

May 17, 1966

R. W. MURRAY

3,251,507

DISPENSING NOZZLE WITH PRE-SET SHUT-OFF

Filed Aug. 21, 1964

3 Sheets-Sheet 1

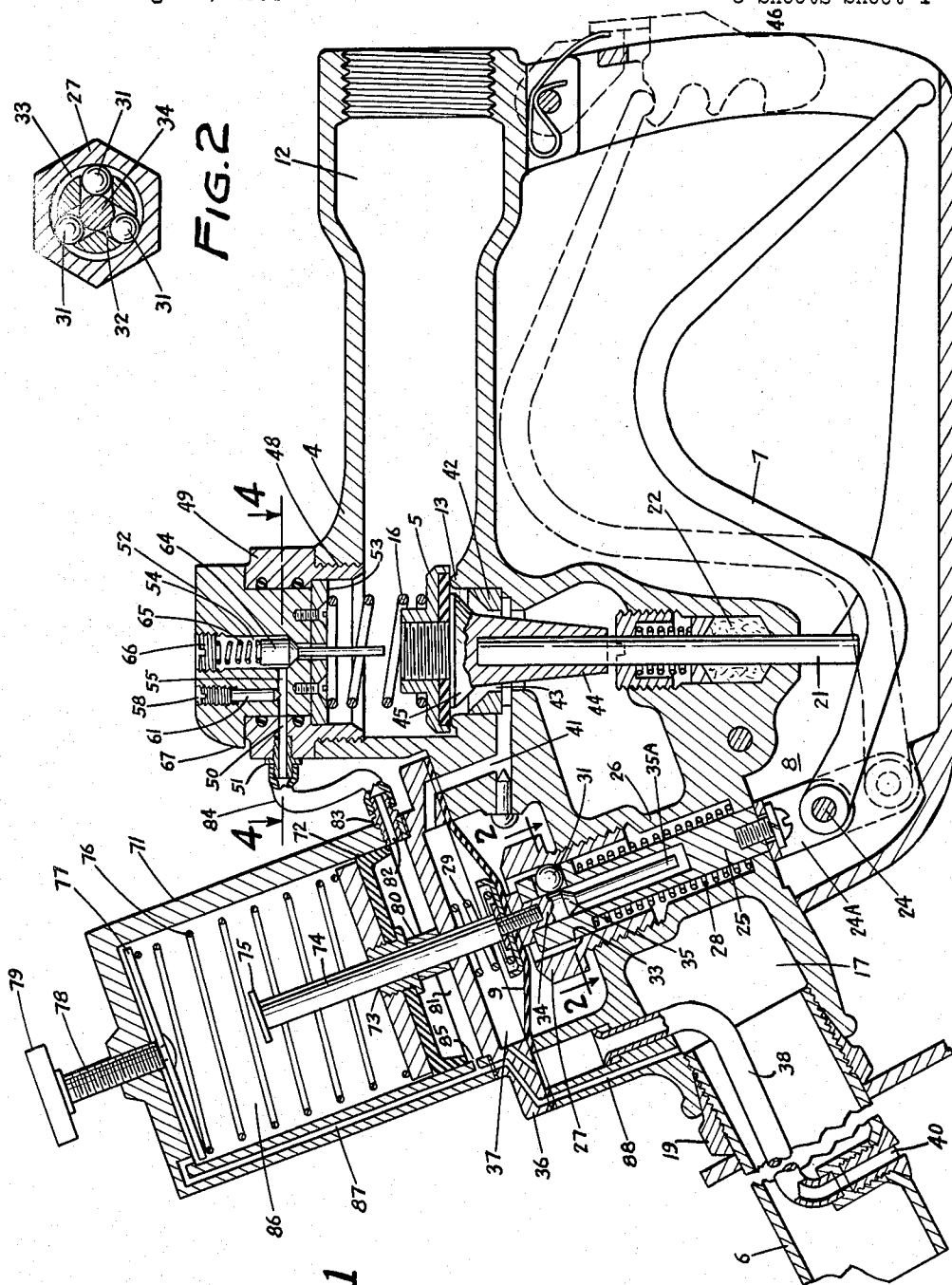


FIG. 1

FIG. 2

INVENTOR
ROBERT W. MURRAY
BY *Moore, White & Bued*
ATTORNEYS

May 17, 1966

R. W. MURRAY

3,251,507

DISPENSING NOZZLE WITH PRE-SET SHUT-OFF

Filed Aug. 21, 1964

3 Sheets-Sheet 2

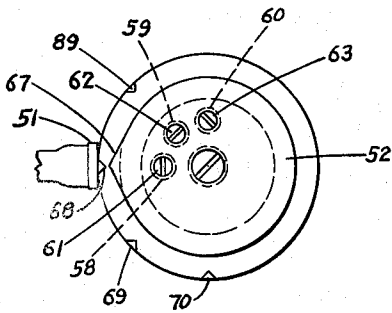


FIG. 3

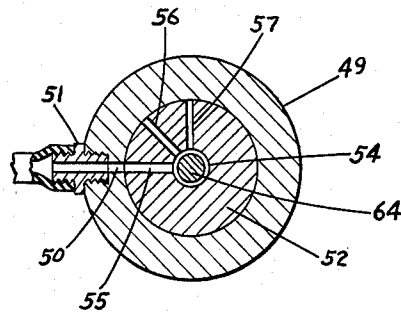


FIG. 4

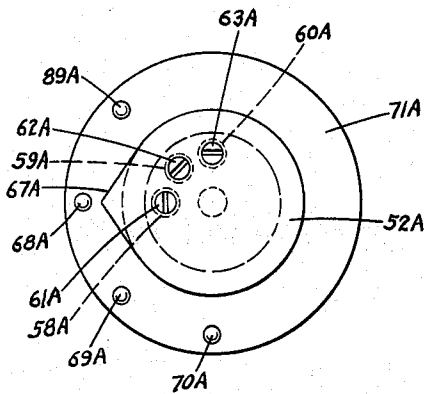


FIG. 6

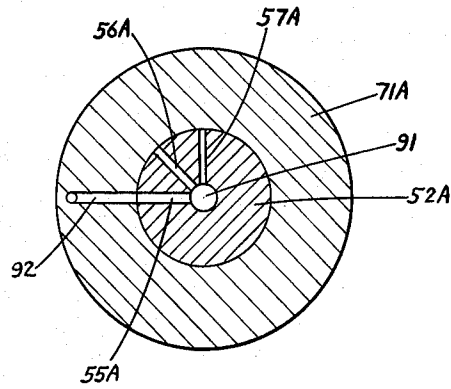


FIG. 7

INVENTOR.
ROBERT W. MURRAY
BY *Moore, White & Burd*
ATTORNEYS

May 17, 1966

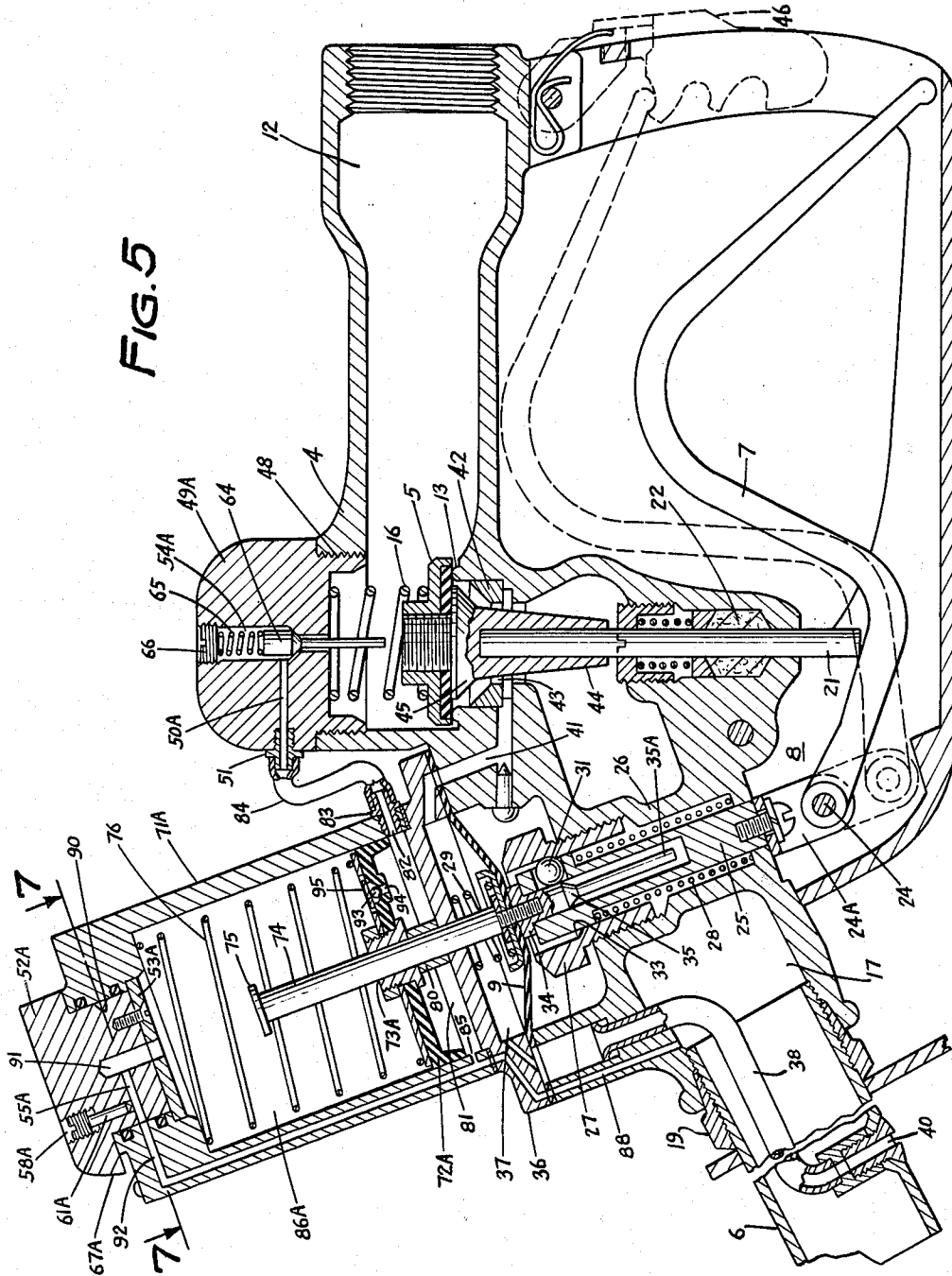
R. W. MURRAY

3,251,507

DISPENSING NOZZLE WITH PRE-SET SHUT-OFF

Filed Aug. 21, 1964

3 Sheets-Sheet 3



INVENTOR.

ROBERT W. MURRAY

BY

Moore, White & Burt

ATTORNEYS

1

3,251,507

DISPENSING NOZZLE WITH PRE-SET SHUT-OFF

Robert W. Murray, 6340 Virginia, Brooklyn Park, Minn.
Filed Aug. 21, 1964, Ser. No. 391,207
12 Claims. (Cl. 222—14)

The present invention is related to the inventions described and claimed in my copending applications Serial No. 338,093 filed January 16, 1964, and Serial No. 357,155 filed April 3, 1964, and this application is a continuation-in-part of those copending applications.

