Feb. 12, 1935. H. E. MARVEL 1,990,742

NOZZLE CONTROLLING MECHANISM FOR LIQUID DISPENSING SYSTEMS

Filed Jan. 23, 1933 3 Sheets-Sheet 1

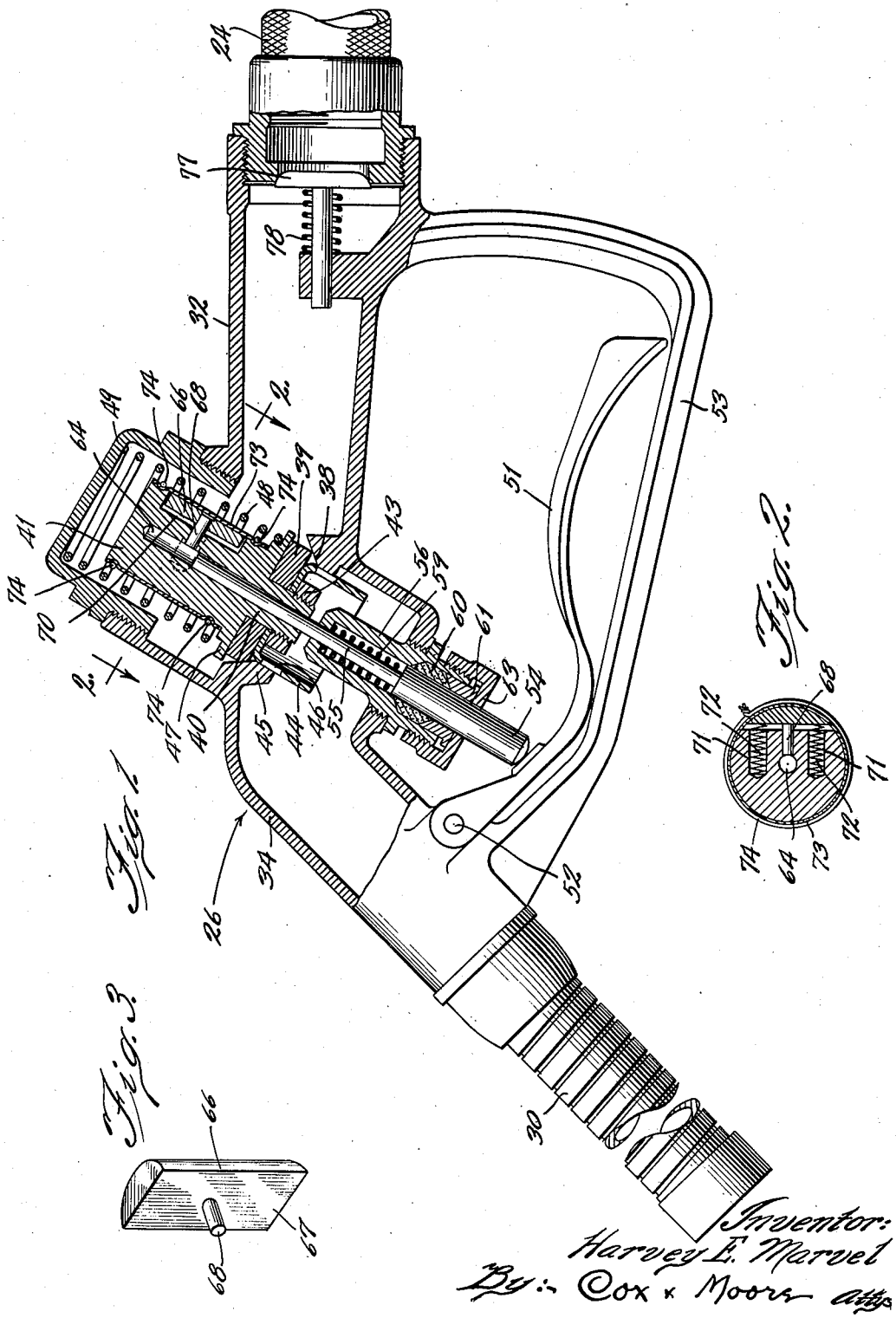


Fig. 1.

Fig. 2.

Fig. 3.

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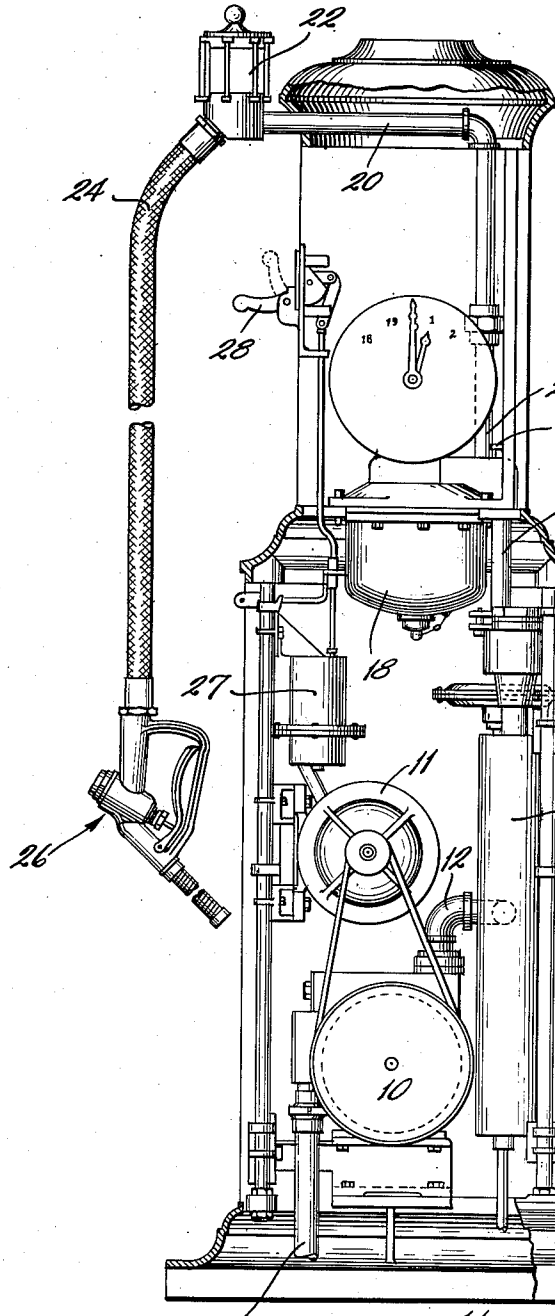


Fig. 4.

