March 22, 1938. H. K. FLINCHBAUGH 2,111,851

AUTOMATIC FILLING NOZZLE

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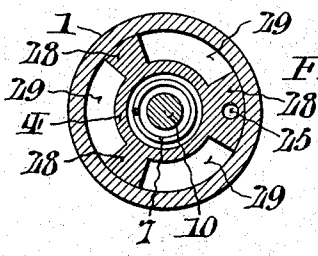


FIG. III.

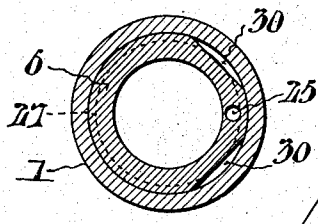


FIG. IV.

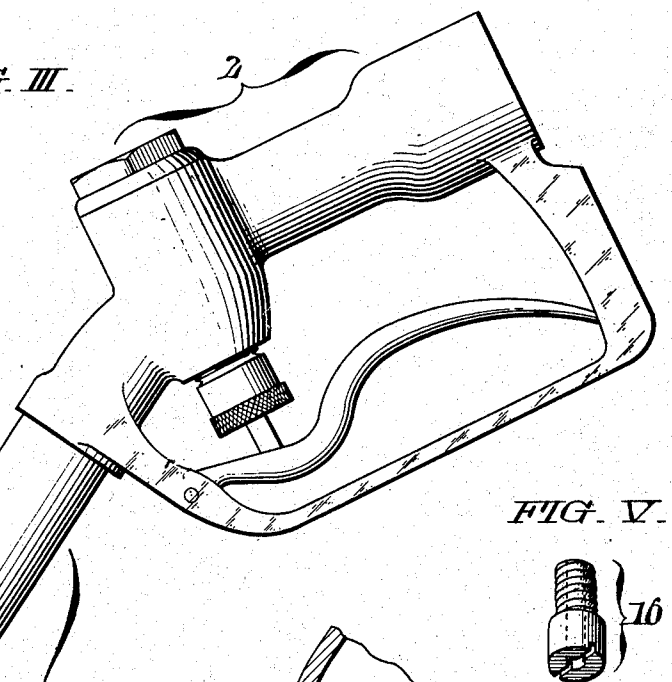


FIG. V.