This invention relates generally to automatically operated liquid dispensing nozzles of the type exemplified by Duerr Patent No. 2,582,195 in which approximate filling of a receptacle by use of such nozzle serves to automatically close the nozzle valve. More particularly, the present invention relates to mechanisms by which such an automatic fluid dispensing nozzle may be automatically shut off upon the dispensing of a predetermined volume of liquid less than a full tank.

It is common practice in the marketing of gasoline automobile fuel for purchasers to order less than full tanks of fuel. Particularly in large volume, cash sale filling stations, sales are normally made in multiples of \$1.00. In some instances, in the case of some juveniles and adults who must budget their expenditures closely, this is a matter of necessity. For others it is a matter of convenience in order to avoid the handling of loose change. Whatever the reasons, the practice has become well established and is well known to operators of gasoline filling stations.

In the case of a customer ordering a full tank of gasoline, automatic nozzles are available to shut off the flow of fuel when the tank becomes full, or almost full. When the customer orders less than a full tank the operator must either hand fill the tank or leave the nozzle in the tank fill tube and keep a close eye on the meter of the pump while he performs his other service functions, such as cleaning the windows, checking the oil, battery and radiator, etc. In this latter instance, there is an ever present danger of dispensing more fuel than has been ordered, or the other service suffers because of the necessity of the operator constantly watching the pump meter, or both.

The metering device of the present invention is so constructed as to permit the operator to pre-set the device to some predetermined amount such as \$1.00's worth, \$2.00's worth, or the like, and then be free to perform his other service functions without fear of overfilling the tank.

At the same time, the nozzle of the present invention functions also to shut off automatically upon dispensing of a full tank in the usual manner.

The invention is illustrated in the accompanying drawings in which the same numerals identify corresponding parts and in which:

FIGURE 1 is a longitudinal section taken through an automatic shut-off nozzle valve with pre-set metering device constructed in accordance with one embodiment of the present invention;

FIGURE 2 is a fragmentary transverse section on the line 2—2 of FIGURE 1 and in the direction of the arrows;

FIGURE 3 is a fragmentary top plan view of the pre-set control knob of the nozzle valve;

FIGURE 4 is a fragmentary transverse section on the line 4—4 of FIGURE 1 and in the direction of the arrows;

FIGURE 5 is a longitudinal section through an automatic shut-off nozzle valve with pre-set metering device constructed in accordance with a further embodiment of the invention;

FIGURE 6 is a fragmentary top plan view of the pre-set

2

control knob of the modified form of the invention; and FIGURE 7 is a fragmentary transverse section on the line 7—7 of FIGURE 5 and in the direction of the arrows.

