Nov. 7, 1950 C. P. GRAVELLE 2,528,747

AUTOMATIC FILLING NOZZLE

Filed June 30, 1948

Fig. 1.

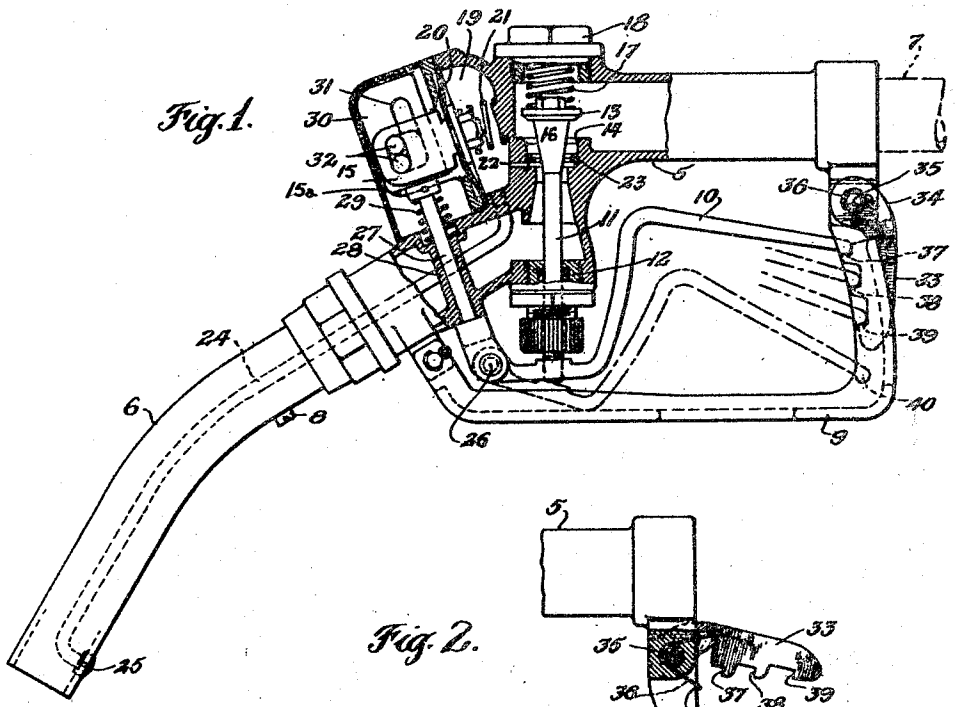


Fig. 2.

Fig. 3.

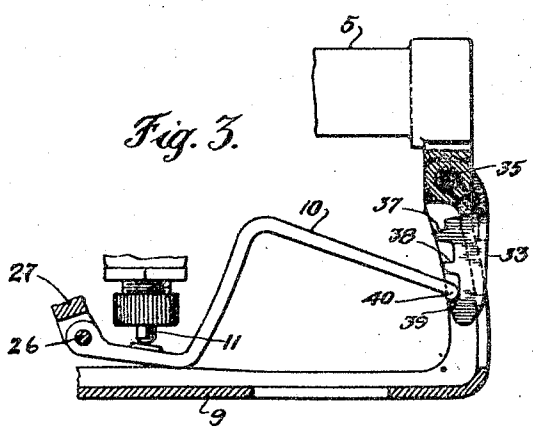
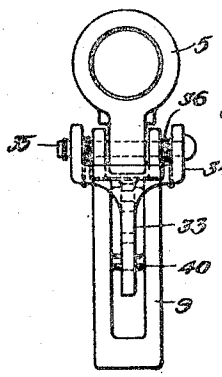


Fig. 4.



Inventor
Clarence Paul Gravelle

By

Attorneys

Patented Nov. 7, 1950 2,528,747

UNITED STATES PATENT OFFICE

2,528,747

AUTOMATIC FILLING NOZZLE

Clarence Paul Gravelle, Philadelphia, Pa.

Application June 30, 1948, Serial No. 36,022

5 Claims. (Cl. 226—127)

1

My invention relates to automatic nozzles for filling containers with a liquid, and the primary object is to provide a nozzle which can be frictionally held in open position, but which will automatically stop the flow of liquid when the container has been filled or if the nozzle is subjected to abnormal jarring which would occur if the nozzle should be accidentally pulled from the container or dropped to the ground.

