

Oct. 31, 1944.

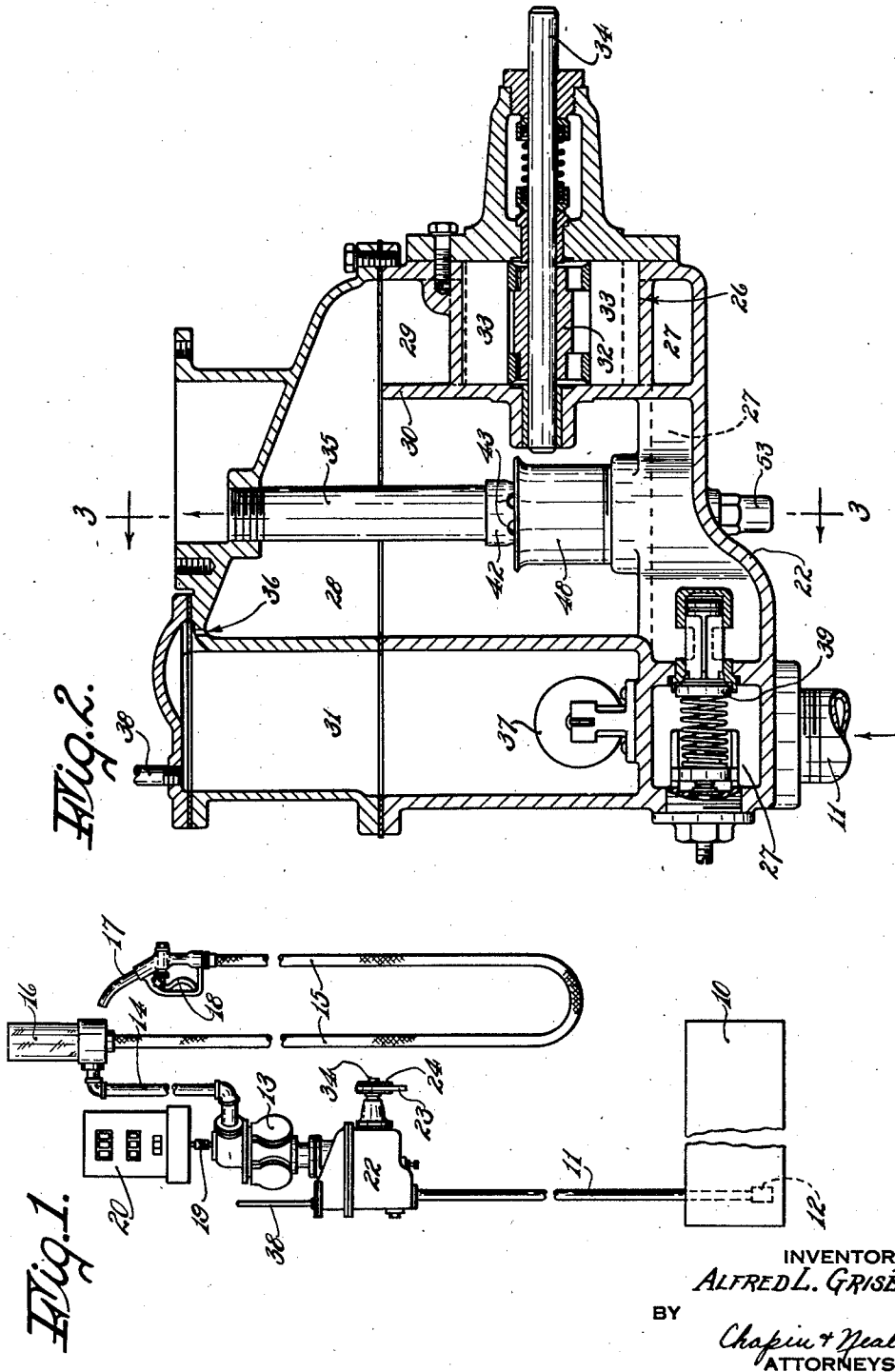
A. L. GRISE

2,361,684

LIQUID DISPENSING APPARATUS

Filed Feb. 25, 1943

2 Sheets-Sheet 1



Oct. 31, 1944.

A. L. GRISÉ

2,361,684

LIQUID DISPENSING APPARATUS

Filed Feb. 25, 1943

2 Sheets-Sheet 2

Fig. 3.

