Jan. 27, 1959 R. W. KINNISON 2,870,799

FILLING NOZZLE WITH SELECTIVE AUTOMATIC SHUT-OFF

Filed April 29, 1955

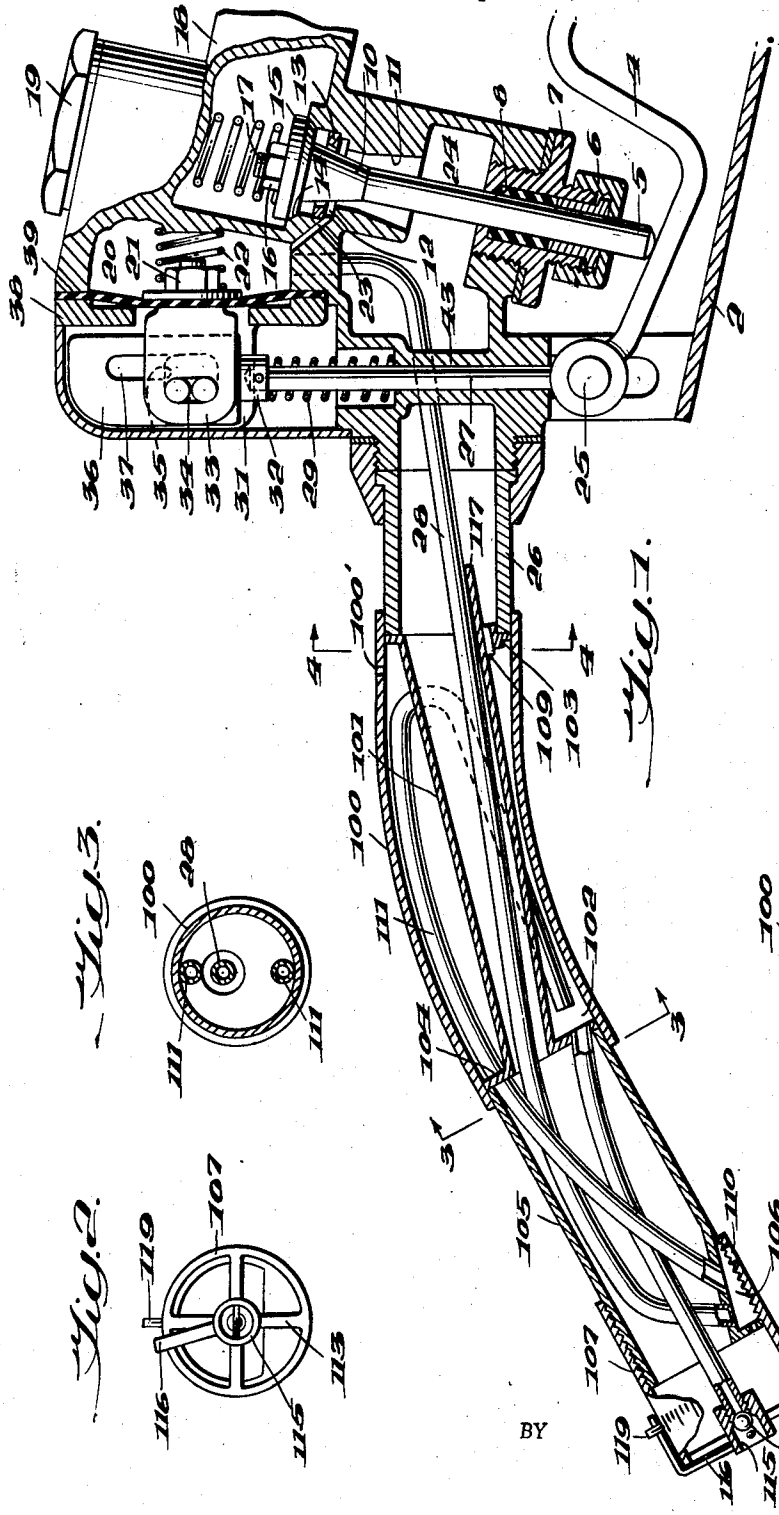


Fig. 1.