My improved nozzle is especially useful for gasoline filling stations, for it will allow the attendant to insert the nozzle in the tank of an automobile, start the flow of gasoline, and then leave the nozzle while he attends to other duties about the car, such as cleaning the windshield, inspecting the oil level of the engine, inflating tires, etc. In busy stations, this is of considerable importance and means that during the course of a day many more cars can be serviced, for the attendant can perform many of the usual courtesy services on the car while the gasoline tank is being filled.

It is of importance, of course, that there be no danger that there will be any spillage of gasoline while the nozzle is left unattended, for, in addition to waste of gasoline, there is the danger of fire and the unsightliness of the spilled gasoline and with my improved nozzle such spillage is practically eliminated.

Another object of my invention is to provide a nozzle for filling gasoline tanks which will substantially eliminate the danger of static sparking—an ever present hazard in filling stations, which is intensified in cold or dry weather.

Another object of my invention is the elimination of "blow-back" of gasoline, which occurs when air is compressed in the tank by too rapid filling thereof. When the nozzle is held in the hand by the attendant, there is always an effort to fill the tank as rapidly as possible. It is, of course, desirable to have the nozzle designed to provide as rapid a rate of flow as tanks are adapted to accommodate, and many tanks can be filled with the gasoline flowing at full rate. However, there are also many tanks which have to be filled at a slower rate of flow to prevent blow-back, and in the case of such tanks, the attendant frequently may allow the gas to flow so rapidly that blow-back will occur. By providing a nozzle which can be definitely set at a predetermined position, guesswork is eliminated.

By experience, attendants at filling stations come to know the rate of flow best suited for particular cars, and with the nozzle set for the

2

rate of flow best adapted for the car being filled, there is no temptation for the impatient attendant to increase the filling rate to a point where blow-back will occur.

In the description which follows I have described my improved nozzle in connection with the filling of the gasoline tanks of automobiles. However, the nozzle is adapted to a variety of uses and I do not intend to limit my invention to the illustrative use described.

I have illustrated my invention in preferred form in the accompanying drawings, wherein:

Figure 1 is a side elevation of my improved nozzle with part of the body broken away to expose certain of the automatic valve parts. In this figure various positions of the valve lever are illustrated in dot-and-dash lines.

Figure 2 is a fragmentary view showing the position of the lever and latch when disengaged;

Figure 3 is a view similar to Figure 2 showing the lever and latch engaged for the lowest filling rate; and

Figure 4 is an end elevation of the nozzle.

In general, the nozzle comprises body portion 5, spout 6, hose 7, tank engaging screw 8, guard 9 and valve operating lever 10. In the valve body 5, there is located the flow control valve and mechanism which will automatically close the valve when the level of gasoline in the tank of the automobile reaches a predetermined point on spout 6. As that part of the disclosure forms no part of my invention, the description thereof will not be detailed, and reference is made to Davis Patent No. 2,320,033 for fuller description.

The mechanism referred to comprises the lever 10 pivoted at 26 to the rod 27. The lever 10 engages valve stem 11 which passes through stuffing box 12 and is connected at the upper end to the valve 13. Compression spring 17 is placed above the valve and the upper end of the spring engages the nut 18. Upward movement of lever 10 will lift the valve from its seat 14 against the compression of the spring 17 to allow the gasoline to flow through the nozzle. The higher the valve is lifted, the greater will be the rate of flow.

Vacuum chamber 19 is located just ahead of the valve 13. At the forward side the vacuum chamber is closed by a flexible diaphragm 20 which can move inwardly against the pressure of the light spring 21. The vacuum chamber 19 is connected by passage 22 to the fluid passage of the nozzle. Just ahead of the point where passage 22 is connected to the fluid passage the

latter is restricted. This restriction is formed by the ring 23 which is carried by a shoulder in the valve body, and by the conical enlargement 16 of the upper end of the valve stem. The further the valve stem is lifted the larger will be the opening between the ring and conical portion of the valve stem. The vacuum chamber 19 is also connected by means of tube 24 to the opening 25 near the end of spout 6.

At the outer face the diaphragm 20 is connected to a roller retaining member 15 which has an opening in which the rollers 32 are carried. The rollers 32 are also engaged by the edge of a slot in ear 15a.

