June 21, 1927. C. SCHOCK 1,633,459

SYSTEM FOR DISPENSING GASOLINE FROM UNDERGROUND STORAGE TANKS

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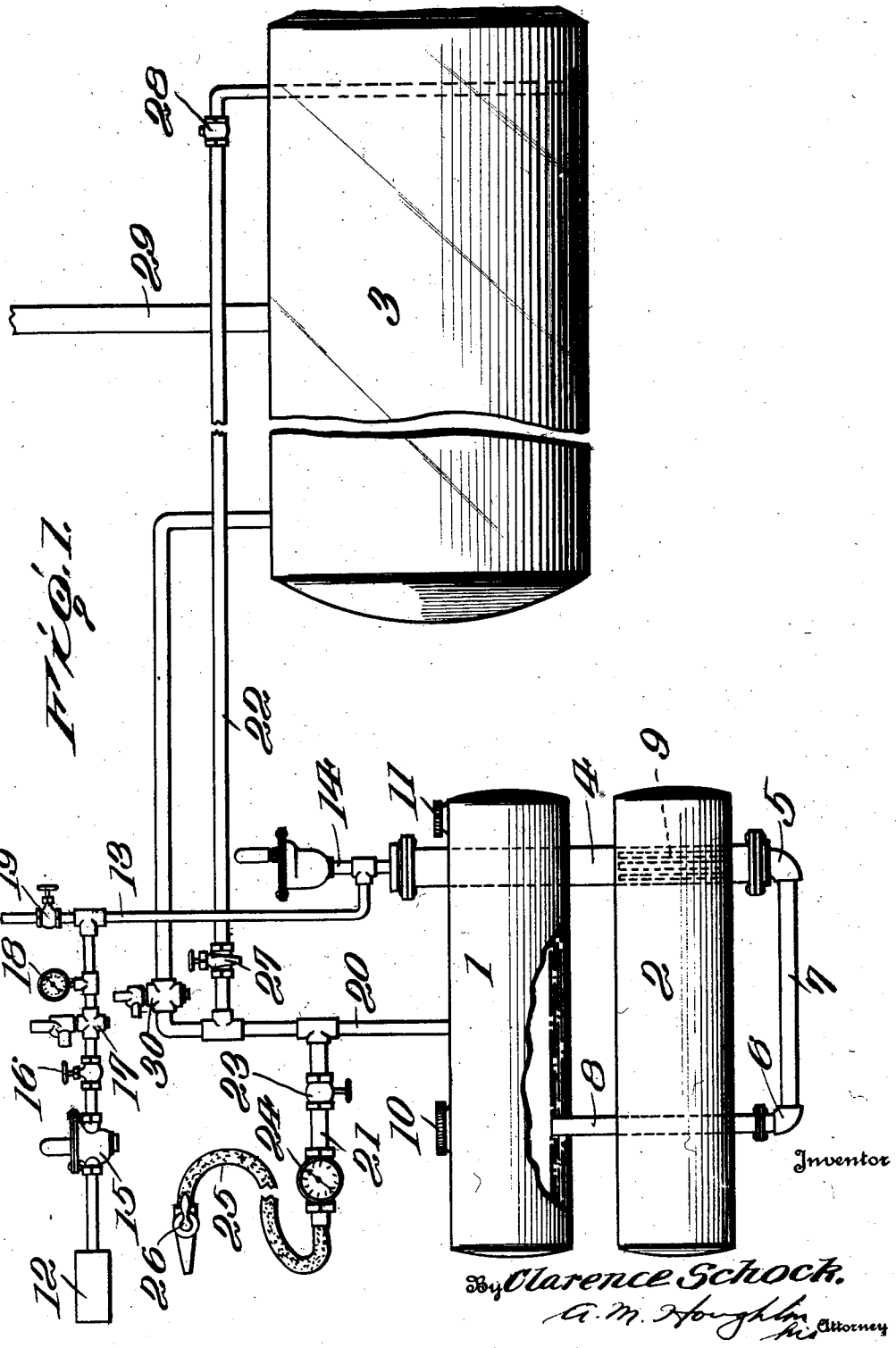