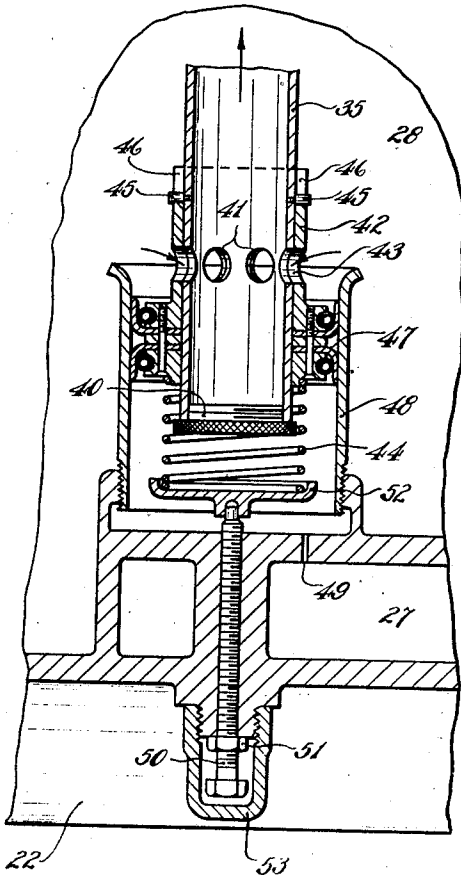
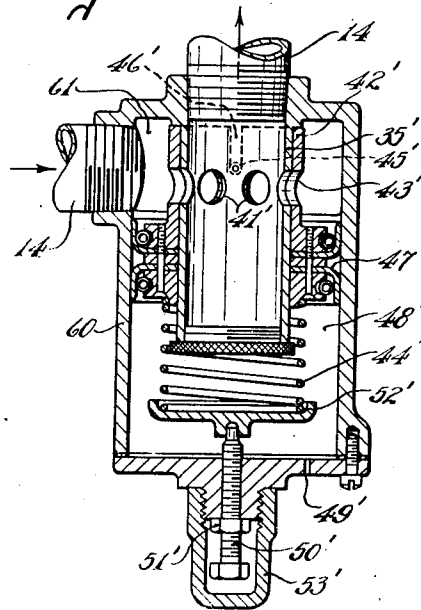


Fig. 4.



INVENTOR
ALFRED L. GRISÉ

BY

Chapman & Beal
ATTORNEYS

UNITED STATES PATENT OFFICE

2,361,684

LIQUID DISPENSING APPARATUS

Alfred L. Gris , Springfield, Mass., assignor to
Gilbert & Barker Manufacturing Company,
West Springfield, Mass., a corporation of Mas-
sachusetts

Application February 25, 1943, Serial No. 477,036

5 Claims. (Cl. 222-52)

This invention relates to improvements in liquid dispensing apparatus, such for example as that customarily used for dispensing measured quantities of gasoline and the like.

The invention has for its object the provision of improved means for preventing chattering of the valve of the hose nozzle, when such valve is closed down to an extent such as to give a trickling flow, and for enabling the nozzle valve to be easily and smoothly operated throughout its entire range from fully open to fully closed position.

It has been heretofore proposed to provide in the hose nozzle itself a throttling valve in addition to the usual nozzle valve for the purpose of cutting down the flow to the main nozzle valve when the latter is closed down to a very small flow with the object of avoiding hammering or chattering of the nozzle valve under such conditions. It has also been proposed to provide the hose nozzle with a valve-actuating handle affording extra leverage for controlling the valve, when closed down to minimum flow. Both these provisions require the use of a special hose nozzle.

This invention is characterized in that a throttling valve is provided at some intermediate point in the discharge line and not at the end of such line, as in the hose nozzle and in accordance with the prior art. The dispensing apparatus can thus be used with any form of nozzle irrespective of whether or not it contains any of the aforesaid special provisions. A simple inexpensive form of nozzle can be used. The invention is intended to render the nozzle valve operable smoothly and without chattering over its entire range. The invention is also characterized in that the throttling valve may be housed in a casing of large volume, such as the air separator for example, wherein the velocity of the liquid is reduced to such an extent that the throttling valve is not subject to shock and hammer action, as it would be if placed in the hose nozzle, due to the momentum of the fast flowing stream in the hose and nozzle, but is operated smoothly and gradually substantially entirely by static pressure.

These objects will best be understood as the detailed description proceeds and they will be pointed out in the appended claims.

