrical means is de-energized, a circuit to said electrically energized means, a switch 60 in said circuit, said casing being provided with a cylinder opening and having a passage leading therefrom to communicate with the interior of the closed container, a piston in said cylinder, and means associated with said piston to open 65 the switch to break the circuit and consequently de-energize the electrical valve opening means to permit closing of the valve and consequent cutting off of the compressed air supply when a desired maximum pressure has been attained 70 within the container.

7. A compressed air operated liquid dispensing device comprising, with a closed container having a liquid discharge connection therefrom through which liquid will be withdrawn upon attainment 75

- of fluid pressure in the upper part of the container, a casing having a compressed air supply passage therethrough, a valve in said passage, a swinging armature arm, a connection from said valve to said armature arm to open and close the valve as the arm is swung, means normally exerting force upon said arm to swing the same to close the valve, electrically energized means to attract said armature arm to swing said arm to open the valve, a fluid pressure operated switch in the circuit with the electrically energized means, and a fluid passage through the casing from the container to the pressure operated switch.
8. A compressed air operated liquid dispensing device comprising, with a closed container having a liquid discharge connection therefrom through which liquid will be withdrawn upon attainment of fluid pressure in the upper part of the container, a casing having a compressed air supply passage therethrough, a valve in said passage, a swinging armature arm, a connection from said valve to said armature arm to open and close the valve as the arm is swung, means normally exerting force upon said arm to swing the same to close the valve, electrically energized means to attract said armature arm to swing said arm to open the valve, a current supply circuit to said electrically energized means, means actuated by attainment of a predetermined pressure within the container to break the circuit and de-energize the electrical means to permit closing of the valve and consequent cutting off of the compressed air supply, and a fluid passage through the casing from the container to said last mentioned means.

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