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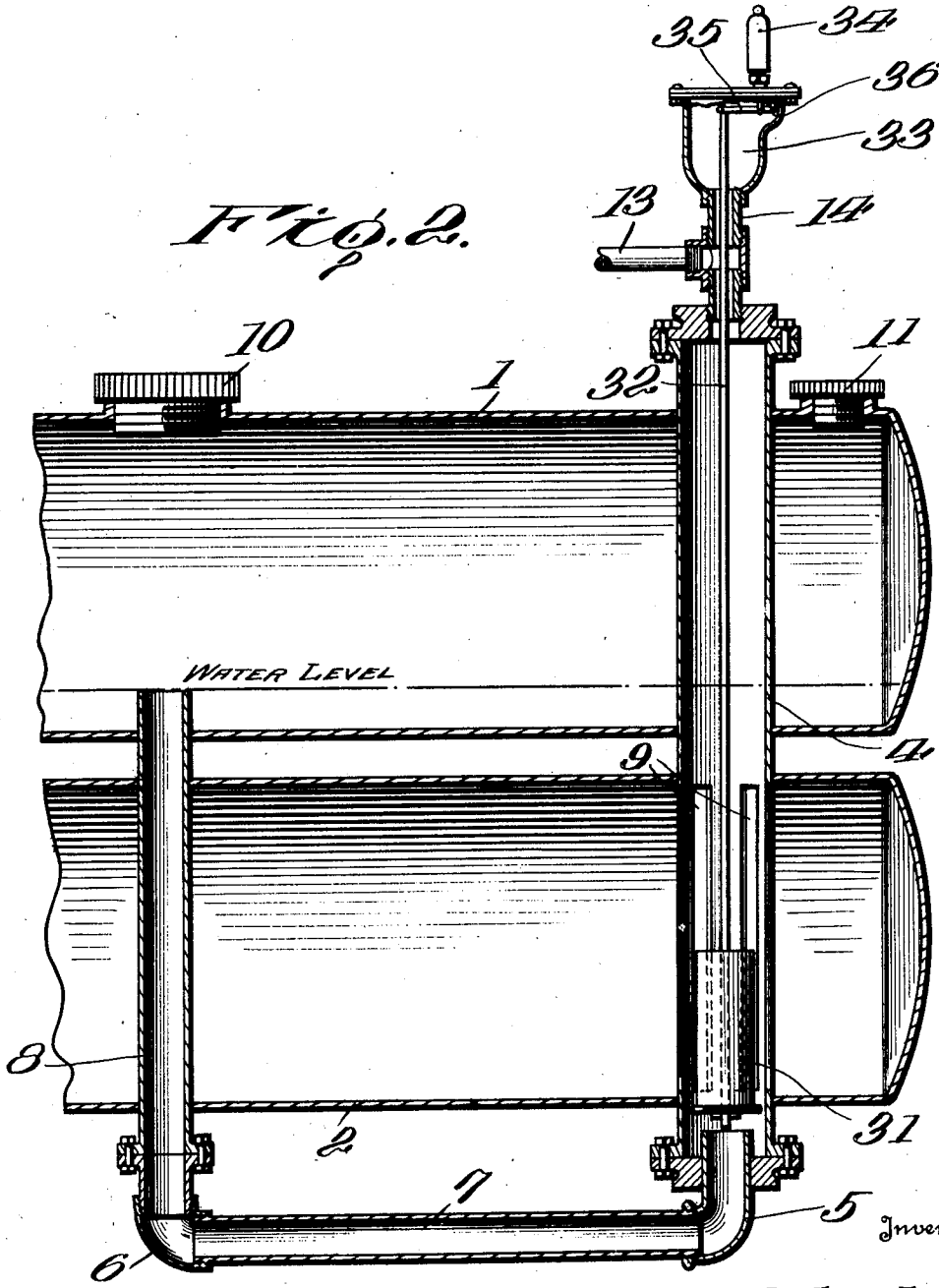
Fig. 2.



Inventor

Clarence Schock.

By A. M. Houghton Jr.

Attorney

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UNITED STATES PATENT OFFICE.

CLARENCE SCHOCK, OF MOUNT JOY, PENNSYLVANIA.

SYSTEM FOR DISPENSING GASOLINE FROM UNDERGROUND STORAGE TANKS.

Application filed September 4, 1924. Serial No. 735,866.

This invention relates to a system for dispensing gasoline from underground storage tanks, and it comprises a pair of tanks in superimposed position, one of said tanks being normally filled with gasoline, and the other with an expelling liquid, and a third tank of greater capacity than those aforementioned, and at a higher level, whereby, upon the cessation of a dispensing operation, an amount of gasoline may be drawn from the largest storage tank into one of the two smaller tanks thereby filling it preparatory to another dispensing operation.