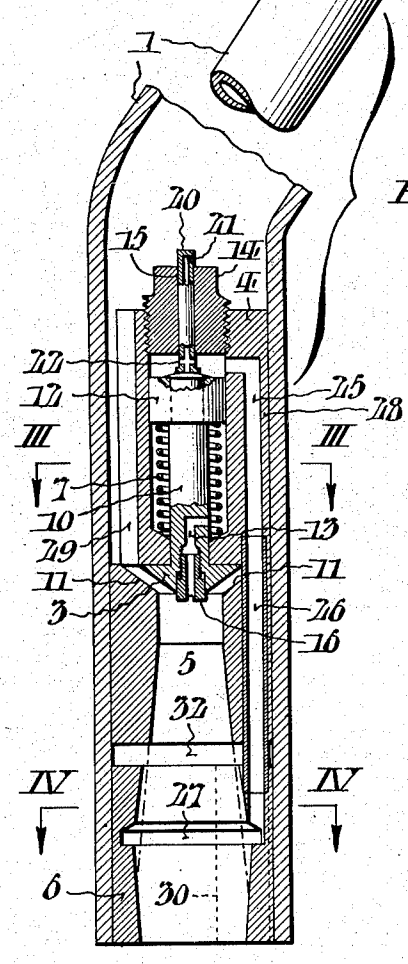


FIG. I

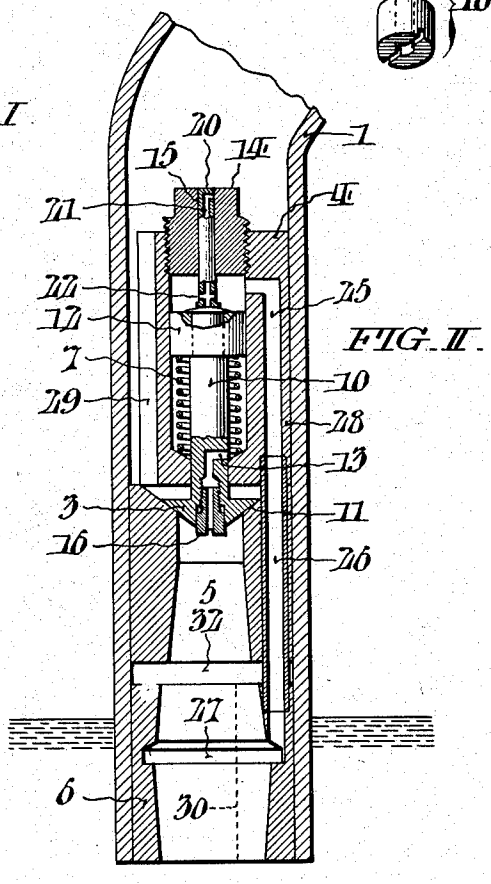


FIG. II.

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AUTOMATIC FILLING NOZZLE

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12 Claims. (Cl. 226—127)

My invention relates to automatic valves and particularly to ones which are actuated to close by the submergence of the nozzle in the liquid which has been discharged into a receptacle. Still more specifically, my invention is concerned with automatic valves for gasoline dispensing nozzles which automatically stop the flow of gasoline when the gasoline in the container being filled submerges the end of the dispensing nozzle.

I am aware of a number of valves of this general type directed to my general purpose but my invention has certain definite advantages over the present state of the art. The use of an electrically operated mechanism to automatically control valves has been suggested in the art as has the float type of automatic control. However, the use of electricity in close proximity to gasoline is undesirable and the float type of control has not the simplicity and positiveness of operation which is possible in my invention.

The object of my invention, therefore, is the provision of a simple and positively operating automatic valve for the nozzle of a gasoline dispensing unit, which can be depended upon to shut off the flow of gasoline when the end of the nozzle becomes submerged.

Other objects and advantages will appear from the following detailed description of a preferred embodiment of my invention, reference being had to the accompanying drawing.

Fig. I is a side view of a nozzle and hand valve, partially in section to show the automatic valve of my invention placed in the end of the nozzle, the automatic valve being open.

Fig. II is a side view in section of the automatic valve portion of the nozzle shown in Fig. I, with the automatic valve closed.

Fig. III is a sectional view taken about the lines III—III of Fig. I.

Fig. IV is a sectional view taken about the lines IV—IV of Fig. I.

Fig. V is a perspective view of the adjustment screw for adjusting the sensitivity of the automatic valve.

For the purposes of a detailed description of the device shown in the drawing, that device may be conveniently analyzed into an outer nozzle 1 with hand control valve 2, automatic valve 3 having an operating cylinder 4, an internal nozzle 5 and a spray control tube 6.

The outer nozzle 1 and hand control valve 2 are of a conventional type and need not occupy us. The automatic valve 3 has a stem 10 formed integrally therewith and extending into the operating cylinder 4. The valve 3 is formed to cause a convergence of the fluid stream into the internal nozzle 5 in which a valve seat 11 is formed. This convergence makes the internal nozzle 5 by the constriction.