Fig. 3.

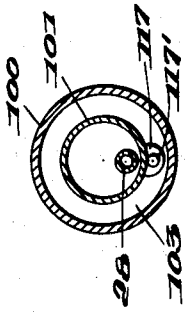


Fig. 4.

Fig. 2.

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United States Patent Office 2,870,799
Patented Jan. 27, 1959

2,870,799

FILLING NOZZLE WITH SELECTIVE AUTOMATIC SHUT-OFF

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Application April 29, 1955, Serial No. 505,018

7 Claims. (Cl. 141—209)

This invention relates to a filling nozzle for filling random containers with liquid, the nozzle being equipped with a valve that is manually opened and may be manually released to close at any point in the filling operation, or may automatically and selectively shut-off at any point of the filling operation and will automatically shut off when the level of the liquid in the container being filled reaches a given point on the nozzle.

While I do not wish to limit my invention to a gasoline nozzle for filling automobile fuel tanks, it is primarily intended for that use and the invention will be illustrated in connection with a nozzle designed for filling the fuel tanks of automobiles.

Typical of the prior art devices over which the present invention constitutes an improvement are the disclosures of the patents to Marone 1,907,260, dated May 2, 1933, Piquerez 2,326,251, dated August 10, 1943, Davis, 2,320,033, dated May 25, 1943, and Shaffer et al., 2,675,952, dated April 20, 1954.

The invention is illustrated in the accompanying drawing as used in association with the mechanism of the nozzle of the Davis Patent No. 2,320,033.

The primary object of the present invention is to provide means for automatically shutting off the flow of liquid at any desired point or time prior to the complete filling of the container or tank according to the sales of liquid or gasoline to the various customers' requirements, that is to say the device of the present invention may be set to automatically shut-off the flow or delivery of the liquid immediately on the delivery of as little as a single gallon of fluid, or at any other quantity point less than a full tank, as well as at the full tank level.

For facilitating the examination and comparison of the elements set forth herein all elements or parts common to the Davis Patent No. 2,320,033 are given the same reference numbers as in said Davis patent and those elements new in the present disclosure are given a distinctly different reference number series.

In the accompanying drawing:

Figure 1 represents a longitudinal sectional view through a nozzle embodying my invention;

Figure 2, an elevation of the end of the delivery spout;

Figure 3, a side elevation of the end portion of the delivery spout, broken away;

Figure 4, a detail fragmentary view on an enlarged scale, taken on the line 4—4 of Figure 1, looking in the direction of the arrows.

Referring now in detail to the drawings, the valve body **18** houses the valve disc **15** seating against the seat **14** and having a depending cone **10** and a valve stem **5** engaging, and being lifted by, the usual hand or lifting lever **4** against the opposition of spring **17**. The valve disk **15**, depending cone **10** and stem **5** are held together by a nut **16** screwing on the screw-threaded upper end portion of stem **5**, which passes through the valve disk **15** and cone **10** and has an annular shoulder abutting the lower end of the cone **10**.

Below the valve disk **15** there is a contraction which

is shown in the form of a ring **13** forced down against an annular shoulder in the passage, immediately below the ring **13** is an annular groove or circular passage **12** in communication with chamber **20** through the small bore or passage **23**. Below the circular passage or groove **12** is a short cylindrical wall portion **9** and next below that there is a downwardly and outwardly flaring wall cone portion **11** discharging into the passage **24**.