In hydraulic gasoline dispensing systems as heretofore used considerable danger attended the refilling of the storage tank inasmuch as water, which had served to expel the gasoline, had to be drained off into an underground sewer. Frequently, a considerable amount of gasoline was run into the sewer along with the water thereby promoting the peril of an explosion in the sewer, to say nothing of the waste of gasoline. Furthermore, in such systems each installation is practically an engineering problem in itself. The necessary head of water is obtained by placing a tank at a high level, and this tank must, of necessity, be placed in an adjoining building to prevent freezing of the water in winter. Furthermore, the drain must be in proximity to a sewer to allow for the carrying off of water when it is desired to refill the storage tank.

Air systems for expelling gasoline are likewise disadvantageous in that the air used to dispense the gasoline becomes saturated with gasoline vapor because of its close association with this volatile fluid. In such systems, when the gasoline tank needs refilling it is necessary to expel this highly saturated air into the atmosphere with the attendant risk of fire.

A system for utilizing the most advantageous qualities of the air and water dispensing systems for gasoline, without the necessity of draining the water into a sewer, or the air saturated with gasoline into the atmosphere, is disclosed in my copending application, Serial No. 697,386. The present invention, while it embodies all the essential characteristics of the system heretofore disclosed, makes possible the use of relatively small dispensing tanks. This is an extremely desirable feature inasmuch as the danger from fire or explosion is still further reduced by keeping but small quantites of gasoline under pressure at one time. Moreover, with the use of tanks of less capacity the necessary storage space is minimized.

It is an object of the present invention to provide a system for dispensing gasoline which is simple in operation and easy to install.

Another object is to provide such a system, wherein water is used for expelling the gasoline, and wherein such water may be used over and over for long periods of time without replenishing.

A further object is to dispose of the objectionable features of the hydraulic and air systems for dispensing gasoline.

A still further object is to so control the flow of gasoline in a dispensing operation that it is impossible to deliver water along with the gasoline when the tank is nearly empty.

Other and further objects will be apparent from the following description taken in connection with the drawing in which

Figure 1 is a plan view of the complete installation.

Figure 2 is a detail cross-section view of the superimposed dispensing tanks, showing the connections of the piping therewith.

Referring more particularly to the drawing:

Superimposed tanks 1 and 2, of approximately sixty-five gallons capacity, are located under ground. A third tank 3, of from five hundred to one thousand gallons capacity, is located at some distance from tanks 1 and 2, and is preferably buried, but at a higher level than tanks 1 and 2.

A pipe 4, of large diameter, passes through tanks 1 and 2, and connects through the medium of elbow joints 5 and 6, with the lateral and upwardly extending sections of pipes 7, 8. Pipe 4 passes entirely through tank 1, and is slotted at intervals as at 9, to permit of communication with tank 2. The slots 9, as shown more particularly in Figure 2 of the drawing, extend from a point adjacent the top of tank 2 to a point adjacent its bottom, and extend entirely around the circumference of pipe 4. Pipe 8 has no communication with tank 2, and extends into tank 1 to a point about two inches above its bottom.

Immediately above the upper end of pipe 8, and in the upper portion of tank 1 there

is provided a cap 10, and adjacent the end of the tank, a second cap 11.

An air compressor 12 is connected, through piping 13 and 14, with pipe 4. Adjacent the compressor are the control and safety valves, comprising an air pressure regulator 15, control valve 16, safety valve 17, pressure gage 18, and globe valve 19, for the purpose hereinafter described.

A pipe 20 extends from the upper portion of tank 1 to the upper portion of tank 3, and has communicating therewith branch pipes 21 and 22. Pipe 21 conducts the gasoline to be dispensed, and is provided with a manual control valve 23 and a flow meter 24 of any desired construction. It is, of course, to be understood that I do not limit myself to the use of a manual control valve such as is shown at 23. A check valve, operating automatically, to prevent inrush of air into the system when the dispensing tank is being refilled might well be substituted for the form of valve shown in the drawing without departing from the spirit of the invention. The end of pipe 21 communicates with the usual dispensing hose 25 provided at its nozzle with an automatic shut-off valve 26.

The second branch pipe 22 is provided with a gate valve 27 and a check valve 28 to permit of flow through pipe 22 in one direction only. Pipe 22 extends to a point adjacent the bottom of tank 3.

A vent pipe 29 of large diameter extends from the upper portion of tank 3 to a point considerably above the level of the ground, whereby any explosive fumes of gasoline which may escape from tank 3 are expelled into the atmosphere at a point where there is little or no danger of fire or explosion.

