The invention relates to automatic dispensing nozzles and has particular reference to a type of nozzle which is commonly seen attached to gasoline pumps at service stations which can be inserted into the fill pipe of an automobile gas tank and there permitted to pass gasoline into the tank unattended until the level of the tank reaches the nozzle, at which point the supply of gasoline is automatically shut off.

Nozzles of this type have been rather well established in the past decade throughout the country and from the point of view of utility have been very satisfactory. They have, however, been serious defects in the nozzles here-tofore available. These nozzles commonly are quite sensitive and prone to get out of adjustment. As a result, most service stations need to retain extra nozzles ready to be attached to the pump in use on the tank whenever the nozzle of the one being used malfunctions, and the replacement of these nozzles is a frequent job, the cost of which is too high for the service stations.

Still another object of the invention is to provide a streamlined compact automatic dispensing nozzle, the arrangement of which makes considerable force available when the tripping mechanism is to be actuated to produce an automatic shut-off and which is so constructed that when the nozzle is turned on, the rate of flow can be selected as either a fast flow or a slow flow at the option of the operator without in any other way affecting the operation of the device.

The objects aforementioned contemplate further the design and construction of an automatic dispensing nozzle such that the parts can be inexpensively fabricated, and can be assembled with a minimum amount of skilled labor.

With these and other objects in view, the invention consists of the construction, arrangement and combination of the various parts of the device whereby the objects contemplated are attained, as hereinafter set forth, pointed out in the appended claims, and illustrated in the accompanying drawings.

FIGURE 1 is a longitudinal view of the automatic dispensing nozzle with substantial portions thereof shown in section to reveal the interior construction and with the parts in position occupied when the nozzle is shut off; FIGURE 2 is a view similar to FIGURE 1 with the parts in the position occupied when the nozzle is turned on to flow at a slow rate of operation; FIGURE 3 is a longitudinal sectional view taken at right angles to the sectional views of FIGURES 1 and 2 showing the position of the diaphragm and trip device as appearing in FIGURE 1; FIGURE 4 is a view similar to FIGURE 3 showing the trip device and diaphragm in the position occupied when the mechanism is tripped to automatically shut off the flow; FIGURE 5 is a fragmentary longitudinal sectional view of the dispensing end of the nozzle showing the air inlet; FIGURE 6 is a longitudinal sectional view of a fail-safe mechanism taken on the line 6—6 of FIGURE 3; FIGURE 7 is a cross-sectional view taken on the line 7—7 of FIGURE 1.

In an embodiment of the invention chosen for the purpose of illustration, there is shown a valve body 10 having a main chamber 11 therein and to which a nozzle or spout 12 is attached at one end and a flexible handle 13 at the other end. Extending transversely within the main chamber 11 is a transverse partition 14, the presence of which defines an inlet chamber or vestibule 15 at the inlet end of the body 10. Liquid such as gasoline is supplied to the device from a supply hose 16 entering a bore 17 in the handle on its way to the valve body 10. A bracket 18 may be provided on the handle for convenience in hanging.
lining 19 around which is a thick rubber grip 20. The handle is secured to the body by an appropriate sealing clamp 21 of substantially conventional character.

Extending through the transverse partition 14 is a liquid supply passage 22 which has a throat 23 somewhat smaller in cross-sectional area. At the entrance end of the liquid supply passage 22 is an annular valve seat 24 and a valve element 25 provided as shown with a valve face 26 which is adapted to seat upon the annular valve seat 24. A valve stem 27 on the valve element is streamlined in substantially the form taken by the flow of liquid through the supply passage, the stem extending longitudinally into the main chamber 11 and slidable through an aperture 28 in a bracket 29. A spring 30 bearing at one end against a pin 31 in the valve stem and at the other end against one side of the bracket 29 creates a bias such that the valve element is normally urged to closed or seated position.

On one side of the main chamber as seen to good advantage in FIGURES 3 and 4 is a longitudinal partition 35 which forms in a sense a diaphragm chamber comprising a low pressure pocket 36 and a fluid pressure pocket 37, when a diaphragm 38 secured therein occupies the position illustrated in FIGURE 4. The diaphragm is held in position by a cover 39 attached by suitable conventional means (not shown) to the valve body. On the inside face of the cover is a spring 40 which bears against the mid-portion of the diaphragm and tends normally to move the diaphragm to the position illustrated in FIGURE 3.