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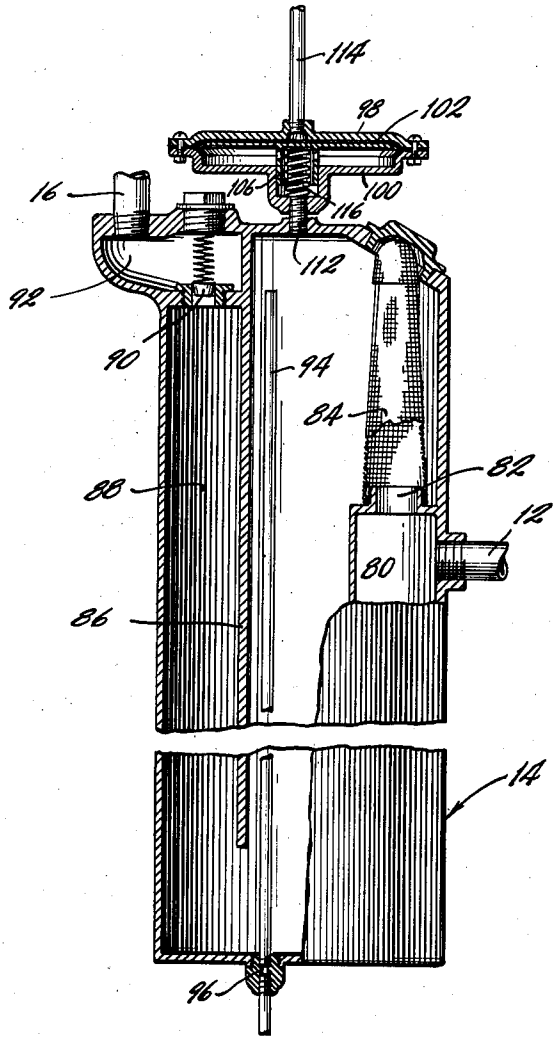


Fig. 5.

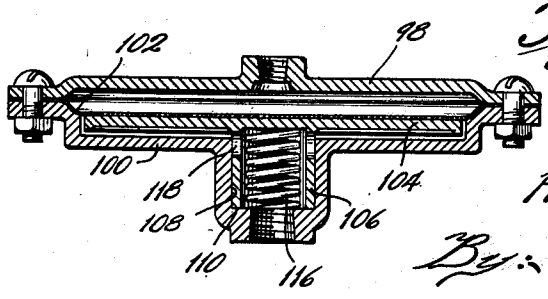


Fig. 6.

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UNITED STATES PATENT OFFICE

1,990,742

NOZZLE CONTROLLING MECHANISM FOR LIQUID DISPENSING SYSTEMS

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Application January 23, 1933, Serial No. 653,018

45 Claims. (Cl. 221—95)

My invention relates to liquid dispensing systems and is particularly adaptable for the dispensing of gasoline and other similar liquids.

In the type of mechanism to which this invention is adapted, the gasoline system comprises the usual type of storage tank generally located underground, from which a pipe extends to an upstanding housing, which encloses an electrically operated pump having its inlet connected to the pipe in the storage tank, the outlet of the pump extends upwardly through the housing, through an air-separating device, and thence to the measuring device generally in the form of a meter, and thence extends upwardly to the usual sight glass disposed at the top of the housing from which the liquid flows through the usual type of flexible hose which terminates in a valve-controlled nozzle. This is the so-called wet hose type of dispensing mechanism which means that the flexible hose is maintained constantly full of gasoline, and the dispensing operation is controlled by the valve in the nozzle, i. e., in this type of device the electric pump is controlled by a separate hand-operated lever so that when the control is thrown to a "pump on" position, the dispensing operation can be controlled by the usual lever at the nozzle. When the pressure on the nozzle and hose has been released by shutting off the pump, it has been possible, with nozzles heretofore designed, to draw gasoline through the nozzle by winding up the hose and then unwinding the same. With nozzles heretofore on the market, it has been possible, by means of a screw-driver or some similar instrument, to press the valve stem and drain the liquid from the hose even when the lever of the nozzle has been locked so that it cannot be operated.

One of the objects of my present invention is to prevent the so-called "milking" of the hose, or the extraction of the gasoline from the hose, and this is accomplished in such a manner so as to preclude the possibility of short-measuring a customer by withdrawing the liquid that is in the hose after one customer has been served, and before the next customer is served.

One of the objects of my invention is the provision of improved and efficient means for relieving the pressure in the delivery line of dispensing apparatus when the supply pressure is cut off while maintaining the delivery line filled with liquid.

A further object of the invention is the provision of pressure reducing mechanism for dispensing apparatus to relieve the hydraulic pressure in the delivery connections while maintaining them filled with liquid.

Another object of the invention is the provision of improved and efficient means for relieving the pressure on the discharge side of the meter and in the delivery hose of dispensing apparatus having a valve controlled nozzle at the discharge end of the delivery hose.

Another object of the invention is the provision of a pressure reducing device for a dispensing apparatus, having a diaphragm partition and provided with connections to the delivery line on one side of the partition and to the supply line on the other side thereof and also vented to the atmosphere.

Another object of my invention resides in providing a dispensing apparatus with means for preventing the opening of the discharge pipe or the lowering of the liquid in the sight glass which is all important to the proper measurement of the liquid dispensed.

Another object of my invention is to provide a dispensing apparatus with means for relieving the pressure in the dispensing line quickly so as to enable more prompt operation of the dispensing unit and to prevent a delay between the serving of two different customers.

Yet another object of my invention is to provide a dispensing system with means for relieving the pressure in the system after the dispensing operation and also to prevent liquid in the system from leaking backward into the tank whereby the sight glass is maintained full.

Another object of my invention resides in providing a device wherein the operation of the nozzle valve is made possible only when the pump is put into operation and wherein also the opening of the nozzle valve by any winding up of the hose or by operating the usual valve stem is precluded, unless the pump is in operation.

Yet another object of my invention resides in providing a gasoline dispensing system of the wet hose type wherein the pump control member extending from the side of the housing is provided with a locking means for locking it in inoperative position and irrespective of the hose nozzle, and wherein it is unnecessary to provide the hose nozzle with an additional locking means or with locking means associated with the pump control device, due to the presence of instrumentalities which preclude the operation of the nozzle valve lever unless the pump or other liquid-forcing means is operating.

These and other objects of my invention will

be apparent from a perusal of the following specification, taken in connection with the following drawings, wherein

Fig. 1 is an elevational view mostly in section showing my invention as applied to a hose nozzle of a dispensing apparatus.

Fig. 2 is a section on line 2—2 of Fig. 1.

Fig. 3 is a perspective view of one of the elements shown in Figs. 1 and 2.