Pipe 20 is provided with a safety valve 30 which is adapted to open when there is excessive pressure in tank 1, and to permit the escape of gasoline and vapor back into tank 3 in case other safety devices on the air side fail to work.

Elbow joint 5 is formed with an extension which enters the lower end of pipe 4 and serves as a seat for the float 31, as shown more particularly in Figure 2.

Float 31 is mounted on the end of rod 32 which extends the length of pipe 4, and into a chamber 33 formed at the upper end of pipe 14. A compressed air whistle 34 is mounted on the walls of chamber 33, and is actuated through the medium of a lever 36, pivoted at one end to the wall of chamber 33 as at 36, and at the other end to rod 32. This whistle serves to act as a warning when the gasoline dispensing tank is empty, or nearly so.

In operation, tank 2 is filled with water through pipe 4 and the level of water is brought sufficiently high in said pipe to permit a substantial amount to flow into tank 1 to the level of the upper end of pipe 8. Tank 1 is then filled with gasoline, as is also tank 3.

Valve 16 is opened and valve 19 closed, and the compressor 12 is started in operation, whereupon compressed air forces its way through pipes 13, 14, and 4, and expels water through pipe 8 into tank 1. When the level of water in pipe 4 registers with the tops of slots 9 air will rush into tank 2 and will continue to force water therefrom, past float 31, through pipes 7 and 8, and into tank 1.

As water continues to be forced into tank 1 the gasoline therein is forced through pipes 20 and 21, past valve 23 and flow meter 24, and is dispensed through hose 25 and nozzle 26. If at any time an unusual pressure is created in tank 1, to relieve such pressure the safety valve 30 is provided in return pipe 20, and is preferably set to open when the pressure is five pounds greater than the pressure at which the safety valve 17 opens. This is an extra precaution in case the safety valve 17 should fail to operate. The opening of valve 30 allows gasoline to flow back into the storage tank 3.

If at the end of a dispensing operation, it is desired to again fill the dispensing tank 1 with gasoline, it is only necessary to close valve 16, thereby cutting off the air supply, and to open valve 19 to permit the escape of compressed air from tank 2, and to open gate valve 27 in the piping leading from the storage tank 3 to the dispensing tank 1. As air escapes through valve 19 water will flow back from tank 1 into tank 2, through pipes 8, 7, 4, and slots 9. When this occurs, there is a suction created in tank 1 which, when valve 27 is open, allows a fresh supply of gasoline to be syphoned into tank 1 through pipe 22. The check valve 28 prevents a return flow of gasoline.

Float 31 is provided to insure against the dispensing of water or air with the gasoline, by cutting off the supply of gasoline to the dispensing hose when the level in tank 1 is extremely low. Float 31 is buoyant in water and, when there is water in tank 2, is raised from its seat. If, however, all water has been discharged from tank 2 into tank 1 the float will immediately drop upon its seat and consequently cut off tank 1 from the pressure of compressed air communicated through the medium of water, whereby the dispensing operation must cease. As a warning to the operator when the level of water in tank 2 is low or exhausted, a whistle is so mounted as to be operated by movement of plunger 32 attached to the float 31. When the float 31 begins to fall, the lever 35 drops and opens a small valve at the base of the whistle notifying the operator that the gasoline in tank 1 is nearly exhausted. The time at which the whistle begins to blow can be varied by regulating the

length of rod 32. The quantity of air escaping through the whistle has no appreciable effect on the air pressure.

The float will continue to fall until it reaches its seat, shutting off pressure on tank 1. The whistle will continue to blow until the air pressure is shut off at valve 16, and until the pressure is relieved by opening air relief valve 19.

It is to be understood that the use of such a warning whistle may be dispensed with in such a system as is disclosed above, without affecting in any way the operation of such system. It is not an essential part of the system, but rather an addition which will prove desirable under some circumstances.

From the foregoing it will be seen that I have provided a compact and efficient system for the storage and dispensing of gasoline, in which excessive pressures are instantly and automatically relieved, and in which there is but a relatively small amount of gasoline under dispensing pressure at one time. Further, that by utilizing the same water for dispensing over and over, and by conducting all inflammable vapors away from the system. I have provided a system in which the fire risk is negligible.

Having now described my invention what I claim is:—

1. In a dispensing system a gasoline receptacle, a discharge outlet therefor, a water receptacle at a lower level than said gasoline receptacle, a source of air under pressure in communication with said water receptacle, a tubular member connecting the lower portions of said receptacles, a float for controlling the opening in the end of said tubular member which connects with said water receptacle, the said float being buoyant in the water contained in the system and gravitating in the air in said system when the supply of water has been depleted, to thereby cut off communication between said receptacles.