The valve housing comprises an upper portion in which the valve disk **15** and the spring **17** are located and which has its upper end, not shown, closed preferably by a screw-plug **19**. The lower end of the lower portion of the housing has its lower end closed by a gland nut screwing into the screw-threaded bottom thereof until its flange **7** together with its interposed packing makes a tight fit against the bottom of the lower end of the lower portion of said housing. A packing **8** disposed in said gland nut and disposed about the stem **5** of the valve may be compressed to prevent leakage by the centrally bored internally screw-threaded cap **6** and its associated compressor sleeve. The gland nut and said cap are centrally bored to permit the stem **5** to extend and work therethrough.

The chamber **20** is closed off from the atmosphere by the diaphragm **39** except for the bore or passage **23** and the intake or triggering tube **28** and air will be drawn through tube **28** into chamber **20** and out therefrom through bore **23** by the aspirating action of the fluid flowing through the passage way controlled by the valve **15** and out through discharge spout portion **26** until the orifice at the outer end of tube **28** is closed by liquid, whereupon air will cease to pass inward through tube **28** and the air in chamber **20** will be sucked out through bore or passage **23**, sucking the diaphragm toward the spring **22** against the resistance of the latter. It will be noted that the passage **23** communicates with the passageway controlled by the valve **15** at a constriction in said passageway which is defined by the conical portion **10** of the valve stem in conjunction with its surrounding inner wall of the valve housing interior. Obviously the said valve constriction, together with the interior communicating passage portion defined by the hollow **24** and the interiors of nozzle portions **26**, **101** and **105**, define the discharge passage of the nozzle.

It will further be apparent that the control chamber **102**, the means **117**, **117'** for delivering liquid at a controlled rate from the nozzle discharge passage into the control chamber, and the syphon **111**, as heretofore described, together exemplify a delayed action means establishing communication between said reservoir and the liquid discharge passage of the nozzle and operative at a predetermined interval subsequent to the commencement of liquid flow through the nozzle for delivering liquid into the reservoir. Such liquid in the reservoir then covers the intake end of tube **28** to reduce the air pressure in chamber **36** and to initiate the valve closing action above-mentioned.

The diaphragm **39** carries with it the actuator **33** which has a screw-threaded stem passing through the diaphragm **39** and receiving over the free end of said stem a nut **21** which serves to hold the actuator clamped to the diaphragm and also serves to center the front end of the helical spring **22**, the rear end of which is received around a centering circular boss on the rear wall of chamber **20**.

Hand lever **4** has its forward end pivotally connected to slide rod **27** by a pivot pin **25** which has end portions disposed in registering slots in side plates or guides rigid with the guard **2**.

The rod **27** slides or reciprocates through the hollow post or sleeve **43** and is connected to the hub **30** of a slotted head **31** by a pin or other suitable known means, a helical spring **29** bearing with its upper end against

said hub 30 and with its lower end on the top of post or sleeve 43, exerting an upward pressure on said head 31.

The head 31 is formed with an L-shaped slot 37 through which passes two rollers 34. The actuator 33 is bifurcated and receives between its bifurcations the head 31 and the rollers 34 extend through the L-shaped slot in head 31 and into or through narrow slots in said bifurcations and may extend into guideways, not shown, outwardly beyond the respective furcations.

Thus, the assemblage comprising pivot 25, stem 27 and head 31 cannot move downwardly as long as the rollers 34 are in the position shown in Figure 1, that is, so long as the rollers are in the short or horizontal portion of the L-slot 37.

A guard housing 36 encloses the latch mechanism so that no fluid enters the latch mechanism chamber.

The parts as thus far described and their operation are all old and known, being shown and described and their operation being set forth in detail, in the Davis Patent No. 2,320,033 of May 25, 1943. They have been set forth to give the background of, and starting point for, the present invention.

The present invention provides means for triggering the triggering means of this general type of automatic shut-off nozzle, whereby any desired amount of liquid short of a full tank or receptacle may be dispensed, with the dispensing nozzle automatically shutting off delivery when the specified amount of liquid has been delivered, while also retaining the advantage of the automatic shut-off when the tank or receptacle is full and floods the intake orifice of the tube 28.