As shown in FIGURE 1, the shut-off valve comprises a body 4 having a normally closed main valve 5 therein, a dispensing nozzle 6, a valve handle or lever 7 provided with a fulcrum 8 and a pressure responsive diaphragm mechanism 9. With any quantity of liquid flowing through the nozzle, mechanism 9 is arranged to trip or release the fulcrum 8 to a position when main valve 5 will automatically close when the discharge end of the nozzle is submerged in liquid to a predetermined depth. The body 4 is provided with an inlet passageway 12 which leads to a valve seat 13 on which main valve 5 is normally pressed or seated by a main spring 16. When the main valve is open, inlet passageway 12 communicates with an outlet passageway 17 which, in turn, is connected to the discharge nozzle 6. The tubular nozzle 6 is threaded into body 4 and secured by a lock nut 19.

The main valve 5 is provided with a valve stem 21 which extends downwardly and outwardly of body 4 through a packing gland 22. The lower end of the stem is disposed to be engaged by hand lever 7 when the lever is actuated upwardly, to lift valve 5 off its seat against the force of spring 16.

Fulcrum 8 comprises a pivot pin 24 on which the lever 7 is pivotally mounted. The pin is supported by a clevis or yoke 24A between the arms of which the pivoted end of lever 7 is disposed. The yoke is attached to the lower end of a connecting link or plunger 25. Plunger 25 is slidably disposed in a housing or sleeve 26 which is integral with the valve body 4, and an externally threaded sleeve 27, the latter being threaded into sleeve 26. Plunger 25 is urged upwardly by a coil spring 28 as shown, but is restricted in its travel by contact of fulcrum 8 with base of body 4. It is urged downwardly by spring 29 as will be explained later.

Normally, the plunger 25 is held in a fixed position by a locking mechanism comprising a plurality of balls 31 nested in radial openings 32 (see FIGURE 2) in the plunger and an annular shoulder 33 on the interior of sleeve 27. The balls are held on shoulder 33, as shown, by a pin 34 secured to the underside of the diaphragm 9. The pin is provided with a tapered portion 35 at a location slightly below the balls. Below tapered portion 35, the pin includes a depending stem 35A which serves as a ball retainer. Thus, when the pin is raised to a position where the tapered portion is adjacent the balls, plunger 25 will be actuated downwardly, provided hand lever 7 is in its valve opening position. This movement of the plunger results because of the strong force of spring 16 and the relatively weaker force of spring 28. When the plunger moves downward, fulcrum 8 is released to dotted line position shown in FIGURE 1 whereby the valve stem is disengaged from hand lever 7.

The diaphragm is actuated upwardly by suction (or reduction in pressure) in the chamber above the diaphragm. The suction results from flow of liquid through the main valve. While the discharge end of the nozzle is not submerged, the pressure in the diaphragm chamber is not reduced sufficiently to deflect the diaphragm to the tripping position of the locking mechanism.

As shown in FIGURE 1, the marginal edge of the diaphragm 9 is clamped between a cap 36 and the valve body by suitable screws or other fastening means, not shown for clarity. The space between the cap and the diaphragm is the suction chamber 37. This chamber communicates with a tube 38 the open end of which is at 40 adjacent the outlet of the nozzle. Opening 40 extends through the side wall of the nozzle and is removed from the flow stream through the nozzle. The diaphragm chamber also communicates with the flow passageway 17 adjacent

and immediately below valve 5, through a passageway 41. The flow passageway of the valve is designed to provide a Venturi effect on the diaphragm. As shown, a ring 42 is mounted in the passageway below the valve seat. The interior of the ring has a tapered surface which provides a converged or restricted throat 43. Immediately below the throat is an annular groove to which passageway 41 is connected.

In order that the restricted or Venturi passageway may be adjusted in flow area for various positions of valve 5, other than closed, and thereby insure that sufficient suction will be developed at low rates of flow say 2 to 2.5 g.p.m. as well as at high rates say 12 to 15 g.p.m., including the intermediate values of rates of flow, the upper part of the valve stem is provided with an inverted frusto-conic portion 44. The upper portion of section 44 has a frusto-conic section 45 of wider angle adjacent the valve seat. These frusto-conic sections so regulate the restricted flow area through the valve for the various open positions of valve 5 that a high degree of suction is developed at the inlet to the diaphragm chamber at the various rates of flow of liquid through the nozzle which are encountered in practice.