Fig. 4 is a general view of my dispensing apparatus;

Fig. 5 is a view of the air separator.

Fig. 6 is a detailed view of the pressure diaphragm connection between the air separator and the discharge line.

Referring now in general to Fig. 4, there is shown the usual type of liquid dispensing device comprising an upstanding housing having a pipe 8, having the usual foot valve, if desired, for connection to an underground gasoline tank. The pipe 8 connects to a pump 10 driven by a motor 11. Pump 10 discharges into a pipe 12, which discharges into the air separator 14 having outlet 16, discharging into the meter 18, which meter in turn discharges into pipe 20 having a sight-glass 22 discharging into a flexible hose 24. The meter is preferably of the displacement type of meter of the construction shown in Blum Patent No. 1,423,597. The motor 11 is operated by means of a switch 27 in turn operated by means of a manual control 28 disposed on the side of the housing so that when this control is thrown upwardly the motor will be thrown into operation to cause liquid to drain from the tank, and if the nozzle valve be closed, to circulate the gasoline around a bypass of the pump and alternatively, if the nozzle valve be open, to force the liquid through the meter, through the flexible hose 24 and out of the nozzle 26.

In any event, after a dispensing operation has been completed, the motor control 28 is thrown to an " off " position so that the pump is then out of operation, and the flexible hose 24 will be maintained full of gasoline. From this operation the dispensing unit is known as the wet hose type.

Many devices have been provided, such as padlocks, for locking the valve-operating nozzle lever up against a guard so as to prevent the operation of the valve rod of the nozzle, and it has been the practice in certain instances, to wind up the hose to thereby create a pressure therein to force the gasoline out of the nozzle. My present invention eliminates the possibility of this improper practice by a construction of valve nozzle wherein the valve of the nozzle is operable only when the pump is in operation.

By reference to Fig. 1 of the drawings it will be seen that the nozzle 26 comprises the usual flexible discharge tube 30 and a supply conduit 32, and a discharge conduit 34. A valve seat 38 is interposed between the supply conduit 32 and the discharge conduit 34. This seat is preferably beveled and is adapted to receive the valve disk 39 which has a hole in the center thereof to fit over cylindrical neck 40 extending from the bottom of the poppet body 41. This neck 40 is screw-threaded to receive the nut 43. A cup-shaped guide sleeve 44 is provided with an opening at the center of its bottom to fit over the neck 40 when the nut 43 is tightened against the bottom of the cup sleeve 44; the latter, together with the valve disk 39, is clamped securely to the poppet body 41.

The cylindrical portion of the guide sleeve 44 is adapted to slide along the cylindrical walls 45 adjacent the beveled seat 38, and openings are provided at 46 in the guide sleeve 44 to effect communication between the conduit 32 and the discharge conduit 34 when the valve 39 is opened. The poppet-body 41 is provided with an annular seat 47 to receive one end of the compression spring 48, the other end of which rests against the bottom of a cup-shaped cap 49 which is screw-threaded into an opening in the valve body as shown.

An operating lever 51 is pivoted at 52 and is adapted to have a limited range of swinging movement within the guard 53 and between the same and the conduit 32. When the nozzle body is grasped, the operator's fingers may reach the lever 51 to press the same toward the conduit 32 for the purpose of rectilinearly moving the plunger 54 to the upper end of which is connected the valve stem 55.

A stuffing box 56 is screw-threaded into an opening in the valve body. This stuffing box is provided with a chamber for receiving the compression spring 59. It will be seen by referring to the drawings that the valve stem 55 is of less diameter than the diameter of the plunger 54 and therefore an annular shoulder is afforded at the upper end of the plunger to receive the lower end of the spring 59, the upper end of which contacts with the upper end of the stuffing box 56. The spring 59 is preferably so designed that when it is fully compressed it will act as an abutment to limit the swinging movement of the lever 51 toward the conduit 32. The plunger 54 extends through packing 60, which is held in place by a packing gland 61 and the packing nut 63.

It should be particularly understood that the valve stem 55 has a free sliding movement along the correspondingly cylindrical recess 64 in the center of the poppet body 41, that is to say, the cylindrical recess 64 is closed at its upper end, but open at its lower end to receive for relatively sliding movement the valve stem 55. When the valve stem 55 is free to move along the cylindrical recess 64, the valve 39 cannot be opened and the upper end of the valve stem 55 cannot reach the upper end of the cylindrical recess 64 because the spring 59 will be fully compressed before this occurs.

The cylindrical portion of the poppet body 41 is provided with a recess 70 in the shape of a segment of a cylinder so as to receive the compression shoe 66, which also has the shape of a segment of a cylinder. Secured to the compression shoe 66 and projecting from the center of the flat face 67 thereof is a pin 68 which fits into a radial opening in the poppet body 41. This radial opening communicates with the cylindrical recess 64 so that the pin 68 may be projected into the cylindrical recess 64, and act as an abutment to be engaged by the upper end of the valve stem 55. Since the cylindrical recess 64 is axial relative to the poppet body 41, and the valve 39, the pin 68 being in a radial position is at right angles of the axial line of the valve.

The length of that portion of the pin 68 which projects from the flat side 67 of the compression shoe 66 is such that it will not project into the cylindrical recess 64 when the outer curved surface of the compression shoe coincides with

the cylindrical surface of the poppet body 41. It will thus be seen that when the compression shoe is in its outer position where its curved surface is concentric to the curved surface of the poppet body 41, the valve stem 55 is free to slide upwardly past the pin 68 without effecting the opening of the valve 39.

The flat faced bottom 70 of the recess 65 is parallel to the rear flat face 67 of the compression shoe 66 shown in Fig. 2. Spaced apart cylindrical recesses 71—71 are adapted to receive compression spring 72—72. These are arranged on opposite sides of the recess 65 and are also preferably parallel to the pin 68. The springs 72 constantly urge the shoe 66 away from the poppet body 41, that is to say these compression springs 72 tend always to keep the space 65 open and therefore always tend to move the pin 68 to a position where it will not extend into the cylindrical recess 64.

Surrounding the cylindrical portion of the poppet body 41 is a cylinder 73 of any flexible material such as leather, thin insulating fiber, or thin metal suitable for the purpose. The material of which the cylinder 73 is composed should be sufficiently thin and flexible to permit the pressure in the conduit 32 to act thereon to communicate such pressure to the shoe 66 and move the latter toward the flat face 70 to cause the pin 68 to be projected into the cylindrical recess 64 where it will act as an abutment for the upper end of the valve stem 55. The flexible material of which the cylinder 73 is composed should also be capable of withstanding, for a reasonable length of time, the particular liquid being dispensed. The cylindrical compression sleeve 73 may be secured to the cylindrical portion of the poppet body 41 by means of wires 74 fitting into the annular recesses in the poppet body 41 and the ends of the wires being twisted. It will thus be seen that the cylindrical compression sleeve 73 may be readily removed and renewed.