To this end the delivery spout of such nozzles as shown in the said Davis patent or devices similar thereto is substituted by a variable volume delivery spout which retains the triggering tube 28 with its orifice 50.

Such delivery spout of the present invention comprises a variable volume control portion 100, a reservoir cap section 105 and a graduated section 107, in operative condition all assembled rigidly with each other.

The variable volume control portion 100 is double walled, having a centrally longitudinally disposed wall or tube 101 having end flanges 103 and 104 respectively secured in a fluid tight manner to the inner face of the outer wall 100 respectively at a point inward of the respective ends of outer wall sufficiently to allow telescopic connection of said end portions of the outer wall 100 with the ends of other portions of said spout adjacent thereto. This construction results in a control chamber 102 of unbroken area between the inner wall 101 and the outer wall 100 except for a small vent opening 100' through the highest point of the wall of the chamber, that is wall 100 to avoid forming a vacuum in said control chamber 102.

A syphon tube 111 with its upper portion in the form of an open loop is disposed in the portions 100 and 105 of the spout with its intake end communicating with and terminating closely adjacent to the lowest portion of the chamber 102, the bend of its loop being closely adjacent to the highest point of said chamber 102 and its discharge end communicating with control reservoir 106 to trigger the trigger tube 28. As the chamber 102 fills with liquid the liquid will progressively fill the syphon tube 111 until it reaches and passes the highest point in said syphon tube 111 and starts flowing out of said tube 111 into said control reservoir, the small opening 100' preventing any vacuum action opposed to such flow. As fluid is discharged by syphon tube 111 into said control reservoir 106 it will cover the orifice 50 of tube 28 so that no air will be drawn through the same into chamber 20, but air will be withdrawn therefrom through the bore or passage 23, resulting in pulling the diaphragm 39 toward the spring 22 against the action of the latter until the rollers 34 have been moved sufficiently to disengage them from the upper horizontal edge 35 of the horizontal leg of the L-slot 37 into alignment with the vertical leg of the L-slot 37, whereupon the spring 17 will force the disk valve 15 back to or down on its seat 14 and simultaneously, overcoming the resistance of weaker spring 29, will force the forward end of hand lever 4 down by means of the engagement of the lower end of valve stem 5 with the handle 4. Since said forward end of hand lever 4 by means of pivot pin 25 is pivotally connected with rod 27 such downward movement of the forward end of hand lever 4 will result in pulling downward the rod 27 and its head 31 against the opposition of spring 29. The seating of disk valve 15 on its seat 14 cuts off the flow of liquid and thus the aspirating action and on the escape of the fluid from reservoir 106 through its drain 120 permits air to flow through orifice 50 and tube 28 into chamber 20, restoring atmospheric pressure therein, the spring 29 pressing rod 27 upward until the top roller 34 lies in a plane below the surface 35, at which point the spring 22 will be free to, and will, expand and return the diaphragm 39 and the actuator 33 forward to their initial positions, ready to dispense another order of the fluid.

The reservoir 106 is defined by the cap 107 threaded on the discharge end of tube 105, in conjunction with an axially inclined wall portion of the tube 105 as will be readily apparent from inspection of Figure 1 of the drawings.

The forward end of tube 28 passes through the radially inner and forward portion of the wall of said reservoir and receives on its forward end a sleeve 50 formed with a minute hole or orifice to permit air to flow through said tube to the chamber 20 and that portion of the graduated section which constitutes the radially outer wall of reservoir 106 is formed with an opening 110 so that when the fluid in the receptacle being filled rises to the level of said opening fluid will flow into and through said opening 110 into reservoir 106 and close the orifice in sleeve 50 which is connected in an air tight manner to the forward and lower end of tube 28, thus triggering the latch mechanism and moving the rollers 34 to move them out of engagement with the surface 35 and into alignment with the long vertical leg of the slot 37 so that the spring 17 may move to closed position as above set forth.

