H. E. GRANT.

LIQUID STORAGE SYSTEM.

APPLICATION FILED OCT. 12, 1910.

1,042,106. Patented Oct. 22, 1912.

Fig. 1.

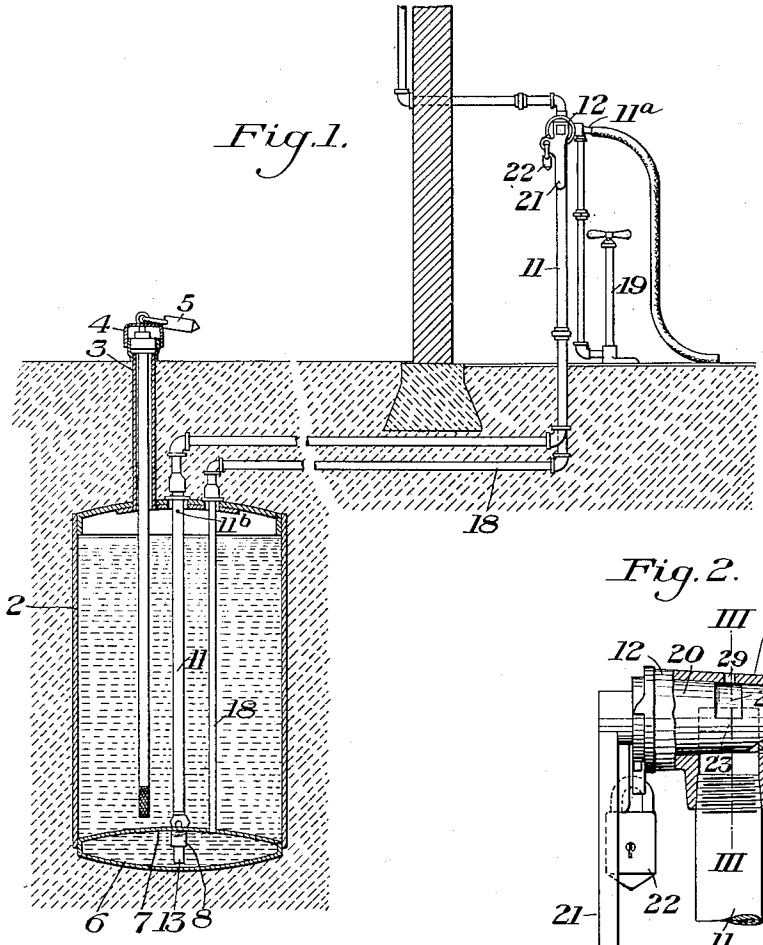


Fig. 2.

Fig. 3.

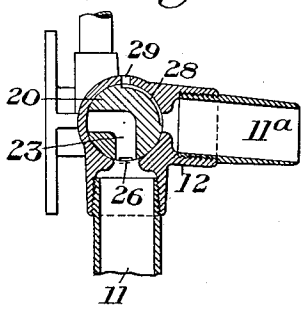


Fig. 4.

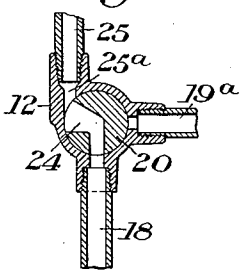
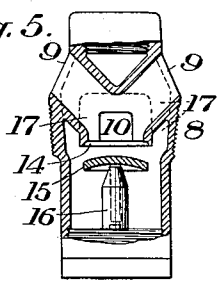


Fig. 5.



WITNESSES

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LIQUID-STORAGE SYSTEM.

1,042,106. Specification of Letters Patent. Patented Oct. 22, 1912.

Application filed October 12, 1910. Serial No. 586,729.

To all whom it may concern:

Be it known that I, HORACE E. GRANT, a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Liquid-Storage Systems, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a sectional elevation of apparatus embodying my invention; Fig. 2 is a detail longitudinal sectional view of the valve; Figs. 3 and 4 are transverse sections of the valve taken on the lines III—III and IV—IV, respectively, of Fig. 2; and Fig. 5 is a detail sectional view of the check valve.

My invention has relation to a storage system for gasolene and other volatile liquids of that class wherein the liquid is forced out to the point of use by air pressure.

The object of the invention is to provide means of novel character for effecting and controlling the operation of the system, as hereinafter more fully described.

Referring to the accompanying drawings, in which I have illustrated the preferred embodiment of my invention, the numeral 2 designates a closed storage tank of the desired capacity, which is preferably buried in the ground, as indicated, and which is provided with an upwardly extending filling neck 3. This neck is preferably provided with a closing cap 4, which can be secured by a suitable lock 5. 6 designates a supplemental tank below the bottom of the main tank with a common separating wall 7. This supplemental tank is of much smaller capacity than the main tank, and is provided in order that liquid may be forced therefrom by the use of a smaller amount of air than would be possible when forced directly from the main tank, especially after the main tank became partially emptied of its contents.

Liquid is admitted from the main tank into the supplemental tank through a valve casing or fitting 8 having one or more lateral inlet openings 9, communicating with the main tank and within a centrally arranged port 10 within the casing or fitting. A liquid outlet pipe 11 is connected to the upper end of the fitting, and thence extends upwardly to a suitable valve casing 12, located above the ground at any convenient point. A short pipe section 13, open at both its upper and lower ends, is secured in the lower end of the fitting 8, and extends downwardly into the supplemental tank. The port 10 is surrounded by valve seat 14, and is adapted to be closed by the upwardly seating check valve 15, which is normally supported on a suitable post 16, or other support. This valve is of considerably smaller diameter than the interior of the casing, so as to leave a free liquid passage around it in both its seated and unseated positions, and liquid passages 17 are provided at the sides of the valve seat, so that liquid can flow freely upwardly into the pipe 11 when the valve is seated. The valve 14 is normally open, thus permitting liquid to flow from the main tank into the supplemental tank and maintain the latter filled.