The dispensing hose may be provided with a non-draining valve 77, which is held in closed position by the spring 78 so long as the pumping pressure is cut off. When this occurs, the spring 78 is of sufficient strength to close the valve 77 against the head of liquid in the dispensing hose. In the same manner when the pumping pressure is cut off, the springs 72 are of sufficient strength to move the pin 68 to its position in full lines in Fig. 1. Therefore, when the pumping pressure is cut off, the pin 68 will be moved by springs 72 out of cylindrical recess 64 and the valve 39 will be automatically closed, irrespective of the position of the lever 21 and the valve stem 55.

The non-draining valve 77 may therefore be omitted because as soon as the pumping pressure is cut off, the spring 72 will move the pin 68 outwardly radially to effect automatic closure of the valve 39; and the latter will therefore act to prevent drainage of the hose when no dispensing operation is taking place. The arrangement shown is particularly adapted for the wet hose system of dispensing apparatus, as it is desired to keep the hose always filled with liquid up to the valve at the nozzle.

After the dispensing operation has been completed, the control member 28 may be thrown down to horizontal position, and the nozzle supported thereon, if desired. A locking lug on the side of the housing and a registering lug on the control member 28 are provided so that when the control member 28 is moved down to horizontal position, a padlock can pass through the registering openings to lock the control member in inoperative position. This inoperative position corresponds to a condition in which the pump is not in operation. The control member 28 is fashioned so that when thrown to its upright position, as shown in dotted lines in Fig. 4, it will not be possible to support the nozzle thereon, whereas when it is moved down to a "pump off" position, the nozzle can be supported.

In connection with the construction of my particular nozzle, I provide means whereby it is absolutely impossible to milk the hose or inadvertently extract gasoline from the hose when the pump is in inoperative position.

In my prior application, Serial No. 478,863, filed August 30, 1930, of which this is a division in part, in certain instances it is possible to milk the hose of such construction by winding up the hose. In my present improved construction, any milking of the hose whatsoever is entirely eliminated. I accomplish this by providing means in the liquid delivery line for relieving the pressure in the event that the hose is wound up so that the pressure is not thrown upon the control member 67 at the nozzle, and whereby the nozzle cannot be opened unless the pump is in operation.

To this end, I combined with my application, Serial No. 478,863, covering the hose nozzle for the dispensing apparatus, the subject matter of my application Serial No. 479,609, filed September 4, 1930, whereby to provide a new and improved combination of instrumentalities for accomplishing the purposes hereinbefore set forth. The present application includes also the disclosure, objects, advantages and claims of my prior mentioned application Serial No. 479,609, of which the present application is a continuation in part. In order to carry out this object, the gasoline or other liquid will pass from the pump 10 into pipe 12 into the air separator 14 where it enters a chamber 80, which is formed as a separate chamber from the interior of the air separator 14, and is provided at its upper end with an outlet 82, over which fits a screen 84 through which the gasoline or other liquid will pass in order to enter the interior of the air separator proper 14. The liquid or gasoline is then compelled to flow under a baffle or partition 86 in order to pass upwardly through conduit 88, past a spring-operated check-valve 90, which automatically opens under the pressure of the pump to permit gasoline to flow in one way, but which will automatically close to prevent the return flow of this gasoline. The gasoline or other liquid passes from the chamber 92 through pipe 16, thence through the meter, thence through pipe 20 into the flexible hose 24 as hereinbefore described.

Any air or gas pumped with the gasoline into the air separator 14 will be separated out to occupy the upper portion of the air separator.

A restricted outlet is provided for this air separator to permit air to be discharged to atmosphere while at the same time maintaining the desired liquid pressure. In the present instance I have shown this air release as a relatively restricted pipe 94 having its open upper end disposed at the top of the air separator chamber 14 so that air and gas accumulating in the top of this chamber will pass downwardly through the pipe through the restricted portion 96 thereof, and thence to any desired connection to the

atmosphere. Generally, during the operation of the pump, a small amount of gasoline will likewise pass through this pipe 94, and therefore it is preferable to connect this pipe 94 to flow back to the underground tank, or preferably to the suction side of the pump as shown in the Lanser Patent 1,783,510, and as shown in the Griffith application, Serial No. 566,029. In a construction of this type, I preferably connect the pipe 94 with a container having its upper portion connecting to a stand pipe discharging to atmosphere, and provide the lower portion of the container with a float-controlled valve governing a discharge back to the suction side of the pump so that the liquid passing down through pipe 94 will form a liquid seal for this valve, thereby precluding the passage of air to the suction side of the pump, as disclosed in the Lanser patent.

Instead of having the pipe 94 extend up to the top of the air separator 14, I may provide the top of the air separator 14 with a restricted vent which extends back to the gasoline reservoir or to the suction side of the pump and provided with a float-controlled valve in the manner hereinbefore described. In the latter instance, no air cushion will accumulate at the top of the air separator 14. If desired, the upper portion of the pipe 94 can extend up to and spaced slightly from the top of the air separator 14 so as to preclude a substantial entrapment of air therein.

When the pump is in operation, the supply pressure is immediately built up in the flow-line, which extends from the pipe 12 through the air separator 14 and discharge pipe 16, meter discharge pipe 20 to the nozzle 24. This pressure is maintained due to the restricted character of the discharge pipe 94. Inasmuch as the dispensing unit is of the wet hose type, it is desirable that the flow line extending from the chamber 92 to the nozzle be maintained and filled with liquid at all times, whether the dispensing unit is operating or not. The meter, being of the displacement type, will also act similarly to the check valve 90 to prevent back flow of gasoline from the pipe 20. When gasoline is to be delivered, the lever 51 is pressed toward the nozzle body to open the valve in the nozzle to permit the flow of gasoline through the delivering end of the nozzle while the pump is being operated by its electric motor. When the lever 51 is released, the flow stops and a by-pass around the pump will prevent undue pressure from being exerted in the flow-line, particularly in the delivery end thereof on the delivery end of the check valve 90. After the valve at the nozzle has been closed, and the pump switch has been opened and the pumping discontinued, liquid under pressure will be entrapped in the delivery section of the flow line. I provide means adapted to relieve this static pressure so as to prevent leakage in the flow line with consequent lowering of the level of the liquid in the sight-glass 22. In addition, I provide means for relieving the pressure in the event that the hose is wound up so that this excess pressure will not be transmitted to the shiftable member 66 of the nozzle, but will be stored up by an expansible member. To this end I connect the pressure reducing or storing device to the dispensing mechanism so that the pressure in the delivery section of the flow line may be relieved or reduced and an appreciable lowering of the liquid in the sight-glass accomplished while maintaining the delivery hose filled with liquid and preventing the undue pressure in the hose from being exerted on the block 67 of the nozzle whereby when the pump is inoperative the nozzle cannot be opened by excess pressure due to winding up the hose so that a full column of liquid will be maintained in the hose, and therefore when the dispensing apparatus is ready to dispense gasoline a full delivery may be effected instantaneously.