To provide a low pressure condition in the low pressure pocket 36, there is provided an operating air passage comprising an outer section 41 and an inner section 42, the outer and inner sections being connected through a recess 43 identified as a trip recess within a box 44 which is stationarily mounted inside of the body 10 within the main chamber 11. As shown in FIGURE 5, the outer section 41 is connected to a fitting 45 at the outermost end of the spout 12, the fitting having a lateral aperture 46 therein which breaks through the spout adjacent to its tip.

The inner section 42 extends through the longitudinal partition 35 and communicates through a hole 46 with the low pressure pocket 36.

At the opposite end of the low pressure pocket is another hole 47 which passes through the diaphragm and the transverse partition 14 and communicates with the through hole 48 at a point 49 through a suction or vacuum passage 49.

The mechanism which aids in providing automatic operation of the valve element 25 in order to cause it to shut off is built in part around a trip rod 50 and a link 51 attached thereto. The trip rod 50 is reciprocatingly mounted in an opening 52 in the transverse partition 14, there being provided a packing seal 53 held in position by a packing nut 54, the packing nut also serving as a guide for the reciprocating movement of the trip rod 50. At the left end of the trip rod a pin 55 provides a pivot connection between the link 51 and the trip rod, at one point on the link. At another point, a pin 56 provides a pivoting connection between the link 51 and a bracket 57 on the valve element 25. In a sense, therefore, the pin 55 provides a movable fulcrum for the link when it is used to open the valve element and later when the trip mechanism actuates to effect closing of the valve element.

Normally, the trip rod 50 occupies the position illustrated in FIGURES 1, 2 and 3. This is accomplished by the presence of a block 58 bearing on one side against a cap 59 on the trip rod and bearing on a side opposite therefrom against a cam track 60 which is part of a stop 61. The stop is pivotally mounted upon a rod 62 inside of the main chamber 11. It will also be noted that in order to provide means for lifting the cam track 60 an adjusting screw has a threaded engagement with the stop and is provided with an adjusting head 64 adapted to receive an Allen head wrench on the outside of the body 10. A packing gland 65 confining an O-ring seal 66 makes the adjusting screw connection liquid tight. Insuch as the tilt required by the cam track 60 is relatively slight, sufficient freedom is achieved by having a loosely threaded engagement between the adjusting screw 63 and the stop 61 so that when the screw is manipulated, it will not bind in its connection with the stop. Since the adjustment is a substantially permanent adjustment once made, the parts 60, 61 need not have freedom of movement other than for adjusting purposes. To minimize friction as the block 58 is moved, rollers 67 are provided on the block engaging respectively the cap 59 and cam track 60.

The block 58 is seated upon a shaft 68 which is reciprocated by a collar 69 held on spider legs 70. The shaft terminates in a head 71 having a substantially broad face in surface to surface contact with the mid-portion of the diaphragm 38 immediately opposite the spring 40.

When the parts occupy the positions illustrated in FIGURE 3, which is true also of FIGURES 1 and 2, a handle 75 attached to the link 51 and lying within the bore 17 has the position illustrated in FIGURE 1. In this position, the valve element is spring pressed by action of the spring 30 to closed position.

Attention is directed to the presence of a bracket 76 which has a limited pivoting motion by virtue of being pivotally attached by means of a pin 77 to a liner 78 at the junction of the handle 13 with the body 10. A torsion spring 79 acting in a well known fashion between the liner and the bracket tends normally to bias the bracket in a clockwise direction as viewed in FIGURES 1 and 2. The bracket is provided with shoulders 80 and 81 and an arcuate land 82.

On the link 51 is a complementary shoulder 83 and adjacent the complementary shoulder 83 is by-pass cam 84 pivotally mounted by means of pin 85 and normally urged in a counterclockwise direction by means of a torsion spring 86 acting in the usual fashion.