Assuming that the fulcrum is in its locked position and it is desired to fill a gas tank, the nozzle is placed with the nozzle 6 in the spout of the tank. The operator then lifts the valve handle to the dotted line position of FIGURE 1 and locked in position by means of spring loaded latch 46. Since the fulcrum 8 is held in fixed position, valve stem 21 will be lifted and valve 5 opened. As liquid flows into the tank, air will be drawn into opening 40 through the tube 38 into diaphragm chamber 37 and thence from the chamber through passageway 41 to the liquid flowing through the valve. When opening 40 is submerged, air is evacuated from the diaphragm chamber whereby the differential pressure acting thereon causes the diaphragm to move upwardly against the force of spring 29. The diaphragm carries with it pin 34 whereby the balls 31 are released as previously described. The fulcrum plunger 25 and its fulcrum 8 are then moved downwardly by spring 16 acting through valve stem 21 whereby the main valve is automatically closed and the flow to the tank is shut off. When the valve handle 7 is released to closed position the fulcrum plunger is reset by spring 28 to the position where the balls will be deflected outwardly to their locking position, the balls being forced to this position by the conical surface 35 or taper on pin 34 which will have been released to its normal position by diaphragm spring 29 when the main valve is closed.

In practice, spring 29 is so designed that only a slight suction or reduction in pressure in the diaphragm chamber is required to lift the ball release pin to the fulcrum tripping position.

In this manner, the dispensing nozzle functions to shut off automatically when used to dispense a full tank of gasoline, in the same manner as described in Duerr Patent No. 2,582,195. The same nozzle is adapted to dispense a predetermined amount of gasoline less than a full tank full and then shut off automatically, as described below. One embodiment of pre-set metering device is shown in FIGURES 1 to 4 and another in FIGURES 5 to 7.

Referring again to FIGURE 1, the inlet passageway 12 is provided with a threaded opening 48 which is axially aligned with the valve stem 21 and spaced above the main valve 5. A threaded collar member 49 is fitted into opening 48. Collar 49 is provided with a small radial passageway 50 extending through the collar and provided with a fitting 51 on the outer periphery of the collar. A pre-set control knob 52 is fit to move with a tight rotating slide fit within collar 49. A retaining disc or washer 53 of slightly larger diameter bears against an inner annular shoulder within collar 49 to secure control knob 52 in place.

A central passageway 54 extends axially through the

control knob and disc to communicate with passageway 12. The control knob is provided with a plurality of small radial restricted passageways 55, 56 and 57 (FIGURE 4) each of a different size and each adapted to communicate with axial passageway 54 through the control knob and radial passageway 50 through collar 49. The control knob is also desirably provided with a plurality of passageways 58, 59 and 60 each intersecting one of the radial passageways 55, 56 and 57, respectively, and each provided with set screw means 61, 62 and 63, respectively, by which the cross-sectional area of each of the radial restricted passageways may be varied and further restricted.

The axial passageway 54 through the control knob is tapered adjacent its lower end and fitted with a needle valve element 64 which is normally maintained seated under pressure of coil spring 65 held in place by means of a threaded plug 66. Valve 64 is unseated by valve 5 when the same is raised when handle 7 is lifted. Flow of gasoline under pump pressure is then initiated from passageway 12 through the lower end of the axial passageway 54 through one of radial passageways 55, 56 or 57, depending upon the position of the control knob, out through radial passageway 50 of collar 49 to a valve shut-off means yet to be described.

As best seen in FIGURE 3, the control knob 52 is provided with a pointer 67 and the rim of collar 49 is provided with indicia 68, 69 and 70 to indicate the positions when each of the radial passageways 55, 56 and 57 is in alignment with radial passageway 50. Each of the indicia and each of the radial passageways within the control knob corresponds to some predetermined volume of gasoline less than a tank full such as \$1.00, \$2.00 or \$3.00 or the like. The rate of flow of part of the stream of gasoline flowing from the pump to the nozzle through one of the restricted radial passageways of the control knob determined volume of gasoline will have been dispensed and the nozzle valve shut off automatically.

Located above diaphragm 9 and suction chamber 37, as seen in FIGURE 1, is a cylinder 71 which is axially aligned with the plunger 25 and pin 34. Cylinder 71 is open at one end and fits on top of suction chamber cap 36 which then forms one end wall of the cylinder. Cylinder 71 is fitted with a piston 72 adapted to move with a relatively tight slide fit axially of the cylinder in response to pressure exerted upon one side or the other. Piston 72 is provided with a central opening 73 which permits it to slide with a slide fit along the length of an elongated pin 74, one end of which is provided with an enlarged head 75 and the other of which is threaded into pin 34 and secures diaphragm 9 thereto.

Piston 72 is spring loaded on one side by means of a coil spring 76. Tension on spring 76 is adjustable by means of circulate plate or disc 77 which is secured to a threaded member 78 extending through the end wall of cylinder 71 and provided with an adjusting knob 79.