The pressure reducing or pressure relieving device comprises an expansible chamber or an expansion device of any desired type. In the embodiment illustrated, it comprises shallow circular cups 98 and 100, which are secured together at their periphery by bolts, if desired. These bolts also clamp to the periphery of the cups 98 and 100, the peripheral portion of the flexible diaphragm 102, which may be composed of leather, thin metal or other flexible material, being particularly adapted to withstand the liquid being dispensed and the hydraulic pressure exerted thereon. The diaphragm 102 forms a partition between the chambers on either side thereof. I provide a circular plate 104 having a cylindrical piston 106 at its center, which is slidable vertically in a cylinder 108 concentric with the cups. Downward movement of the cylindrical piston is limited by the horizontal annular shoulder 110 and the upward movement of the plate is limited by the diaphragm 102 therein striking against the bottom of the upper cup. The plate 104 is less in diameter than the cylindrical wall of the lower cup 100 and therefore the plate and its piston have their up and down movement relatively to the lower cup 100. The cylinder 108 has a screw-threaded opening at its lower end to facilitate the use of a nipple 112 for connecting the cylinder with the top of the chamber 14 of the air release device. The upper central portion of the upper cup 98 is screw-threaded to receive a pipe 114 which extends upwardly and is connected to the liquid flow-line at any portion between the check valve 90 and the nozzle. I preferably connect it to the discharge side of the meter or to the pipe 20 as illustrated in Fig. 4. The spring 116, as shown in Fig. 6, is mounted between the shoulder 110 and the center of the plate 104 within the cylindrical piston 108. Radial ports 118 at the upper end of the cylindrical piston 106 establish communication between the diaphragm 102 and the lower cup 100 and the hollow nipple 112 which connects with the upper portion of the interior of the air separator.

During the operation of the dispensing mechanism, the spring 116 aids hydraulic pressure on the under side of the diaphragm 102 and the plate 104 and therefore the hydraulic pressure on the upper side of the diaphragm 102 is overbalanced. Consequently the diaphragm 102, during operation of the dispensing mechanism, will occupy its upward position as shown in Fig. 5, where it closes the upper chamber between the diaphragm and the upper cup 98. During the operation of the dispensing system, the gasoline is flowing under pressure through the pipe 12 into the air separator 14 and hence downwardly and under partition 86 and upwardly past the check-valve 90. The restricted port 96 will effect maintenance of sufficient pressure in the chamber 14 to co-act with the spring 116 to overbalance the pressure in the pipe 20 and on the

top of the diaphragm 102. The tension of the spring 116 may be varied according to conditions. In practice, this spring must be of sufficient tension to maintain the head of liquid in pipe 20 and in the sight-glass of the flow indicator 22.

When the operation of the dispensing mechanism is discontinued, by stopping the pump, the restricted port 96 relieves the pressure in the air separator 14. Since air is usually in the upper end of the air separator 14, about the upper end of pipe 94, the relief of the pressure in the chamber will be rapid and consequently the pressure in the delivery section of the flow-line including the pressure in the delivery hose will be sufficient to overcome the action of the spring 116 and the diaphragm 102 will move to its lower position as shown in Fig. 6. The expansion of the chamber formed between the diaphragm 102 and the upper cup 98 allows sufficient liquid to flow thereinto to reduce or relieve the pressure in the delivery section of the flow-line and consequently less leakage is likely to result, and the desired depth of gasoline in the sight-glass is maintained.

Similarly, when the pump is not in operation, and the nozzle valve is closed, if one should wind up the hose, the pressure created therein will cause the diaphragm 102 to move downwardly the plate 104 against the tension of the spring 116 thereby providing an adjustable expansion chamber or pressure relief chamber in which any excess liquid is temporarily stored during this winding operation. When the winding operation ceases, the pressure equilibrium will be restored by the pressure of the spring 116 and the liquid will flow out of this expansion chamber and the pressure balance will be restored.

It should be also noted that the reduced pressure in the delivery section of the flow line may be only a little more than is necessary to overcome the spring 116. Consequently when the dispensing operations are again started the pressure in the chamber between the diaphragm 102 and the lower cup 100, produced by the pump, will be built up very quickly so as to co-act with the spring 116 and immediately reclosing the chamber disposed between the diaphragm 102 and the upper cup 98, thus enabling the dispensing of gasoline from the nozzle immediately after the lever 128 has been moved to pump-operating position, and the nozzle valve lever 51 moved to open position.

It must be obvious that by providing a control mechanism wherein the flow of liquid from the nozzle valve is ultimately governed by the shiftable movement of the pump control lever located on the side of the housing or elsewhere, I am enabled to eliminate any additional locking mechanism for the nozzle valve lever and also for locking the nozzle to the housing. It is apparent that by providing a single lock for the lever 28, or any other type of manually shiftable pump control member, I am able to prevent the dispensing operation when the device is locked up for the night.

In connection with the operation of the valve nozzle itself, it must be apparent from an inspection of Fig. 1, that if the valve stem 55 were connected to the poppet body 41 to move bodily therewith at all times irrespective of the hydraulic pressure in the conduit 32, the operator could, by opening the valve 39 and winding up the hose, force the gasoline or other liquid past the non-draining valve 77, by the pressure produced in the hose, and thus effect considerable draining of the gasoline or other liquid from the hose. In the present invention such draining of the hose is prevented because, as it can readily be seen, if such draining were attempted when the valve structure shown in Fig. 1 is connected to the nozzle, the valve 39, by closing toward the conduit 34 will prevent flow from the hose, and the operator cannot operate the valve 39 because any pressure produced by winding up the hose will be relieved by the movement of the fluid from the hose backwardly through the pipe 20, thence through pipe 114 into the upper expansion chamber to thereby force the diaphragm 102 and plate 104 downwardly against the tension of the spring 116. This will relieve the pressure in the hose and thus the pressure will not be sufficient to move the pin 68 into position where it can act as an abutment for the valve stem 55. That is to say, no matter how much the attendant operates the lever 51, he cannot open the valve 39 until the pumping pressure has been built up sufficiently in the conduit 32 to act on the compression sleeve 73 against the springs 72 to move the pin radially inwardly. As stated before, the pressure produced by winding the hose will not be sufficient to move the pin 68 radially inwardly, but even if such pressure were sufficient and the operator were able to move the valve 39 upon discharge of a relatively small amount of liquid, the pressure would then be relieved so that the valve 39 would automatically close, and thus very little, if any, gasoline could be drained. There must be sufficient pumping pressure in the conduit 32 to maintain the pin 68 projected radially inwardly, and as soon as this pressure falls below a predetermined maximum, the valve 39 will automatically close.