When the operator wishes to set the nozzle in operation, the customary procedure is to insert the nozzle or spout 12 into the fill pipe of a tank, this action being one permitting the operator to sink or depress the flexible handle 13 from the position of FIGURE 1 to the position of FIGURE 2. This action also shifts the position of the handle 75 to the position of FIGURE 2. During this movement the trip rod 50 remains fixed in position insuch as much as the diaphragm 38 occupies the position of FIGURE 3 because there is a free flow of air through the low pressure pocket 36 and the spring 40 urges the diaphragm to the position mentioned. Hence, the pin 55 stays in set position serving as a fulcrum at a fixed point and rotation of the link 51 about this point elevates the valve element 25 from its seat. If a slow flow adjustment is desired, the handle 75 is tilted only until the complementary shoulder 83 engages the shoulder 80 at which point, by reason of the presence of the torsion spring 79, the bracket 76 is tilted clockwise so that the shoulders overlie each other in the position illustrated in FIGURE 2. Should the by-pass cam 84 engage any portion of the bracket during this motion, it is permitted to rotate in a clockwise direction against tension of the torsion spring 86.

If the operator wishes an adjustment for rapid flow, the handle 75 would be rotated one step further until the complementary shoulder 83 engages the shoulder 81. This would result only in a lifting of the valve element 25 a greater distance above the seat and permit a greater flow of liquid through the liquid supply passage 22. Should the operator wish to promptly close the valve, it is necessary only to rotate the handle 75 to a still greater extent until a corner 87 on the link presses against the arcuate land 82 of the bracket 76 causing the bracket to rotate a slight amount counterclockwise against tension of the torsion spring 79 until the by-pass cam 84 urged by its torsion spring 86 is moved to a position over-
lying the corner of the shoulder 81. After the parts have reached the positions described, the operator then shifts the handle 75 and incidentally the flexible handle 13 back to the position of FIGURE 1, and the by-pass cam 84 interposes itself again against the corners of both shoulderna 84 and 85 so that there is no engagement of the complementary shoulder 83 therewith, and hence the link is returned to the position of FIGURE 1 and the valve element 25 is returned to a seated position aided by action of the spring 3.

If the valve device is to be placed in automatic operation, the handle 75 is moved either to the position shown in FIGURE 2 for slow flow, or to the position for fast flow hereinbefore described and the spout 12 is permitted to remain in the fill pipe of the tank as deep as permitted by the length of the spout beyond the body 10. While in this position, liquid flows freely from the supply hose 16 through the bore 17, the liquid supply passage 22 and the main chamber 11 through the spout and into the fill pipe. Passage of the liquid through the throat 23 of the liquid supply passage 22 induces a flow of air through the vacuum passage 49 at the point 38, this, in turn, inducing a flow of air from the hole 46 through the outer section 41 and inner section 42 of the composite air supply passage and accordingly through the vacuum pocket 36 adjacent the diaphragm. Flow continues until the rising level of liquid in the fill pipe of the gas tank (not shown) reaches the hole 46. This blocks the free flow of air through the air passage sections. Since the liquid continues to flow through the liquid supply passage and throat 23, suction in the vacuum passage 49 tends to draw a low pressure in the low pressure pocket 36 overcoming tension in the spring 40 and pulls the diaphragm 38 from the position of FIGURE 3 to the position of FIGURE 4. This is a strong and positive action sufficient to move the block 58 by aid of the rollers 67 across the face of the cap 59 and track 60 until the block is clear of a position between the trip rod 50 and the stop 61. When this happens, the trip rod 50 will move lengthwise from the position of FIGURE 3 to the position of FIGURE 4. This in turn shifts the location of the movable fulcrum, identified by the pin 55, lengthening the distance between the pin 55 and the shoulder 80 to a distance greater than that between the pin 55 and the complementary shoulder 82. When this happens, the by-pass cam 84 will be pushed into position overlying the shoulder 80, or 81 as the case may be, and the spring 30 will be free to draw the valve element 25 to closed position and sufficiently strong to return the handle 75 to the position of FIGURE 1.

At this point, consequently, the flow of liquid will cease before enough liquid has flowed into the tank to overflow the fill pipe. Occasions do arise after a nozzle has been inserted in the fill pipe and the valve opened when the automatic nozzle may slip from the fill pipe. Unless there is means for shutting off the flow of liquid through the valve, the liquid will spill upon the pavement. This would create a dangerous condition were it not for some secondary means for shutting off the flow of liquid through the valve body other than by stopping the passage of air through the air supply passages.