A spacer member 80 extending around pin 74 insures the maintenance of a pressure chamber 81 within cylinder 71. The pressure chamber 81 is provided with a gasoline inlet 82 formed in fitting 83 inserted into the side of the cylinder. Fitting 83 is connected to fitting 51 of the flow control assembly by means of a short piece of flexible tubing 84 or the like. The pressure chamber 81 is provided with a restricted outlet opening 85 which is of a smaller size than the inlet 82. Accordingly, when gasoline flows into the pressure chamber through the pre-set control assembly, it cannot flow out as fast as it flows in. The accumulating volume of gasoline expands the size of chamber 81 by exerting force against piston 72 against the pressure of spring 76.

As the piston moves through the cylinder in response to the pressure of the accumulating gasoline in chamber 81, any accumulated fluid, either gaseous or liquid, in cylinder chamber 86 is forced ahead of the moving piston

5

out through a bleeder passageway 87. This fluid joins the restricted outflow of gasoline through outlet 85 to flow through passageway 88 into the nozzle outlet passageway to the gas tank.

As the piston reaches the enlarged head 75 of pin 74, it causes the pin 74 to move upwardly carrying with it the diaphragm 9 and pin 34 against the force of spring 29. This causes the release of the balls 31, as previously described, to cause the fulcrum plunger 25 to move downwardly by spring 16 acting through valve stem 21, whereby the main valve 5 is automatically shut off. At the same time needle valve 64 is shut off by virtue of the force of spring 65. Upon the cut-off of further inflow into the pressure chamber 81 through inlet 82, the action of spring 76 upon piston 72 causes the return of the piston to its normal position against spacer 80 forcing ahead of it the small amount of gasoline in chamber 81 to flow into the gas tank and to ready the nozzle for use for the next customer.

It will be readily understood that the greater the flow into pressure chamber 81, the more quickly piston 72 will move into contact with the head 75 of pin 74 to release the locking mechanism to shut off the nozzle valve. Accordingly, the larger radial passageway 55 in the control knob represents the smallest predetermined amount of gasoline and the smaller passageway 57 represents the largest predetermined amount.

In order to render the pre-set control mechanism inoperative in those instances where a full tank of gasoline is desired to be dispensed, the control knob may be turned so that there is no flow through it. Desirably a further indicator 89 is provided on the periphery of collar 49. By comparison of FIGURES 3 and 4 it will be seen that when the control knob pointer 67 is aligned with indicator 89 there will be no communicating passageway through the control knob.

Referring now to FIGURES 5, 6 and 7 there is shown a modified form of automatic shut-off dispensing nozzle adapted either for dispensing of a full tank of gasoline or some predetermined volume less than a tankful. The basic structure of the nozzle body, main valve, automatic shut-off release etc., are the same as already described and hence will not be repeated. Only the manner in which dispensing of the pre-set volume is adjusted and regulated differs.

In this modified form of automatic shut-off dispensing nozzle, a cap 49A is fitted into the threaded passageway 48. Cap 49A is provided with a radial passageway 50A. The outer end of radial passageway 50A is provided with a fitting 51. Cap 49A is provided with a central passageway 54A which is tapered at its lower end and which is in communication with radial passageway 50A. A needle valve 64 is seated in the tapered portion of passage 54A and held seated by the pressure of coil spring 65 which is retained in place by means of a threaded plug 66. Needle valve 64 normally maintains passageway 54 closed against the flow of gasoline therethrough, but the needle valve is unseated when the main valve 5 of the dispensing nozzle is opened by action of handle 7.

A cylinder 71A is located above the diaphragm 9 and suction chamber 37, axially aligned with the plunger 25 and pin 34 of the valve release mechanism. Cylinder 71A is open at one end and is secured over the suction chamber cap 36 which forms one end wall of the cylinder. A piston 72A is positioned within the cylinder for movement longitudinally thereof. Piston 72A is spring loaded by means of a coil spring 76. Piston 72A is provided with a central opening 73A through which the piston may slide along pin 74. As already described, pin 74 has an enlarged head 75 and is secured to the diaphragm 9 and pin 34.

The bottom end of cylinder 71A constitutes a pressure chamber 81 having an inlet 82 through fitting 83 which is connected by means of tubing 84 to fitting 51 of cap 49A. A spacer 80 limits movement of the piston 72A so

6

as to maintain open the inlet 82 to and outlet 85 from the pressure chamber 81. Outlet 85 is restricted and smaller than inlet 82 so as to permit an accumulation of liquid and build up of pressure within chamber 81 sufficient to move piston 72A, as previously described.