It must be apparent that even though the lever 51 be moved inwardly to move the plunger 54 inwardly, the valve 39 will not open because the spring 48, when fully compressed, will act as an abutment to prevent the upper end of the valve stem 55 from reaching the upper end of the cylindrical recess 64, and so long as sufficient hydraulic pressure is not present in the conduit 32, the spring 72 will urge the pin 68 into its outer position where the valve stem 55 cannot engage it. The nozzle, therefore, cannot be tampered with to effect draining of whatever gasoline there is in the hose in a wet hose dispensing outfit in an outside location at a filling station.

The claims of the present application, insofar as it is a division of my co-pending application Serial No. 478,863 filed August 30, 1930, are drawn to the combination of my improved nozzle and a gasoline dispensing system including a pump and a control member for the pump. The claims of my co-pending application Serial No. 478,863 relate to the nozzle per se.

Having thus described my invention, what I claim as new and desire to obtain by Letters Patent is:

1. In a liquid dispensing device of the wet hose type terminating in a valve-controlled nozzle, pressure means for forcing liquid through the hose and nozzle upon the opening of said valve, and means operated solely by the pressure of said pressure means for controlling the opening of said valve by said manually operable member.

2. In a liquid dispensing apparatus having a

wet hose terminating in a manually operable valve-controlled nozzle, a pump for forcing liquid through said means by the opening of said nozzle valve, and means actuated by a predetermined liquid pressure in the wet hose for controlling the operation of said valve.

3. In a gasoline dispensing system, an apparatus of the wet hose type wherein the hose is provided with a valve-controlled nozzle, a pump for forcing gasoline through said hose and nozzle, and means operative only during the actuation of the pump for controlling the opening movement of the valve of said nozzle.

4. In a gasoline dispensing device of the wet hose type having a dispensing nozzle, pressure means for forcing liquid through said hose and nozzle, said nozzle having a normally closed valve, manual means for operating said valve, and a liquid pressure-operated clutch for connecting said valve with said actuating member.

5. In a gasoline dispensing device of the wet hose type having a dispensing nozzle, pressure means for forcing liquid through said hose and nozzle, said nozzle having a normally closed valve, manual means for operating said valve, and a clutch operated by the pressure of said pressure means for connecting said valve with said actuating member.

6. In a liquid dispensing device of the wet hose type, means forming a liquid flow line, means for forcing liquid therethrough, means in said line forming a valve seat, a valve normally closed on said seat, an actuating member manually movable in one direction relative to said valve, spring means for returning said actuating member, means actuated by the pressure of liquid in said line for operatively connecting said member to said valve whereby to cause the opening of said valve.

7. In a liquid dispensing device, the combination of a pump adapted to be connected to a source of gasoline supply, a metering device adapted to receive the discharge from said pump, a flexible hose adapted to receive the discharge of said member, said hose terminating in a nozzle, a single valve in said nozzle governing the flow of liquid through said nozzle, a valve stem projecting from said nozzle and freely reciprocable, a manually operable member for actuating said stem, and means for preventing the opening of said valve by said valve stem when said pump is inoperative.

8. In a liquid dispensing device, the combination of a pump adapted to be connected to a source of gasoline supply, a metering device adapted to receive the discharge from said pump, a flexible hose adapted to receive the discharge of said member, said hose terminating in a nozzle, a single valve in said nozzle governing the flow of liquid through said nozzle, a valve stem projecting from said nozzle and freely reciprocable, a manually operable member for actuating said stem, and means for closing said valve upon the termination of the pumping pressure irrespective of the position of said manually operable member for operating said valve stem.

9. In a liquid dispensing device of the wet hose type wherein the hose is provided with a nozzle having a single valve, hand actuated means for operating said valve, pressure means for forcing liquid through said hose and nozzle upon the opening of said valve, and means operable upon the cessation of said forcing means for preventing the draining of liquid from said hose upon the actuation of said hand operated member for said valve.

10. In a liquid dispensing system of the wet hose type wherein the hose is provided with a nozzle and a guard, a valve for said nozzle, a valve stem for operating said valve, a lever disposed within said guard and adapted to actuate said valve stem, pressure means for forcing liquid through said hose and nozzle upon the opening of said valve, and means operable upon the cessation of said forcing means for preventing the draining of said hose and preventing the opening of said valve upon the actuation of said lever, said means being effective to cause the opening of said valve upon the actuation of said lever when said forcing means is in operation.

11. In a liquid dispensing device of the wet hose type terminating in a valve-controlled nozzle, a manually operable member for opening said valve pressure means for forcing liquid through the hose and nozzle upon the opening of said valve, means operated solely by the pressure of said pressure means for controlling the opening of said valve of operation of said manually operable member, and a pressure expansion chamber connected to the hose and adapted to relieve the pressure therein upon the winding of the hose.

12. In a liquid dispensing device of the wet hose type terminating in a valve-controlled nozzle, a manually operable member, a pump adapted to draw liquid from a source of supply and force the liquid through the hose, a manually operable control member for the pump, instrumentalities actuated solely by the pressure in the hose created by the operation of the pump for controlling the opening of the valve on movement of the first mentioned manually operated member, pressure relieving means for relieving an undue pressure in the hose upon cessation of the pumping means.

13. In a liquid dispensing device of the wet hose type terminating in a valve-controlled nozzle, a manually operable member, a pump adapted to draw liquid from a source of supply and force the liquid through the hose, a manually operable control member for the pump, instrumentalities actuated solely by the pressure in the hose created by the operation of the pump for controlling the opening of the valve on movement of the first mentioned manually operated member, and means forming an expansible chamber arranged to receive liquid from the hose upon the creation of an undue pressure in the hose upon cessation of the pumping means.

14. In a liquid dispensing device of the wet hose type terminating in a valve-controlled nozzle, a manually operable member, a pump adapted to draw liquid from a source of supply and force the liquid through the hose, a manually operable control member for the pump, instrumentalities actuated solely by the pressure in the hose created by the operation of the pump for controlling the opening of the valve on movement of the first mentioned manually operated member, a pipe connected to the hose, and terminating in a compartment having an expansible wall portion whereby upon the creation of an excess pressure in said hose after the cessation of the pumping means the liquid will be forced through said pipe into the chamber to move said expansible means.