In the device herein described, this is accomplished by action of a yoke 90 which pivots upon a shaft 91, the shaft being one extending through the trip recess 43 as shown in FIGURE 6. By use of a conventional torsion spring (not shown) the yoke 90 will normally be pressed away from the spout to the position of FIGURE 1. In this position a trip valve 93 in the solid line position of FIGURE 6 closes the inner section 42 of the operating air supply. When the spout 12 is moved to the position against the spout 12 by being squeezed in the fill pipe, the trip valve 93 on the shaft 91 will be moved to the broken line position of FIGURE 6 and hence there will be a free flow of air through the trip recess 43 and the operating air supply. If the nozzle slips from the fill pipe, the yoke 90 will then be spring pressed to the position of FIGURE 1 and will shift the trip valve 93 to the solid line position of FIGURE 6 shutting off the flow of air to the inner section of the operating air passage. When this happens, the diaphragm 38 will be shifted in a manner heretofore described and the same action will take place as if the operating air passage were blocked. Hence the valve element will immediately close and shut off the supply of liquid.

The shift 91 is properly journalled in bearings 94 secured by O-rings 95 in bosses 96 of the body, thereby providing a sealed bearing which has sufficient freedom of rotation to accomplish the desired results.

It will be clear from the foregoing description of structure and operation that there has been provided an automatic nozzle of very simple construction and with positive acting parts so arranged that they can be easily constructed and put together and when properly assembled assure positive action over long periods of time despite the customary hard wear and rough usage given them in many locations.

Although I have herein shown and described my invention in what I have conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of my invention, which is not to be limited to the details disclosed herein, but is to be accorded the full scope of the claims so as to embrace any and all equivalent structures and devices.

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

1. A filler valve device with automatic shut-off comprising a valve body having a chamber therein, a transverse partition across an inlet end of said main chamber and a spout in communication with said chamber at an outlet end, a diaphragm at one side of the chamber forming a low pressure pocket, means forming a liquid supply passage through said transverse partition, a valve seat around said supply passage and a valve element in said body operatively associated with said valve seat being spring biased to closed position, a trip member reciprocably mounted in a position extending through said transverse partition having a movable fulcrum thereon at said inlet end and a trip element in said main chamber and forming part of said trip member, a link having a pivotal attachment to said fulcrum and having a separate pivotal attachment to said valve element, a shoulder on the body adjacent the link and a manually positionable catch on said link engageable with said shoulder when said valve element is in open position, a stop in said main chamber, a movable block in engagement with said diaphragm having a position between said stop and said trip element adapted to hold said valve element in open position when said catch is in engagement with said shoulders, a suction air passage between said low pressure pocket and said supply passage, an operating air passage between said low pressure pocket and an outer portion of said spout, said block being movable with said diaphragm to a position removed from said trip element upon the blocking of said operating air passage whereby to effect automatic closing of said valve element.

2. A filler valve device with automatic shut-off comprising a valve body having a main chamber the outlet end of said main chamber forming a vestibule and a spout in communication with said chamber at an outlet end, a longitudinal partition at one side of the chamber forming a diaphragm chamber, a diaphragm in said diaphragm chamber across said longitudinal partition dividing said chamber into a low pressure pocket and a fluid pressure pocket, means forming a hole through said longitudinal partition communicating between said main chamber and said fluid pressure pocket, means forming a liquid supply passage through said transverse partition, a valve seat around said
supply passage and a valve element in said vestibule operatively associated with said valve seat having a stem extended through said supply passage and spring biased to closed position, a trip rod reciprocably mounted in a position extending through said transverse partition having a movable fulcrum at the end thereof in said vestibule and a trip element in the end thereof in said main chamber, a link having a pivotal attachment to said fulcrum and a separate pivotal attachment to said valve element, a shoulder in said vestibule and a manually positionable catch on said link engageable with said shoulder when said valve element is in open position, a stop in said main chamber, a movable block in engagement with said diaphragm having a position between said stop and said trip element adapted to hold said valve element in open position when said catch is in engagement with said shoulders, a suction air passage between said low pressure pocket and said supply passage, an operating air passage between said low pressure pocket and an outer portion of said spout, said block being movable with said diaphragm to a position extending through said trip rod to valve closing position upon the blocking of said operating air passage.