18 is an air supply pipe which extends downwardly through the main tank into the supplemental tank and thence upwardly to the valve casing 12, above referred to, and through said valve communicates with a pump 19, or other source of air pressure. When air is admitted to the supplemental tank through the pipe 18, liquid is forced from the supplemental pipe upwardly through the pipe 13, thereby closing the check valve 14. The flow of liquid past this valve through the passages 17, and into the pipe 11, maintains the valve 14 firmly seated and prevents fluttering thereof.

20 is a rotary valve of the turning plug type, which is seated in the casing 12, and whose stem is provided with a suitable actuating lever or handle 21, which is preferably arranged to be secured by a suitable lock, as indicated at 22. This valve has at one end portion an angular port 23, and at the other end portion another angular port 24. When the valve is in its normal closed position it cuts off all communication between the liquid outlet pipe 11 and the outlet hose connection 11^a, through which the liquid is delivered, and said valve also closes the communication between the pipe 19^c, leading to the air pump 19 and the air inlet pipe 18 (see Fig. 4). In this position of the valve the port 24 connects the air inlet pipe 18 with a vent pipe 25, which opens to the atmosphere at any desired point and which gives a normally open vent for the supplemental tank. The valve and its casing also

have a longitudinally extending port 26, formed partly in the valve and partly in the casing (see Figs. 2 and 3). This port 26 in the closed position of the valve connects the pipe 11 with the passage 25^a which leads to the vent pipe 25. The pipe 11 at the upper portion of the tank has a lateral vent opening 11^b, and this opening, together with the port 26, provides a normally open vent for the main tank. The valve also has a peripheral port 28 which, in the closed position of the valve, connects the outlet hose connection 11^a with an escape passage 29 in the valve casing 12. This port 28 and escape opening 29 are provided so that as soon as the valve is closed and the hose connection is shut off from the pipe 11, air will at once be admitted to the hose and will force out all liquid which may be left therein. When the valve is moved to its open position, the port 23 connects the pipe 11 with the hose connection 11^a and the port 24 connects the air pipe 18 with the pipe 19^a, leading to the pump 19. If the pump is now actuated, air is forced into the supplemental tank, thereby forcing the liquid upwardly through the pipe 11 and through the port 23 of the valve into the hose connection 11^a.

It will be obvious that by one movement of a single valve of simple character, I am able to control the operation of the system and at the same time to provide for proper venting, etc.

The features of the invention herein shown and described but not claimed, form the subject matter of other pending applications.

It will be obvious that various changes may be made in the construction and arrangement of the several parts. Thus, the supplemental tank may be structurally separate from the main tank, but located at a lower level so that it can be kept filled by the gravity flow of liquid from the main tank; changes may be made in the pipe connections, and the details of the valve may be changed, all without departing from the spirit and scope of my invention, as defined in the appended claims.

I claim:

1. In a liquid storage and supply system, a storage tank, an outlet pipe leading from the storage tank, an air pressure pipe leading into said tank from a source of air under pressure, and a single valve having ports which control both the outlet pipe and the air pressure pipe; said valve also having a port arranged to connect the outlet pipe with the atmosphere, and thereby admit air to the outlet pipe adjacent to the discharge side of the valve when the valve is closed, substantially as described.

2. In a liquid storage and supply system, a storage tank, an outlet pipe leading from the storage tank, an air pressure pipe leading into said tank from a source of air under pressure, and a single valve having ports which control both the outlet pipe and the air pipe, the outlet pipe having a vent opening to connect with the interior of the tank, and said valve also having a port which, in the closed position of the valve, connects the outlet pipe with the atmosphere and thereby forms a vent for the storage tank through said outlet pipe, substantially as described.

3. In a liquid storage and supply system, a main tank, a supplemental tank arranged to be filled from the main tank, an outlet pipe leading from the supplemental tank, an air pressure pipe leading into the supplemental tank, a source of air pressure, and a single valve having ports which control both the outlet pipe and the air pipe, the outlet pipe having a vent opening communicating with the interior of the main tank, and said valve also having a port which in the closed position of the valve connects the outlet pipe with the atmosphere and thereby forms a vent for the main tank through the said outlet pipe, substantially as described.

4. In a liquid storage and supply system, a main tank, a supplemental tank arranged to be filled from the main tank, an outlet pipe leading from the supplemental tank, an air pressure pipe leading into the supplemental tank, a source of air under pressure, and a single valve having ports which control both the outlet pipe and the air pipe, said valve also having a port which in its closed position connects the outlet pipe beyond and adjacent to the valve with the atmosphere, and thereby forms a vent to the atmosphere for the discharge portion of the outlet pipe, substantially as described.

5. In a liquid storage and supply system, a storage receptacle, an outlet pipe leading therefrom, and a valve for controlling said pipe, said valve having a port arranged to register with the said pipe to communicate with the atmosphere and thereby admit air thereto adjacent to the discharge side of the valve when the valve is closed, substantially as described.

In testimony whereof, I have hereunto set my hand.

HORACE E. GRANT.

Witnesses:
GEO. H. PARMELEE,
H. M. CORWIN.