15. In a liquid dispensing apparatus, the combination of a dispensing apparatus comprising

a flow-line having a dispensing portion and a delivery portion, the latter terminating in a valve-controlled nozzle, a manually operable member for operating the valve of said valve-controlled nozzle, pressure means for forcing liquid through the hose and nozzle upon the opening of the valve, means for maintaining the delivery portion filled with liquid when the supply pressure to the supply portion is cut off, an air release device for the supply portion, and means operated solely by the pressure of said pressure means for controlling the opening of said valve by said manually operable member, and shiftable means connected to the air release device and to the delivery portion of the flow-line and actuated by the differential in pressure between the air release and the delivery portion for relieving the pressure in said delivery portion.

16. In a liquid dispensing device of the wet hose type having a dispensing nozzle having a normally closed valve, pressure means for forcing liquid through said hose and nozzle, manual means for operating said valve, a clutch for connecting the valve with said actuating member, means for operating said clutch by the pressure of said liquid created by said forcing means when the same is in operation, and means for preventing the operation of said clutch when said pressure forcing means is not in operation.

17. In a gasoline dispensing device of the wet hose type having a dispensing nozzle, pressure means for forcing liquid through said hose and nozzle, said nozzle having a normally closed valve, manual means for operating said valve, a liquid pressure-operated clutch for connecting said valve with said actuating member, and means adapted to prevent the operation of said clutch by winding up the hose when the pressure means is inoperative.

18. In a liquid dispensing apparatus, the combination of a housing, a pump adapted to draw gasoline from a source of supply, a meter in said housing connected with said pump, said meter discharging into a liquid conduit terminating outside of said housing in a flexible hose, a manually operable valve-controlled nozzle for said flexible hose, manually operable control means on the side of said housing for operating said pump, and instrumentalities for preventing the opening of said nozzle valve by its manually shiftable member unless said manually operable control means is in operative position, and means for locking said control means in inoperative position.

19. A liquid dispensing device comprising a housing, a pump in said housing, a pump switch in said housing, a meter in said housing, a manually operable control extending outside of said housing and connecting with the pump switch within said housing, a liquid flow-line connecting the pump with the meter, and a liquid flow-line connecting with the meter and terminating in a flexible hose disposed outside of said housing, said flexible hose having a valve-controlled nozzle provided with a manually operable member, instrumentalities for normally preventing the opening of said valve by said manually operable member and instrumentalities being operable only upon the creation of a predetermined pump pressure, and a single locking means for said manually operable member extending outside of said housing for preventing the operation of said dispensing apparatus.

20. In a gasoline dispensing device having a discharge line provided with a dispensing nozzle, pressure means for forcing liquid through said line and nozzle, a normally closed valve for controlling the flow through said nozzle, and means responsive to the pressure in the discharge line for controlling the opening of said valve.

21. In a gasoline dispensing device having a discharge line provided with a dispensing nozzle, pressure means for forcing liquid through said line and nozzle, a normally closed valve for controlling the flow through said nozzle, and means including devices responsive only to pressure in the discharge line for controlling the opening of said valve.

22. In a gasoline dispensing device having a discharge line provided with a dispensing nozzle, pressure means for forcing liquid through said line and nozzle, a normally closed valve for controlling the flow through said nozzle, and clutch means responsive only to pressure in the discharge line for controlling the opening of said valve.

23. In dispensing apparatus, the combination with dispensing mechanism comprising a flow line, of an air separator therein, and means including an expansible chamber connected to said flow line and to said air separator for relieving the fluid pressure in the flow line when the supply pressure is cut off.

24. In dispensing apparatus, the combination with a pump, of air release mechanism comprising a vented chamber connected to said pump to receive flow therefrom, a delivery line connected to said chamber, and mechanism comprising a fluid pressure diaphragm having one side connected to said chamber and the other side to said delivery line.

25. In dispensing apparatus, the combination with dispensing mechanism comprising a flow line, of pressure reducing mechanism comprising a flexible diaphragm, connections for subjecting both sides of the diaphragm to hydraulic pressure during dispensing operations, and means for removing the hydraulic pressure on one side of said diaphragm when dispensing operations stop.

26. In dispensing apparatus, the combination with dispensing mechanism comprising a flow line having a delivery section and a supply section, of means for confining liquid in the delivery section when the supply pressure is cut off, and pressure reducing mechanism connected on one side to said delivery section and on the other side to said supply section and to a restricted port for pressure relief.

27. In dispensing apparatus, the combination with dispensing mechanism comprising a delivery line, of means for maintaining said delivery line filled with liquid after being cut off from the supply pressure, pressure reducing mechanism comprising a flexible partition between two chambers, a connection between one chamber and said delivery line, and connections between the other chamber and the supply pressure and also to the atmosphere.

28. In dispensing apparatus, the combination with dispensing mechanism comprising a delivery pipe, of pressure reducing mechanism having a flexible diaphragm partition between two chambers, a connection affording communication between said delivery pipe and one of said chambers on one side of said partition, a spring acting on the other side of said parti-

tion tending to close the chamber connected to said delivery pipe, and connections between the spring side of said partition to cause the supply pressure to act on said diaphragm in the direction of said spring, and means venting the spring side of said partition to the atmosphere.

29. In dispensing apparatus, the combination with dispensing mechanism comprising a pump and a delivery section, an air release device connected to said pump and having a restricted air outlet to atmosphere, means between said air release device and said delivery section for maintaining the delivery section filled with liquid at all times, and pressure reducing mechanism connected between said air release device and said delivery section and automatically actuated by the passage of air through said restricted air outlet on cessation of said pump.

30. Pressure reducing apparatus for dispensing apparatus, comprising a flexible diaphragm partition between two chambers, one chamber being adapted to be connected to the delivery line and the other chamber being adapted to be connected to the supply pressure and also vented to the atmosphere, and a spring acting on said diaphragm to tend to close the chamber connected to the delivery line when hydraulic pressure is exerted on both sides of said diaphragm.

31. Dispensing apparatus comprising a flow line having a supply section and a delivery section, a pressure reducing device for the delivery section and comprising a diaphragm partition between two chambers, a spring in one chamber in position to act on said partition and move the same to close the other chamber, and connections for subjecting both sides of said partition to hydraulic pressure during dispensing operations and venting the spring side of said partition to the atmosphere when said spring is compressed by the entrapped pressure in the delivery line.