5. A filler valve device with automatic shut-off for use with a fill pipe for a tank, said device comprising a valve body having a main chamber therein, a transverse partition across an inlet end of the main chamber, a liquid supply passage therethrough having a valve seat on the upstream side, and a spout in communication with said main chamber at the outlet end, a valve element spring biased into closed position upon said seat, a trip element extending reciprocably through said partition and a catch mechanism connecting said trip valve with said valve element and having one position holding said valve element in unseated adjustment and a released position wherein said valve element is seated, a diaphragm on one side of said chamber forming a low pressure pocket, a stop in said chamber and a block in engagement with said diaphragm having a position between said trip element and said stop adapted to hold said valve device in open position, said stop being pivotally mounted in the chamber and having a portion thereof in engagement with said stop block, means extending between said stop and the outside of said body, said last identified means being adapted upon adjustment to shift said portion of the stop relative to said block whereby to vary the sensitivity of tripping action, a suction air passage between said low pressure pocket and said liquid supply passage; an operating air passage between said low pressure pocket and said liquid supply passage; an operating air passage between said low pressure pocket and an outer portion of said spout, said block being movable with said diaphragm to a position extending through said trip rod whereby the cam track relative to said block to vary the sensitivity of tripping action, a suction air passage between said low pressure pocket and said liquid supply passage; an operating air passage between said low pressure pocket and an outer portion of said spout, said block being movable with said diaphragm to a position effecting actuation of said trip rod to valve closing position upon the blocking of said operating air passage.

6. A filler valve device with automatic shut-off for use with a fill pipe for a tank, said device comprising a valve body having a main chamber therein, a transverse partition across an inlet end of the main chamber, a liquid supply passage therethrough having a valve seat on the upstream side, and a spout in communication with said main chamber at the outlet end, a valve element spring biased into closed position upon said seat, a trip element extending reciprocably through said partition and a catch mechanism connecting said trip valve with said valve element and having one position holding said valve element in unseated adjustment and a released position wherein said valve element is seated, a diaphragm on one side of said chamber and a block attached to said diaphragm having a position between said trip element and said stop adapted to hold said valve device in open position, a suction air passage between said low pressure pocket and said liquid supply passage; an operating air passage between said low pressure pocket and an outer portion of said spout, said block being movable with said diaphragm to a position effecting actuation of said trip rod to valve closing position upon the blocking of said operating air passage, and valve means separating opposite ends of said operating air passage, an actuator for said valve means movably mounted on the body and extending to the exterior of said body, said valve means being movable between positions blocking said operating air passage and unblocking said operating air passage, and a lever on said actuator having a portion thereof insertable in the fill pipe and movable therein in a direction transversely of the spout to one position wherein said valve means is in blocking position and another position wherein said valve means is in unblocking position.

7. A filler valve device with automatic shut-off for use with a fill pipe for a tank, said device compris-
ing a valve body having a chamber therein, a transverse partition across an inlet end of the chamber, a liquid supply passage therethrough having a seat on the upstream side, and a spout in communication with said chamber at the outlet end, a valve element spring biased into closed position upon said seat, a trip element extending reciprocatably through said partition and a catch mechanism connecting said valve element with said trip element, said catch mechanism comprising a link having a pivotal connection at one point to said trip element and a pivotal connection at another point to said valve element, a bracket in said case having a plurality of shoulders thereon, a projection on said link having selective positions of engagement with said shoulders wherein said link is in respectively different open positions whereby to establish different rates of flow in said supply passage, a hollow flexible handle on said body having a supply passage therein in communication with said liquid supply passage, an operating air passage between said low pressure pocket and an outer portion of said spout, said block being movable with said diaphragm to a position effecting actuation of said trip rod to valve closing position upon the blocking of said operating air passage.

9. A filler valve device with automatic shut-off for use with a fill pipe for a tank, said valve device comprising a valve body having a chamber therein, a transverse partition across an inlet end of the chamber, a liquid supply passage therethrough having a valve seat on the upstream side, and a spout in communication with said chamber at the outlet end, a valve element spring biased into closed position upon said seat, a trip element extending reciprocatably through said partition and a catch mechanism connecting said valve element with said trip element, said catch mechanism comprising a link having a pivotal connection at one point to said trip element and a pivotal connection at another point to said valve element, a bracket in said case having a plurality of shoulders thereon, a projection on said link having selective positions of engagement with said shoulders wherein said link is in respectively different open positions whereby to establish different rates of flow in said supply passage, a hollow flexible handle on said body having a supply passage therein in communication with said liquid supply passage, an operating air passage between said low pressure pocket and an outer portion of said spout, said block being movable with said diaphragm to a position effecting actuation of said trip rod to valve closing position upon the blocking of said operating air passage.