On the end of the valve stem 10 is a piston 12 which works in the cylinder 4 in an obvious manner. Around the stem 10 is a coil spring 7 urging the piston 12 upward and the valve 3 open. In order to avoid the danger of fluid collecting in the cylinder 4, a drainage conduit 13 is provided. This conduit 13 leads out through a hole in adjustment screw 16 by which the sensitivity of the valve is regulated. The farther the screw 16 projects, the greater impediment it is to the fluid stream through the valve 3. When a greater portion of the screw 16 is exposed to the pressure of the fluid stream, it is clear that the resolved force urging the screw 16 downward against the pressure of spring 7 is correspondingly increased. The angle of the fluid stream impinging on the screw 16 causes this resultant downward force. Hence the sensitivity of the automatic operation of the valve 3 may be regulated by varying this resultant force through changing the degree of projection of the screw 16. A plug screws into the end of cylinder 4 as a cylinder head 14. An inlet port 15 is drilled axially through the cylinder head 14 and receives a sliding valve 20 therein. The sliding valve 20 is enlarged at its inner end to prevent its coming out of place and has a central conduit 21 which has a plurality of openings 22 at the inner end of the conduit 21. The conduit 21 at its outer end takes a radial course so that the conduit 21 is closed when the sliding valve 20 slides into the inlet port 15. An exhaust port 25 is formed in the cylinder 4 and this port 25 is continued by tube 26 to its point of discharge in annular recess 27 formed in the spray control tube 6. The cylinder 4 has three supporting elements 28, see Fig. III, running longitudinally to support the cylinder 4 in place and provide passages 29 for the fluid flow.

The internal nozzle 5 is constricted by the bevel form of the valve 3 as explained above and its discharge side is flared to direct the fluid stream over and without touching the annular recess 27 before hitting the wall of spray control tube 6. The discharge side of the tube 6 is also slightly constricted by a converging wall to effect a good fluid discharge. Two air ports 30 are formed between the inside of the outer nozzle 1 and the outside of the spray control tube 6, see Fig. IV. These ports 30 lead from the end of the outer nozzle 1 to the annular space 32 between

the spray control tube 6 and the internal nozzle 5. The function of these air ports 30 is that of breathers which induce the fluid stream discharged from the internal nozzle 5 to follow its natural course over the annular recess 27 without filling up the clearance space between the stream and the spray control tube 6 at its inner end. Dotted lines indicate the normal course of the fluid stream from inner nozzle 5.

The operation of this preferred form of my invention is as follows: When in use, the fluid flows freely through the outer nozzle 1 under the control of the hand valve 2 in the usual manner. The automatic valve elements are then in the positions shown in Fig. I. The fluid flows through conduits 29, the valve 3 into the internal nozzle 5 where it is constricted, and then the fluid flares out to hit the wall of the spray control tube 6 on the other side of recess 27. Because of the functioning of the air ports 30 as breathers, the fluid stream takes its natural path indicated by the dotted lines from the internal nozzle 5. At the same time the fluid stream is also flowing in through conduit 21 of sliding valve 20 and into the cylinder 4 by means of openings 22, over the top of piston 12 and out through the exhaust port 25 to the annular recess 27 where it mingles with the discharge from the internal nozzle 5.

We now come to the point where the end of outer nozzle 1 becomes submerged, stopping the functioning of the air ports 30. This causes the fluid stream discharging from the internal nozzle 5 to spread into the recess 27 and back up into exhaust port 25. This results in a pressure being built up on top of piston 12 which is forced with valve 3 toward the closed position, Fig. II. This closure is aided by the pressure on the upper face of valve 3 as the valve 3 is separated from the cylinder 4 by the movement of piston 12. When the valve 3 is closed, the slide valve 20 slides into the inlet port 15, closing the conduit 21 and the inlet port 15. The elements of the automatic valve will then be in the position shown in Fig. II and no fluid will flow until the nozzle 1 is removed from its partially submerged position and the hand valve 2 closed and opened again. The closure of hand valve 2 causes the fluid pressure on valve 3 to be withheld or cut off, and the spring 7 restores the valve 3 to its open position.

It is clear that this automatic valve is characterized by a simplicity of operation and a positiveness of action. The construction is economical and durable, and there are no intricate parts to get out of order. While I have described this preferred embodiment of my invention in detail, it is obvious to one skilled in the art that numerous changes might be made and these modifications are deemed to be within the spirit of the invention as hereinafter claimed.

While the preferred embodiment of my invention has been described in its specific application to gasoline dispensing, it is not intended to be restricted thereto, for it has obvious advantages in use with other liquids.