In this modified form of dispensing nozzle the pre-set control knob 52A is located at the upper end of cylinder 71A. The control knob 52A is fitted into a central opening 90 in the top wall of cylinder 71A so as to be rotatable therein with a tight slide fit. A retaining washer or disc 53A bears against an inner annular shoulder of opening 92 to secure the control knob in place. The control knob 52A is provided with a central passageway 91 which extends part way into the control knob so as to form a communicating passage between the chamber 86A of cylinder 71A and one of a plurality of small restricted radial passageways 55A, 56A and 57A extending outwardly from the center of the control knob.

A further passageway 92 in the body of cylinder 71A is positioned so as to communicate with one of the radial passageways 55A, 56A or 57A and with a passage 88 in the nozzle body extending to the dispensing spout. As already generally described, a transverse passageway 58A, 59A and 60A is desirably provided communicating with each of radial passageways 55A, 56A and 57A, respectively, each of these transverse passageways being provided with a set screw 61A, 62A and 63A, respectively, so as to permit variation in the cross-sectional area of the radial passageways and further restriction and regulation of flow therethrough.

The control knob 52A is also provided with a pointer 67A and the outer top wall of cylinder 71A is desirably provided with indicators 68A, 69A, 70A and 89A to indicate the pre-setting positions for predetermined volumes of gasoline less than a tank full and also to indicate an "off" position for the control knob when it is desired to fill the tank of an automobile.

The piston 72A is provided with a one-way check valve. As illustrated, this may be in the form of a ball seated in a passage 94 and held in place by means of a leaf spring 95. This permits flow of gasoline from chamber 81 into chamber 86A during the return stroke of the piston under influence of spring 76. Passageway 94 should be substantially larger than passageway 85 from pressure chamber 81 in order to facilitate rapid return of the piston 72A.

In the operation of the modified form of dispensing nozzle, when a full tank is desired the control knob 52A is turned to indicator setting 89A. This insures that there will be no flow from cylinder chamber 86A and the pre-set metering device is inoperative. The dispensing nozzle is operative to dispense a full tank of gasoline and shut off automatically, in the manner previously described. Then, when it is desired to dispense a predetermined volume less than a full tank, the control knob is turned to the appropriate setting to align one of the radial passageways with the outlet passageway 92.

Chamber 86A is normally full of gasoline. When the control knob is turned so that there is no passage from the top end of cylinder 71A the piston cannot move because that gasoline cannot escape. However, when the control knob is turned so as to permit restricted flow from chamber 86A, then the build-up of pressure in pressure chamber 81 as a result of the inflow of gasoline into that chamber through passageways 54A and 50A, tubing 84 and inlet 82 forces the piston to move in the cylinder. The piston moves along pin 74 at a rate determined by the restricted flow passage in the control knob. When the piston 72A reaches the enlarged head 75 of pin 74 to raise pin 34 and release the locking mechanism, the nozzle valve is automatically shut off as previously described.

At the same time needle valve 64 is closed to shut off further flow of gasoline into pressure chamber 81. Then, under force of spring 76, piston 72A is returned to the

bottom of the cylinder. The gasoline in pressure chamber 81 is transferred into cylinder chamber 86A through passage 94 past check valve 93. The pre-set control assembly is thus returned to neutral position to await the next customer.

Applicant has provided simple effective means for modifying the conventional automatic shut-off dispensing nozzle to a pre-set nozzle with automatic shut-off. Variation in flow rates to adjust for fluctuations in price of gasoline may be made through the set screws in the passages intersecting the restricted flow channels. The same nozzle may be used to dispense full tanks of gasoline with automatic shut-off in the conventional manner. The nozzle may also be operated manually in the conventional manner. In most instances it is desirable that the pre-set device be arranged so as to dispense just slightly less than the desired predetermined volume. Then the attendant can manually add the slight additional amount of gasoline to bring the sale up to the desired dollar amount or desired volume.

Although not described in detail, it will be understood that all of the fittings are gasketed or otherwise provided with sealing means so as to prevent leakage, in the conventional manner.

It is apparent that many modifications and variations of this invention as hereinbefore set forth may be made without departing from the spirit and scope thereof. The specific embodiments described are given by way of example only and the invention is limited only by the terms of the appended claims.