Also, the forward end of the supplemental triggering tube 111 is secured in an opening in the rear part of the radially inner wall of said reservoir 106 slightly in advance of the opening 110 in any suitable manner as by soldering and the adjacent part of said tube 111 is so formed and directed that fluid flowing from its discharge end will normally be directed below said opening 110 into the interior of said reservoir to close the orifice of the trigger tube 28 to shut the valve disk 15 on its seat and thus cut off the flow of liquid.

In order to provide for closing the valve 15 and cutting off the flow of fluid after the desired amount, from say one gallon up to fifteen gallons, I provide an adjustable leak means for drawing off and diverting into chamber 102 a portion of the fluid being discharged through the nozzle 101.

The fluid is directed by scoop 117 to the removable and replaceable jet 117' discharging into the interior of chamber 102 and may pass therefrom through the leak tube 112 to and through the leak valve assemblage to the receptacle being filled.

There is a definite relation between the cross-sectional size of the inlet opening in the jet 117' and the variable position of the ball valve 114 and the graduations 119 and stop 119 on the exterior of the sleeve 107, the cross-sectional size of the passageway in the tube 112 throughout its length being at least as large, or larger than the cross-sectional size of the passage through the jet 117 at the smallest point of said jet passage, the ratio between the size of the passage in the jet 117 and the smallest

cross-sectional size of tube **101** being such that, with the leak valve closed, the chamber **102** will be full and liquid will flow through syphon tube **111** into reservoir **106** and trigger the trigger tube **28** when one gallon of fluid has passed through tube **101.**

The tube **112** has its forward or discharge end centered by a spider support **113** engaging the inner face of sleeve **107** and has its forward end enlarged and externally screw-threaded to be engaged by the internal screw-threads of the valve retaining cap or cage **115** which carries rigid with it an index finger or pointer **116** extending radially from said cap or cage **115** beyond the wall of sleeve **107** and there being bent sharply, preferably at a right angle, to lie substantially parallel to the outer face of said sleeve **107.**

The pitch of the screw-threads on the end of tube **112** and in cap or cage **115** and the passage in the jet **117** and the passage in leak tube **112** and the size of ball valve **114** are all so related that when the pointer or index **116** points to any specific number of gallons within the range of the graduations **118** when that number of gallons has been dispensed to the container the chamber **102** will have filled and liquid will have flowed through the syphon tube **111** into the reservoir **106** and will have covered orifice **50** of trigger tube **28** with resultant seating of the valve **15** on its seat **14** to thus cut off the flow of liquid through the nozzle.

When the index finger or pointer **116** has been turned from its initial position wherein it engages one side of the stop **119** to its full open position wherein it engages the other side of stop **119** the ball valve **114** will drop to its extreme open position. In that position of the ball valve **114** it will have moved so far from its seat and left such a large open space that the liquid can leak from the chamber **102** as fast or a little faster than it flows into the chamber **102** through the jet **117,** so that under such circumstances the chamber **102** would never fill, the tube **111** would never be brought into play and the nozzle would automatically cut off only when the liquid level in the container reached a point slightly above the lower edge of opening **110** and flowed over the same into reservoir **106** and closed the orifice **50** in the outer end of tube **28** or a cap applied to the outer end thereof.

The real gist of the invention resides in the combination of the old and known intake or triggering tube **28** with a small space or reservoir disposed about the outer end of the triggering tube **28** and means for supplying liquid to said space or reservoir **106** when the quantity of liquid called for by the position of index or pointer **116** has been dispensed.

The ends of the tubular sections **26, 100** and **105** are preferably associated as by being soldered or welded together.

The jet **117** may be of any cross-sectional size so long as the mentioned relationship between it and the leak tube **112** and the valve ball **114** are maintained. An automobile carburetor jet may constitute the inlet **117,** in fact such a jet has been used with good results in several specimens I have made.