The invention will be disclosed with reference to the accompanying drawings, in which:

Fig. 1 is a diagrammatical view of a liquid measuring and dispensing system embodying the invention;

Fig. 2 is a sectional elevational view, drawn to a larger scale, of the combined pump and air separator unit shown in Fig. 1 and showing the application of the regulating valve thereto;

Fig. 3 is a cross sectional view taken on the line 3-3 of Fig. 2; and

Fig. 4 is a sectional view showing a different form of housing for the regulating valve.

Referring to these drawings; there is shown conventionally in Fig. 1 a measuring and dispensing system for gasoline and the like. The liquid is drawn up from a low-level supply tank 10 through a suction pipe 11, having the usual foot valve 12, and forced through a meter 13 interposed in a discharge conduit, which includes pipe 14, flexible hose 15 and an interposed sight glass 16 as well as passages in the separator to be described. On the delivery end of the hose is a nozzle 17 of usual form having a normally closed valve which may be opened by a hand lever 18. The nozzle valve is arranged as shown in Eickman Patent No. 1,585,332, dated May 18, 1926. The meter drives through a shaft 19 a suitable register 20 which may show the cost and/or the quantity of the liquid dispensed. Interposed between the suction pipe 11 and meter 13 is a casing 22 which houses a pump, driven by suitable means indicated in part in Fig. 1 by the belt 23 and pulley 24. The casing also houses a separator for freeing the gasoline from air before delivery of the gasoline to the meter.

The pump and separator are best shown in Fig. 2. The housing is partitioned off to form a pump chamber 26 at one end of the housing; an inlet chamber 27 located at the base of the housing and communicating at one end with suction pipe 11 and at the other end with the pump chamber; a separating chamber 28 receiving the discharge from the pump outlet chamber 29 over a dam 30; and a liquid recovery chamber 31. The pump consists of a rotor 32 mounted eccentrically in the pump chamber and carrying radially slidable vanes 33 to engage the walls of such chamber. The rotor has a shaft 34 for connection to the aforesaid driving means. The pump draws liquid from pipe 11 through chamber 27 and forces it out through passage 29, where it flows over dam 30 into chamber 28. Here the velocity of the liquid is greatly lowered and separation of air and gases from the liquid occurs in the known manner—the air-free liquid passing to the bottom of the chamber 28 and being forced out through a pipe 35 to the meter. Air and gases and usually

some liquid pass out of chamber 28 through a constantly open passage 36 of restricted area into chamber 31. Here the liquid settles to the bottom of the chamber and is intermittently delivered to suction chamber 27 by float valve means, indicated in part at 37, and the air and gases leave through a vent pipe 38 communicating with the atmosphere.

When the pump is operated with the valve of nozzle 17 closed, pressure builds up in the system because the only outlet is the restricted vent 36. To limit the pressure, it is usual to provide a spring-pressed by-pass valve, such as shown at 39 in Fig. 2, which opens when a predetermined pressure is reached and interconnects the suction and discharge sides of the pump as, in this case, by interconnecting chambers 27 and 28. A substantial pressure, say 18 to 20 lbs. per square inch, is built up in the chamber 28 and in the discharge conduit before valve 39 opens. A somewhat less but still a relatively heavy pressure is also necessary when the valve of nozzle 17 is open in order to effect the discharge of the measured liquid at the desired high rate of say 12 to 15 gallons per minute.

With the heavy pressure used and the high velocity flow obtained in gasoline dispensing systems of the type described, it is difficult to control the flow by use of the usual hand lever 18 and the usual valve at the nozzle 17. When the operator attempts to throttle down the flow, the liquid moving at high velocity and under considerable pressure tends to drive the valve to its seat with considerable force and the operator must exert a great deal of force on the handle in order to hold the valve open. The tendency is for the valve to close sharply, setting up a hammer action in the liquid by quick stoppage of the high velocity stream. The operator then has to exert much force in order to open the valve and usually he opens it too much. Then, when he relaxes his grip on the handle to allow the valve to move more closely to its seat, the valve is liable to sharply close again. A chattering of the valve is likely to be set up as a result of the procedure described.