2. In a dispensing system a gasoline receptacle, a discharge outlet therefor, a water receptacle at a lower level than said gasoline receptacle, a source of air under pressure in communication with said water receptacle, a tubular member connecting the lower portions of said receptacles, a valve and float controlling the opening in the end of said tubular member which connects with said water receptacle, said valve being held in an open position by the buoyancy of the float in the water in said system, said valve being held in closed position by the gravitation of the float in the air in said system when the supply of water has been depleted, to thereby cut off communication between said receptacles.

3. In a gasoline dispensing system, two superimposed tanks adapted to contain gasoline and water respectively; a third tank located at a distance from, and at a higher level than said superimposed tanks having pipe connections with said gasoline tank; a pipe communicating with the lowermost of said superimposed tanks, being provided with a series of slots in communication with the interior of said tank, and an extension of said pipe adapted to communicate with the bottom of the upper of said superimposed tanks; a second pipe extending from the upper of said superimposed tanks to a point of dispensing; a source of fluid under pressure in communication with the lowermost tank, a float within the first pipe; a seat for said float in said first pipe and adjacent the bottom of the lower of said superimposed tanks, whereby when the water in the lower of said superimposed tanks has been exhausted, said float will engage its seat thereby preventing the dispensing of fluid through the second pipe.

4. In a gasoline dispensing system, an upper and a lower tank adapted to contain gasoline and water respectively, a gasoline dispensing pipe in communication with the upper tank, a source of fluid under pressure in communication with said lower tank, a pipe communicating with the bottom of said lower tank and provided with an upward extension communicating with the upper tank and terminating adjacent the bottom thereof; a float adjacent said pipe responsive to the level of liquid in said lower tank; a seat for said float in said pipe at its point of communication with said lower tank, the said float being buoyant in water, whereby when the supply of water in said lower tank is low the float is adapted to seat to thereby cut off communication between said upper and lower tanks and stop the dispensing of gasoline from the upper tank.

5. In a gasoline dispensing system, an upper and a lower tank adapted to contain gasoline and water respectively; a source of air under pressure in communication with said lower tank; a pipe communicating with the bottom of said lower tank and provided with an upward extension terminating within and adjacent the bottom of said upper tank; a float adjacent said pipe responsive to the level of liquid in said lower tank; a seat for said float in said pipe at its point of communication with said lower tank, the said float being buoyant in water, whereby when the supply of water in said lower tank is low the float is adapted to seat to thereby cut off communication between said upper and lower tanks; a whistle in communication with the compressed air conduit, a valve normally closed to prevent passage of compressed air through said whistle, and means connecting said valve and float, whereby before said float seats, the whistle is made operative by the rush of compressed air therethrough to act as a warning of a depleted supply of gasoline.

6. A gasoline dispensing system comprising three tanks at varying levels, the lowermost tank being adapted to contain water, the intermediate tank to contain gasoline for dispensing, and the uppermost tank to contain a reserve supply of gasoline; piping connecting said lowermost tank with a source of compressed air, and means providing communication between said lowermost and intermediate tanks whereby when compressed air is forced into said lowermost tank the water therein will pass into said intermediate tank; a dispensing nozzle; piping connecting said dispensing nozzle with said intermediate tank; additional piping connecting said intermediate tank with said uppermost tank; valve means in said first-named piping whereby after a dispensing operation the air pressure in the lowermost tank may be relieved to thereby permit the water to return from the intermediate tank into the lowermost tank; valve means in said second and third named piping whereby when the water passes from said intermediate tank into said lowermost tank the suction created in said intermediate tank will serve to syphon gasoline from said uppermost tank into said intermediate tank thereby filling it preparatory to another dispensing operation; a float in said first-named piping; a seat therefor; the said float being adapted to rest upon its seat when the supply of water in the lowermost tank is exhausted to thereby automatically stop the dispensing operation.

7. In a gasoline dispensing system an upper tank for containing gasoline, a second tank at a lower level for containing water; means establishing communication from a low point in the lower tank to a low point in the upper tank; and means for normally exerting a pressure on the water in the lower tank to dispense it to the upper tank for dispensing gasoline therefrom as needed; and means associated with the lower tank for closing the communication between the tanks when a predetermined amount of water from the lower tank has been delivered to the upper tank.

In testimony whereof, I have hereunto affixed my signature.

CLARENCE SCHOCK.