I claim:

1. In a device of the character described, the combination of a body having intake and discharge passages connected by a valve controlled passage, a valve for opening and closing said valve controlled passage, a chamber having a flexible wall acting as a diaphragm, a latch carried by the medial portion of said flexible wall and moving therewith, a tube for supplying air to said chamber, an evacuating duct extending from the interior of said chamber to the interior of said valve controlled passage at a point on the discharge side of said valve to evacuate said chamber, means for opening said valve, and releaseable means slidably disposed in said body and connected to said valve opening means and normally engaged and held in raised position by said latch, with a control chamber, means for delivering fluid from said body to said control chamber, adjustable means for regulating the time required to fill said control chamber, a syphon tube having a loop disposed in and in communication with the interior of said control chamber and extending from said control chamber to a point in the discharge passage adjacent to the intake end of said air supply tube, a reservoir extending across the adjacent ends of said tubes, said reservoir being formed with a minute drain at its lowest point.

2. In a device of the character described the combination of a body having inlet and outlet passages communicating with each other through an intermediate passage, a valve controlling such communication through said intermediate passage, an air chamber in said body and having a flexible wall, a triggering air tube having its intake end formed with a small orifice and extending through the wall of said outlet passage adjacent the outer end thereof, a control chamber receiving liquid from the interior of said body, adjustable means for draining various amounts of fluid from said control chamber, a reservoir extending across the inlet end of said triggering tube, and a control tube discharging liquid into said reservoir to immerse the inlet end of said triggering tube in liquid when the desired quantity of liquid has been delivered.

3. A control device for use with a nozzle structure for dispensing liquid, which said nozzle structure has a valve, means for unseating said valve, and a triggering air tube for releasing said valve to reseat itself upon the liquid being delivered rises in the container to which it is being delivered to such point on the nozzle structure as to close the outer end of said triggering tube, said control device comprising a control chamber receiving fluid from said nozzle structure, a reservoir disposed about the intake end of said first mentioned triggering tube, variable adjustable drain means for varying the time required to fill the control chamber, and a tube receiving liquid from said control chamber when the latter has been filled and delivering said fluid to said reservoir to trigger the triggering tube when the desired quantity has been delivered to the container without relation to the level of fluid in the container.

4. In a liquid dispensing nozzle of the class wherein an air pressure responsive means including an enclosed chamber functions in response to a reduction in air pressure in the chamber to initiate the seating of a valve controlling a liquid discharge passage through said nozzle, incident to reduction of air pressure within said chamber, said liquid discharge passage having a constriction therein, said pressure responsive means including a passage communicating with said chamber and opening from said chamber into said constriction for withdrawing air from the chamber by aspirating action incident to flow of fluid through said liquid discharge passage, and an intake tube communicating with and supplying air to said chamber, said intake tube having an intake end normally open to atmosphere the combination with said nozzle of a liquid reservoir carried thereby over the intake end of said intake tube, and delayed action means establishing communication between said reservoir and said liquid discharge passage of the nozzle and operative at a pre-determined interval subsequent to the commencement of liquid flow through the nozzle, for delivering liquid into said reservoir to a level above the intake end of said intake tube to reduce the air pressure within said chamber.

5. The combination defined in claim 4 wherein said reservoir is formed with a drain passage below said intake end of the intake tube and an overflow port above said intake end.

6. The combination of claim 4, wherein said delayed action means includes a control chamber within said nozzle, means for delivering liquid at a controlled rate from said discharge passage into said control chamber, a siphon having an intake end in and adjacent the bot-

tom of said control chamber and a delivery end communicating with said reservoir, said syphon having an intermediate portion between its ends at a level above its said intake end, to delay initiation of the liquid flow through said siphon until after the liquid in the control chamber has reached said level.

7. The combination of claim 6 including adjustable

leak means associated with said control chamber for regulating the duration of said delay.

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