According to this invention, a regulating valve is provided outside the hose nozzle and located at some place in the discharge conduit other than the nozzle. Such valve may conveniently be located in the air separator, for example, and is so shown in Fig. 3. The lower end of outlet pipe 35 is suitably closed, as by the flanged plug 40 and the inlet consists of a series of holes 41 formed in the peripheral wall of the pipe. The aggregate area of these holes is at least equal to the cross sectional area of pipe 35. A sleeve 42 is slidably mounted on pipe 35 and has holes 43 therein adapted normally to register with the holes 41. A spring 44 holds this sleeve valve in its upper position which is defined by pins 45 fixed in pipe 35 and riding in slots 46 in the sleeve. The interengaging pins and slots prevent rotation of the sleeve valve. The sleeve valve can move downwardly until it abuts the flange on plug 40 as a stop and in such position the holes 43 are completely out of register with holes 41 and communication between pipe 35 and chamber 28 is completely cut off. The sleeve valve 42 carries on its lower end a piston 47 which slides in a cylinder 48 upstanding from the floor of chamber 28. This cylinder at its upper end is open to, and in free communication with, chamber 28. The lower end of the cylinder is vented by a passage 49 to the suction chamber 27. An

adjusting screw 50, threaded into the lower wall of chamber 28 and held in its various positions of adjustment by a lock nut 51, carries on its upper end a seat 52 for the spring 44. A cap 53 covers the head of screw 50 and prevents leakage from the chamber 28 by way of the screw.

In the dispensing operation, the sleeve valve 42 is held open by spring 44, whenever the valve in the hose nozzle is fully open. On partial closure of the nozzle valve, there will be a rise in pressure in the system and the increased pressure, acting on piston 47, will move the latter and the sleeve valve downwardly, thereby partially closing the inlet holes 41 and thus throttling down the flow to the hose nozzle. The force acting to close the sleeve valve is more nearly that of static pressure than that which acts on the nozzle valve. The velocity of the liquid is purposely slowed down as much as possible in the air separator in order to make the liquid as nearly quiescent as possible and to obtain efficient separation of air from the liquid. In the nozzle, however, the valve when moved toward closed position, arrests a fast moving stream of liquid and the result is a tendency to force the valve to its seat with a hammer action. The momentum of the liquid causes the trouble. In the separator, the piston is not acted on in the same way because the velocity of the liquid is too low. The partial closing of the sleeve valve 42 thus reduces the flow to the hose and nozzle and avoids the hammer action on the nozzle valve. The flow to the hose will be cut down more or less in proportion to the closing of the nozzle valve. The greatest difficulty ordinarily occurs when the operator attempts to get merely a trickling flow from the nozzle. The operator relaxes his grip on handle 18 enough to allow the valve to move almost to its seat. The sudden stoppage of the fast moving stream drives the valve to its seat with a hammer blow. The operator then tries to open the valve just slightly but considerable force is necessary and the valve is moved too far and will again be driven closed. A very undesirable chattering action of the valve results. As above set forth, attempts have been made to overcome this trouble by the use of valve-actuating handles affording extra high leverage, effective near the start of the valve opening and near the end of the valve closing movement; also by the use of special throttling valves in the nozzle. In each case, a special and relatively expensive nozzle is required. My invention enables the provision of a gasoline dispensing apparatus with which any kind of nozzle may be used. Special and costly nozzles are not necessary. Furthermore, the location of the throttling valve as shown herein rather than in the nozzle itself is far more effective because, as above set forth, the throttling valve is not subjected to the momentum of a fast moving stream of liquid. It can be moved gradually and smoothly by the pressure rise without shock or hammer action. The result is that an ordinary hose nozzle, without any special provisions such as have been above set forth, may be operated easily and smoothly in varying the flow throughout the available range and without chattering when the flow is throttled down to a trickling flow.

The advantages of the invention may be had by locating the throttling valve elsewhere in the dispensing line. Thus, the throttling valve may have a separate casing 60 of its own, as shown in Fig. 4, and it may be interposed in the discharge pipe 14, as indicated. This casing has

inside it a tube 35' depending from its top wall in line with the outlet portion of pipe 14. This tube corresponds to the tube 35 in Fig. 3 and is similarly constructed. Upon the tube is mounted a similar sleeve valve, similarly actuated and similarly adjustable. The parts in Fig. 4 which correspond with those shown in Fig. 3 have been given the same reference numerals with the addition of a prime. The only difference in the Fig. 4 construction is that the lower part of cylinder 48' is vented to the atmosphere instead of the suction passage and that the casing is of different shape. It is assumed that the upper portion of casing 60—the portion marked 61—is extended rearwardly and forwardly to afford a chamber of large volume in order to cut down the velocity of the liquid. The advantages of the invention may be had in part, if the velocity of the liquid in the casing in which the throttling valve is located is not substantially reduced but the best results are had where such casing is of large enough volume, as the air separator is, to slow down the velocity to a point where there will be no hammer action on the throttling valve.