10. A filler valve device with automatic shut-off for use with a fill pipe for a tank, said valve device comprising a valve body having a chamber therein, a transverse partition across an inlet end of the chamber, a liquid supply passage therethrough having a valve seat on the upstream side, and a spout in communication with said chamber at the outlet end, a valve element spring biased into closed position upon said seat, a trip element extending reciprocatably through said partition and a catch mechanism connecting said valve element with said trip element, said catch mechanism comprising a link having a pivotal connection at one point to said trip element and a pivotal connection at another point to said valve element, a bracket in said case having a plurality of shoulders thereon, a projection on said link having selective positions of engagement with said shoulders wherein said link is in respectively different open positions whereby to establish different rates of flow in said supply passage, a hollow flexible handle on said body having a supply passage therein in communication with said liquid supply passage, an operating air passage between said low pressure pocket and an outer portion of said spout, said block being movable with said diaphragm to a position effecting actuation of said trip rod to valve closing position upon the blocking of said operating air passage.

11. A filler valve device with automatic shut-off comprising a valve body having a chamber therein, a partition across an inlet end of said main chamber dividing said chamber into an upstream recess and a downstream recess, and a spout in communication with said chamber at the outlet end, an emptying position of said valve element, a bracket in said case having a plurality of shoulders thereon, a projection on said link having selective positions of engagement with said shoulders wherein said link is in respectively different open positions whereby to establish different rates of flow in said supply passage, a hollow flexible handle on said body having a supply passage therein in communication with said liquid supply passage, an operating air passage between said low pressure pocket and an outer portion of said spout, said block being movable with said diaphragm to a position effecting actuation of said trip rod to valve closing position upon the blocking of said operating air passage.
through the partition and normally urged to closed position, a trip element having a movable fulcrum thereon, a link having a pivotal attachment to said fulcrum and a separate pivotal attachment to said valve element, a shoulder on the body adjacent the link and a manually positionable catch on the link, a stop movably mounted on the body, said stop having an adjustable connection therefrom to the exterior of the body, a movable block in engagement with the flexible closure element having a position between said stop and the trip element and having one position holding said valve element in open position when said link is in engagement with said shoulder, said adjustable connection being shiftable from the outside of the body whereby to vary the sensitivity of said block to release by said flexible closure element, a suction air passage between said low pressure pocket and said supply passage, an operating air passage between said low pressure pocket and the outer portion of the spout, said block being movable with said flexible closure element to a position removed from said trip element upon the blocking of said air passage whereby to effect automatic closing of said valve element.

12. A filler valve device with automatic shut-off comprising a valve body having a chamber therein, a partition across an inlet end of said main chamber dividing said chamber into an upstream recess and a downstream recess, and a spout in communication with said downstream recess, and a flexible closure element at one side of the chamber forming a low pressure pocket, means forming a liquid supply passage through said partition, a valve element mounted on the body in said partition adapted to close said passage through the partition and normally urged to closed position, a trip element reciprocatably mounted in a position extending through the partition from the main chamber to a location in the supply passage upstream of the partition, said trip element having a movable fulcrum thereon, a link in the upstream recess having a pivotal attachment to said fulcrum and a separate pivotal attachment to said valve element, a shoulder on the body adjacent the link and a manually positionable catch on the link having a plurality of catch elements alternatively engageable with the shoulder when said valve element is in open position, a stop mounted on the body, a movable block in engagement with the flexible closure element having a position between said stop and the trip element and having one position holding said valve element in open position when said link is in engagement with said shoulder, a suction air passage between said low pressure pocket and said supply passage, an operating air passage between said low pressure pocket and the outer portion of the spout, said block being movable with said flexible closure element to a position removed from said trip element upon the blocking of said air passage whereby to effect automatic closing of said valve element.

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