I claim:

1. In an automatic shut-off fluid dispensing nozzle comprising

- (A) a main valve,
- (B) a hand lever for opening said valve,
- (C) a latch for holding said lever in the open position of said valve,
- (D) a pivot for said hand lever movable to a position for releasing said lever to close the main valve, and
- (E) a diaphragm within a chamber and connected to a release pin for moving said pivot to release position responsive to differential air pressure on opposite sides of said diaphragm,

the improvement consisting in a pre-set metering device for dispensing a predetermined volume of fluid from a supply of that fluid under pressure and comprising

- (F) a cylinder,
- (G) a release pin extension within said cylinder and secured at one end to said diaphragm and release pin and having stop means at the other end,
- (H) a piston movable within said cylinder in response to fluid pressure exerted against it and movable relative to said release pin extension to the stop means at the end thereof,
- (I) a fluid pressure chamber within said cylinder adjacent said piston,
- (J) a by-pass flow line into said fluid pressure chamber extending around said main valve,
- (K) separate valve means in said by-pass flow line operative with said main valve to be open at the same time, and
- (L) variable restricted flow passage means for regulating rate of flow of fluid into said pressure chamber, whereby rate of movement of said piston is regulated.

2. An improvement according to claim 1 further characterized in that said cylinder is positioned in axial alignment with said release pin, adjacent to but spaced from the chamber housing said diaphragm.

3. An improvement according to claim 1 further characterized in that said variable restricted flow passage means comprises a stationary body member enclosing a rotatable member, said rotatable member having an axial passage therein, a plurality of restricted radial passages of different sizes in said rotatable member in communication with said axial passage and extending to the periph-

ery of the rotatable member, and a communicating radial passage in said stationary body.

4. An improvement according to claim 3 further characterized in that said variable restricted flow passage means is located in said by-pass flow line between said separate by-pass flow line valve means and said pressure chamber in said cylinder.

5. An improvement according to claim 3 further characterized in that separate channels are provided intersecting each of said restricted radial passages and axially adjustable closure means are provided therein whereby the effective cross-sectional area of each radial passage may be varied.

6. An improvement according to claim 3 further characterized in that said variable restricted flow passage means is located in the end wall of said cylinder opposite from said diaphragm to regulate rate of flow into said pressure chamber by regulating rate of discharge from said cylinder.

7. An improvement according to claim 1 further characterized in that said piston is spring loaded in the direction toward said pressure chamber.

8. An automatic shut-off gasoline dispensing nozzle comprising

- (A) a main valve in the principal gasoline flow line through the nozzle,
- (B) a hand lever for opening said valve,
- (C) a latch for holding said lever in the open position of said valve,
- (D) a pivot for said hand lever which is movable to a position for releasing said lever to close the main valve upon the dispensing of a predetermined amount of gasoline,
- (E) a diaphragm within a chamber and connected to a release pin for moving said pivot to release position responsive both to differential air pressure on opposite sides of said diaphragm to shut off said nozzle upon filling of a gasoline tank and to positive piston pressure upon dispensing of a predetermined amount of gasoline less than a tankful,
- (F) a cylinder positioned in axial alignment with said release pin and adjacent to but spaced from the chamber housing said diaphragm,
- (G) a release pin extension axially aligned within said cylinder and secured at one end to said diaphragm and release pin and having stop means at the other end,
- (H) a piston movable axially within said cylinder in response to fluid pressure exerted against it and movable axially relative to said release pin extension to the stop means at the end thereof, said piston being spring loaded in the direction opposite to said fluid pressure.
- (I) a fluid pressure chamber within said chamber adjacent said piston,
- (J) a by-pass flow line into said fluid pressure chamber and to the nozzle discharge, said by-pass flow line extending around said main valve,
- (K) separate valve means in said by-pass flow line operative in response to said hand lever with said main valve to be open at the same time, and
- (L) variable restricted flow passage means for regulating rate of flow of gasoline into said pressure chamber, whereby rate of movement of said piston is regulated.

9. A nozzle according to claim 8 further characterized in that said variable restricted flow passage means comprises a stationary body member enclosing a rotatable member, said rotatable member having an axial passage therein, a plurality of restricted radial passages of different sizes in said rotatable member in communication with said axial passage and extending to the periphery of the rotatable member, and a communicating radial passage in said stationary body.

10. A nozzle according to claim 9 further characterized

in that said variable restricted flow passage means is located in said by-pass flow line between said separate by-pass flow line valve means and said pressure chamber in said cylinder.

11. A nozzle according to claim 9 further characterized 5
in that separate channels are provided intersecting each of said restricted radial passages and axially adjustable closure means are provided therein whereby the effective cross-sectional area of each radial passage may be varied.

12. A nozzle according to claim 9 further characterized 10
in that said variable restricted flow passage means is located in the end wall of said cylinder opposite from said

diaphragm to regulate rate of flow into said pressure chamber by regulating rate of discharge from said cylinder.

References Cited by the Examiner

UNITED STATES PATENTS

2,219,761	10/1940	Burdick	-----	251—23 X
2,688,337	9/1954	Shivers	-----	251—23 X
3,166,108	1/1965	Hearn	-----	141—225

LOUIS J. DEMBO, *Primary Examiner.*