32. Dispensing apparatus comprising a delivery line, pressure reducing mechanism connected to said delivery line and having a flexible diaphragm between two chambers, a piston plate acting on one side of said diaphragm, a spring acting on said piston plate, and connections to said chamber for causing said pressure reducing mechanism to relieve the pressure in the delivery line while the latter remains filled with liquid.

33. In a liquid dispensing apparatus, the combination of a tank, pump, meter, a sight glass, and a wet hose having a valve-controlled nozzle, a flow line through which liquid is forced from the tank to the meter and through the sight glass and thence through the wet hose and nozzle, means for maintaining that portion of the flow line from the meter to the nozzle full of liquid after the dispensing operation, yieldable means actuated by the liquid pressure in the wet hose portion of the flow line for relieving said pressure after the dispensing operation, and additional yieldable means for restricting the yieldable movement of said yieldable means to maintain the head of liquid in said portion after the dispensing operation.

34. In a liquid dispensing apparatus, the combination with dispensing mechanism comprising a flow line having a supply portion and a delivery portion, of means for maintaining the delivery portion filled with liquid when the supply pressure to the supply portion is cut off, means for connecting the delivery portion to atmosphere when the supply pressure is cut off, means connecting the delivery portion with said relieved portion of the supply line, and yieldable means in said connecting means actuated by the liquid pressure for relieving the pressure into the delivery portion while maintaining the liquid head therein.

35. In a dispensing apparatus, the combination with dispensing mechanism comprising a flow line having a supply portion and a delivery portion, of means for maintaining the delivery portion filled with liquid when the supply pressure to the supply portion is cut off, an air release device for the supply portion, and shiftable means connected to the air release device and to the delivery portion and actuated by the differential in pressure between the air release and the delivery portion for relieving the pressure in said delivery portion.

36. In a dispensing apparatus, the combination with dispensing mechanism comprising a flow line having a supply portion and a delivery portion, an air release in said flow line, of means for maintaining the delivery portion filled with liquid when the supply pressure to the supply portion is cut off, and means actuated by release of pressure in the air release for automatically increasing the capacity of said delivery portion of the flow line when the supply pressure to the supply portion is cut off for releasing the pressure in said delivery portion.

37. In a dispensing apparatus, the combination with dispensing mechanism comprising a flow line connected to a liquid forcing means, said flow line including an air separator, a meter, and a nozzle connected in series, a normally closed check valve disposed between the air separator and the meter, said check valve adapted to open under flow of liquid, and means connected to the flow line between the valve and the nozzle, and connected to the air separator for relieving the fluid pressure in the flow line between the meter and the nozzle when the supply of pressure is cut off.

38. In a dispensing apparatus, the combination with a flow line adapted to be connected to a source of fluid pressure and to a meter, a second flow line from said meter to said nozzle, a pressure-actuated valve normally closing communication between said flow lines when the fluid pressure falls below a predetermined amount, means for controlling the flow of fluid through said flow lines, and pressure-actuated means connected to said second flow-line for reducing the fluid pressure in said second flow line when said second flow line is cut off from said source of fluid pressure.

39. In a liquid dispensing device, the combination of a liquid reservoir, a pump adapted to be operatively connected therewith, an air separator connected to the discharge side of said pump, means for connecting the air separator with the atmosphere, a liquid flow line connected with the air separator, a normally closed check valve controlling the flow of liquid from the said air separator to said last mentioned liquid flow line, a meter interposed in said last mentioned liquid flow line, a valve controlled nozzle connected to said meter, and a pressure reducing device connected to said air separator and to the flow line between the meter and the nozzle, said pressure reducing device being constructed and arranged to prevent the passage of liquid from the flow line between the meter and the nozzle back to the air separator.

40. In a gasoline dispensing device, the combination of means forming a liquid flow line

including a tank, a pump connected to the tank, a meter connected to the pump discharge outlet, a sight glass connected to the meter discharge outlet, an air release in the flow line in advance of the meter, said air release having a restricted outlet to atmosphere, a flexible hose terminating in a valve-controlled nozzle, said hose being connected to the sight glass discharge outlet, means to hold the liquid level in the sight glass comprising an expansion chamber having a pressure actuating connection to the air release and having a liquid flow line connection to a portion of the liquid flow line and out of which liquid from the liquid flow line flows during the operation of the pump and into which liquid from the flow line flows during the cessation of the pump and as a result of the expansion of the liquid in the flow line.

41. In a gasoline dispensing device, the combination of means forming a liquid flow line including a tank, a pump connected to the tank, a meter connected to the pump discharge outlet, a sight glass connected to the meter discharge outlet, a flexible hose terminating in a valve-controlled nozzle, said hose being connected to the sight-glass discharge outlet, means for automatically relieving pressure in the sight glass comprising an expansion chamber having a plurality of separate connections to the flow line, including devices whereby said expansion chamber is adapted to receive liquid from the flow line and to automatically feed said liquid back to the flow line in the event of leakage therein.

42. In a liquid dispensing device, the combination with a tank, a pump, a meter, a flow line from the tank to the pump to the meter including a hose receiving the discharge from the meter, said hose having a valve-controlled nozzle, an air relief mechanism inserted in the flow line between the pump and the meter comprising means forming a chamber having a partition, means connecting one side of said partition with the flow line from the pump, the chamber on the opposite side of said partition having an outlet connected to the meter, a spring-pressed check valve controlling the passage of liquid through said outlet to the meter, and means providing a restricted air and liquid outlet disposed substantially at the top of that side of the partition in which the connection to the pump is located, said restricted outlet having means for discharging air to atmosphere and for returning liquid back to the system.

43. In a liquid dispensing device, the combination of a liquid flow line including a tank, a pump, a meter and a dispensing nozzle disposed in series for the passage of liquid therethrough by the pump, means forming a chamber having a restricted connection to the flow line and through which connection liquid from the flow line flows into the chamber after the pump stops and upon the action of expansion in said flow line, and means including a second restricted connection between the flow line and said chamber for preventing the retention of as large a volume of liquid in said chamber during the dispensing operation as is contained in said chamber after the cessation of the pump.

44. A liquid dispensing device including in combination a metering device, an intake line connected to the metering device, a discharge line communicating with said metering device, a control valve in said discharge line, expansible means for relieving excess pressure in said discharge line and connected thereto at a point between said meter and said control valve.

45. A liquid dispensing device including in combination a metering device, an intake line connected to said metering device, a discharge line communicating with said metering device, a control valve in said discharge line, and excess pressure relieving means connected to said discharge line, said means including an expansible chamber communicating with said discharge line at a point between said valve and said meter and arranged to receive a portion of the liquid in said discharge line when the pressure therein rises above a normal value.

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