What I claim is:

1. The combination in a liquid dispensing apparatus having a liquid discharge conduit terminating with a nozzle having a spring-closed valve and a hand lever for manually opening the valve, and means for forcing liquid at high velocity through said conduit, of a casing interposed in said conduit and affording a chamber having a cross sectional area many times that of said conduit for substantially reducing the velocity of the liquid, a valve in said chamber controlling the passage of liquid out of said chamber, means for holding said valve in open position against the normal pressure prevailing in said conduit during dispensing of liquid through said conduit and nozzle while the nozzle valve is fully open, and means in said chamber responsive to a rise in pressure in said conduit and nozzle when the nozzle valve is partly closed and the pressure in said conduit rises above said normal pressure to partly close the first-named valve and cut down the flow from said chamber to the conduit and nozzle and to close the first-named valve in proportion to the closing of the nozzle valve.

2. The combination in a liquid dispensing apparatus having a liquid discharge conduit terminating with a nozzle having a spring-closed valve and a hand lever for manually opening the valve, and means for forcing liquid at high velocity through said conduit, of a casing interposed in said conduit and affording a chamber having a cross sectional area many times that of said conduit for substantially reducing the velocity of the liquid, a valve in said chamber controlling the passage of liquid out of said chamber, a cylinder having one end communicating with said chamber, a piston in the cylinder connected to said valve and tending to be moved by liquid pressure in a direction such as to move said valve toward closed position, a spring tending to move the valve toward open position and to hold it in such position while normal pressure exists in the

discharge conduit during dispensing when the nozzle valve is fully opened, a partial closure of the nozzle valve effecting a pressure rise in said conduit and chamber and moving said piston to partially close the first-named valve.

3. In liquid dispensing apparatus, a discharge conduit terminating with a valved hose nozzle, an air separator interposed in said conduit; means for forcing liquid through said conduit, separator and nozzle when the nozzle valve is open; a valve controlling the outflow of liquid from said separator, resilient means for maintaining said second-named valve open against the normal pressure of liquid in said conduit when the nozzle valve is fully open during dispensing, and means responsive to a rise in pressure of liquid in the separator when the pressure rises above said normal pressure because of the partial closing of the nozzle valve to move said second-named valve toward closed position and decrease the flow to said nozzle.

4. In liquid dispensing apparatus, a discharge conduit terminating with a valved hose nozzle, an air separator interposed in said conduit; means for forcing liquid through said conduit, separator and nozzle when the nozzle valve is open; an outlet pipe for the separator extending deep down into the separating chamber thereof, a cylinder in said chamber having one end open to said chamber, a piston in said cylinder, a valve for said pipe connected to said piston and actuated toward closed position by the pressure of liquid in said chamber on said piston, and a spring for moving the valve toward open position; said spring holding said valve in open position while normal dispensing pressure exists in said chamber, conduit and nozzle while the nozzle valve is fully open; a rise in pressure caused by partial closure of the nozzle valve causing the piston to move the valve toward closed position and cut down the flow to the nozzle.

5. In liquid dispensing apparatus, a discharge conduit terminating with a valved hose nozzle, an air separator interposed in said conduit; means for forcing liquid through said conduit, separator and nozzle when the nozzle valve is open; an outlet pipe for the separator extending deep down into the separating chamber thereof, said pipe having a closed lower end and inlet openings in its peripheral wall, a cylinder in said chamber coaxial with said pipe and having one end open to said chamber, a piston in said cylinder, a sleeve valve slidably mounted on the pipe and having openings to register with the openings in said pipe when the valve is in open position, said sleeve valve being connected to said piston and actuated toward closed position by the pressure of liquid in said chamber on said piston, and a spring for moving the valve toward open position; said spring holding said valve in open position while normal dispensing pressure exists in said chamber, conduit and nozzle while the nozzle valve is fully open; a rise in pressure caused by partial closure of the nozzle valve causing the piston to move the valve toward closed position and cut down the flow to the nozzle.

ALFRED L. GRISÉ.