The forward end of lever 10 is pivoted at 26 to the rod 27. This rod 27 extends upwardly passing through post 28 which extends across the fluid passage. The upper end of rod 27 is connected to head 30 which has a reverse L-shaped slot 31 therein, and the rollers 32 extend across this slot and engage the edge thereof. Compression spring 27 surrounds the rod and bears at one end on the underside of head 30 and at the other end against the top of post 28. The spring urges the rod 27 and head upwardly.

In operation, when the lever 10 is moved upwardly, it will engage valve stem 11 and lift valve 13 from its seat. Gasoline will now flow through the nozzle and in passing through the restricted portion between the ring 23 and the conical enlargement of the valve stem will create a sub-atmospheric pressure at the point where passage 22 from the vacuum chamber, connects to the fluid passage due to the venturi effect. Due to the sub-atmospheric pressure, created by the venturi, air will be drawn from vacuum chamber 19, through tube 24 and opening 25 at the end of the tube, so long as the liquid level in the gasoline tank remains below the opening 25. When the level of the liquid in the tank rises above opening 25 flow of air through the tube 24 will be interrupted. This will cause diaphragm 20 to move inwardly under atmospheric pressure, drawing with it the roller retaining member 15 and the rollers 32. When the rollers have been moved sufficiently to permit them to enter the upward extension of slot 31 in the head 30, pressure of valve spring 17 will overcome the pressure of spring 29 and the head 30 and rod 27 will be moved downwardly carrying with it pivot pin 26, thus lowering the forward end of the lever and permitting the valve 13 to seat even though the rear end of the lever is still held in its upper valve opening position. Thus the flow of gasoline will be automatically shut off immediately when the liquid in the gasoline tank of the car being filled rises above opening 25. When the rear end of lever 10 is lowered, pressure of the spring 29 will return the head 30, rod 27 and pivot pin 26 to their upper position and the diaphragm spring 21 will cause the diaphragm to return to normal, moving the roller retaining member 15 and the rollers 32 to the narrow portion of the slot in the head 30 where the rollers will engage the head to prevent downward movement thereof when the nozzle is again used for a filling operation. In other words, the parts automatically reset themselves at the end of the filling operation.

The foregoing describes briefly the operation of the device illustrated in Davis Patent No. 2,320,033 and forms no part of my invention. A description of my improvements will now follow.

As was pointed out above it is desirable that the attendant be relieved of the duty of holding gasoline nozzle open while filling the tank in order to permit him to perform other duties about the car being serviced. In order to achieve this, I provide at the rear end of the guard 9 a latch 33. At its upper end this latch 33 has a yoke 34 and the yoke of the latch is mounted on the nozzle by means of pivot pin 35. Wire spring 36 is also carried by the pivot pin and this spring has two arms on either side of the guard member one of which bears against the latch and the other against the guard member to urge the lower end of the latch away from the guard as illustrated in Figure 2. The latch 33 has friction surfaces 37, 38, 39, in order, from top to bottom, which are adapted to engage the rounded rear end 40 of lever 10 to hold it in any one of three positions, pressure of the valve spring 17 on the lever creating sufficient friction between the end 40 of the lever and the friction surfaces of the latch to prevent spring 36 from moving latch 33 so long as valve spring 17 is compressed. It is to be observed that these friction surfaces do not "hook" the latch but are, on the contrary, flat surfaces, substantially at right angles to the edge of the latch, on which the rounded end 40 of lever 10 will rest and from which the latch can move under sufficient pressure to overcome the friction.

When pressure of valve spring 17 has been relieved from lever 10 by movement of rod and pivot 26 downwardly, as described above, pressure of spring 36 is sufficient to move the latch from the position shown in Figure 3, where it engages the lever, to the position shown in Figure 2 where the lever is disengaged. This will mean that immediately on operation of the automatic valve feature of the nozzle the lever will be released from the latch 33, will drop to normal inoperative position and the parts of the automatic valve will be restored to normal position as above described.

I found from experience that it is desirable to have three valve opening positions for lever 10. Attendants at the gasoline filling stations by experience learn to know the rate of flow of gasoline best adapted for various makes of automobiles and can select the latch position where the particular car to be filled will prevent "blow-back" of gasoline as above described. Thus, no matter what make of car is to be filled the attendant can engage the latch with the lever in the proper position for the particular car and leave the nozzle to attend to other duties.