Having thus described my invention, I claim:

1. The combination of an outer nozzle, a closure valve within said nozzle, a pressure means urging said valve open, a closing piston attached to said valve, a cylinder in which said piston operates, said cylinder having an inlet port and an exhaust port, a control valve closing said inlet port when said closure valve is in the closed position, an internal nozzle into which said closure valve opens, a spray control tube positioned at the discharge end of said internal nozzle, said spray control tube having a recess into which said exhaust port opens, an air duct leading from the end of the outer nozzle to a point between said internal nozzle and said recess in the spray control tube, and means for independently closing said outer nozzle.

2. The invention according to claim 1, characterized by the further fact that said internal nozzle is formed to discharge the fluid against the inner wall of the spray control tube at a point on the discharge side of said recess in said spray control tube.

3. The invention according to claim 1, characterized by the further fact that said internal nozzle diverges toward the spray control tube, the spray control tube converges in both directions from the recess and the point of contact of the fluid stream from the internal nozzle on the wall of the spray control tube is on the discharge side of said recess.

4. The invention according to claim 1, characterized by the further fact that said operating cylinder is formed at its lower end to abut against the upper face of the closure valve, said lower end being of an equal or greater area than said upper face of the closure valve.

5. The invention of claim 1, characterized by the further fact that said valve has a means for adjusting the sensitivity of its automatic operation.

6. In combination, an outer nozzle, a valve within said nozzle, said valve having a stem, and operating cylinder into which the stem of said valve extends, said valve in the open position fitting against said cylinder so that the upper face is not exposed to the fluid stream, a piston on said stem and within said cylinder, a spring in said cylinder urging said piston to open said valve, an inlet port formed in said cylinder for admitting the fluid stream to the top of the piston, an exhaust port formed in said cylinder for leading the fluid from said piston and past said valve, an internal nozzle on which is formed the seat for said valve, a spray control tube into which said internal nozzle discharges, said tube having an annular recess into which said exhaust port leads, said internal nozzle being formed to direct its discharge stream against the wall of the spray control tube at a place beyond said annular recess, an air duct leading from the end of the outer nozzle to a point between the spray control tube and said internal nozzle and an independent means of closing said outer nozzle.

7. The invention of claim 6, characterized by the further fact that said cylinder has a drain port.

8. The invention of claim 6, characterized by the further fact that said inlet port is controlled by a control slide valve which closes the inlet port when the first mentioned valve is closed.

9. In combination, an outer nozzle, a valve within said nozzle, a spring pressure means forcing said valve open, a closing piston attached to said valve, said piston being within said outer nozzle and exposed to the free flow of liquid through said nozzle, and a conduit for leading said flow of liquid into said nozzle, said conduit being positioned to drain liquid away from the upper face of said piston and relieve pressure on said piston, whereby the submergence of the nozzle end interrupts the free flow of fluid over said piston and the trapped fluid force causes the piston to close said valve.

10. The invention of claim 6, characterized by

the further fact that said inlet port is controlled by a slide valve which rides on top of said piston and has an axial conduit which becomes radial at the outer end of the slide valve.

11. In combination, an outer nozzle, a valve within said nozzle, a pressure means forcing said valve open to allow fluid discharge therethrough, a closing piston within said nozzle and exposed to the free flow of fluid through said nozzle and attached to said valve, and an exhaust duct for leading said fluid away from said closing piston for the discharge of said fluid at substantially the lower end of said nozzle with the fluid discharging through said valve, whereby the submergence of said nozzle end will interrupt said discharge and back up the pressure of said fluid stream on said closing piston to close said valve.

12. The invention of claim 11 characterized further by the fact that the upper face of said valve is positioned in the fluid stream and exposed to the flow of fluid through said nozzle except when said valve is in the open position and that there is an additional valve member which automatically cuts off the flow of fluid to said closing piston when said first mentioned valve is closed.

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