When the nozzle is left unattended, however, it is important that provision be made to prevent spillage of gasoline if there should be any abnormal jarring of the nozzle such as would occur if the nozzle is accidentally pulled from the tank, if the car should accidentally move or if the gasoline hose should be accidentally struck. In my improved latch arrangement the friction between any one of the friction surfaces of the latch 37, 38 and 39 and rounded end 40 of lever 10 is light and sufficiently so that upon abnormal jarring of the nozzle the spring 36 will force the latch away from the end of the lever, allowing the lever to drop to position shown in Figure 2 and thus immediately stop the flow of gasoline.

In order to insure proper positioning of the nozzle in the gasoline tank and also to ground it to the automobile, I provide a lug in the form of a screw member 8 made of brass or other non-sparking good conducting material. On insertion of the nozzle into the tank this screw mem-

ber 8 will engage the edge of the tank opening and will hold the nozzle in proper position so that opening 25 will be covered when the tank is filled.

When used in conjunction with my improved latch the screw 8 affords an additional safety factor to prevent static sparking for it insures that at all time during gasoline flow the nozzle will be grounded to the car. When the attendant attempts to hold the nozzle when filling a car it frequently happens that through carelessness, or in an effort to look into the gasoline tank, the nozzle is removed from contact with the car. When this is done there is danger that there will be a static spark between the nozzle and the car which will ignite the gasoline with disastrous results. When the attendant is not required to hold the nozzle, as is the case when it is latched, as above described, the nozzle will remain in contact with the car throughout the filling operation and the danger of static spark is thus eliminated.

I claim:

1. In an automatic filling nozzle for insertion into a container to be filled with liquid, said nozzle having a valve body with a liquid passage therein, a valve in said body to control the flow of liquid through said passage and a spring tending to close the valve, the combination of a lever having a position for normally opening the valve against the pressure of the valve spring, a friction latch for the lever to hold it in said position, a spring for the latch tending to release the same, automatic means for closing the valve and relieving the pressure of the valve spring on the lever while it is held in said position, the latch spring having such pressure that it will overcome the friction between the latch and lever when the pressure of the valve spring on the lever is relieved.

2. In an automatic filling nozzle for insertion into a container to be filled with liquid, said nozzle having a valve body with a liquid passage therein, a valve in said body to control the flow of liquid through said passage and a spring tending to close the valve, the combination of a lever for opening the valve against the pressure of the valve spring when one end of the lever is held in valve-opening position, a friction latch for the lever to hold said end of the lever in valve-opening position, a spring for the latch tending to release the same, means to move the other end of the lever to relieve the pressure of the valve spring thereon while the first end of the lever is held in valve-opening position, the latch spring having such pressure that it will overcome the friction between the latch and the lever when the pressure of the valve spring on the lever is relieved.

3. In an automatic filling nozzle for insertion into a container to be filled with liquid, said nozzle having a valve body with a liquid passage therein, a valve in said body to control the flow of liquid through said passage and a spring tending to close the valve, the combination of a lever having a position for normally opening the valve against the pressure of the valve spring, a friction latch for the lever biased to release position, automatic means for closing the valve and relieving the pressure of the valve spring on the lever while it is held in said position, the biasing of the latch being such that it will overcome the friction between the latch and lever when the pressure of the valve spring on the lever is relieved.

4. In an automatic filling nozzle for insertion into a container to be filled with liquid, said nozzle having a valve body with a liquid passage therein, and a valve in said body to control the flow of liquid through said passage, the combination of a lever having a position for opening the valve, a friction latch for the lever to hold it in said position and a spring for the latch tending to release the same, automatic means for closing the valve while the lever is held in said position when the level of liquid in the container reaches a predetermined point above the end of the nozzle, the pressure of the latch spring being sufficient to overcome the friction between latch and lever on abnormal jarring of the nozzle.

5. In an automatic filling nozzle for insertion into a container to be filled with liquid, said nozzle having a valve body with a liquid passage therein, and a valve in said body to control the flow of liquid through said passage, the combination of a lever having a position for opening the valve, a friction latch for the lever biased to release position, automatic means for closing the valve while the lever is held in said position when the level of liquid in the container reaches a predetermined point above the end of the nozzle, the biasing of the latch being such that it will overcome the friction between the latch and lever on abnormal jarring of the nozzle.

CLARENCE PAUL GRAVELLE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,543,827	Doty	June 30, 1925
2,320,033	Davis	May 25, 1943
2,367,138	Payne	Jan. 9, 1945
2,410,105	Remus	Oct. 29, 1946