

July 5, 1966

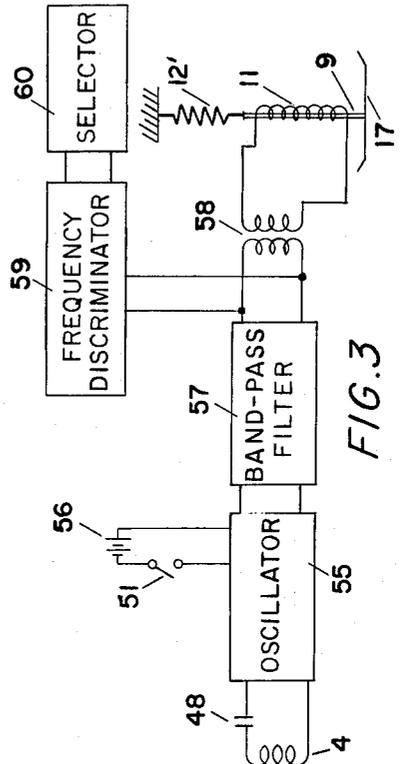
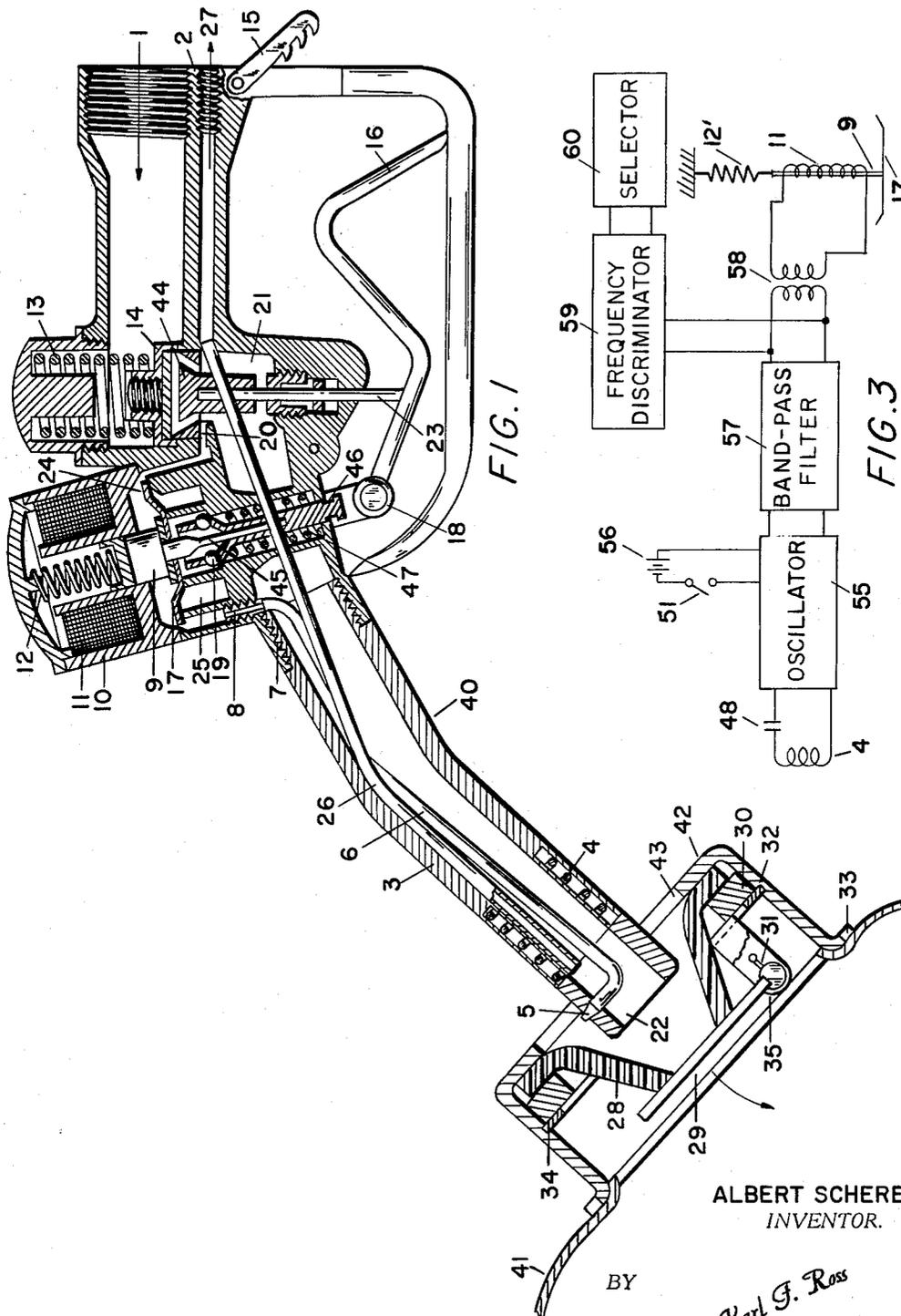
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APPARATUS FOR DISPENSING A FLUID

Filed July 19, 1965

2 Sheets-Sheet 1



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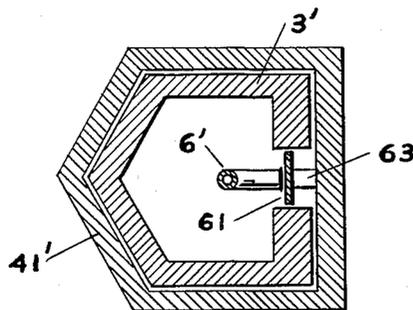
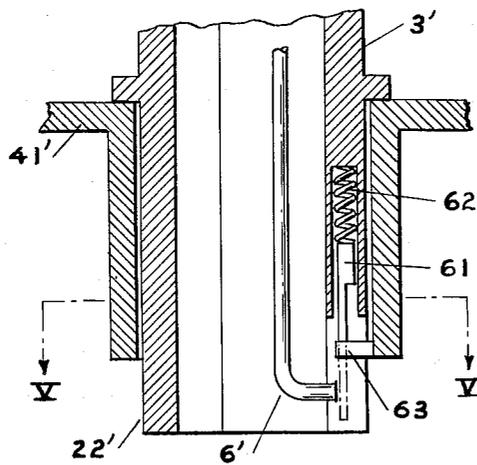
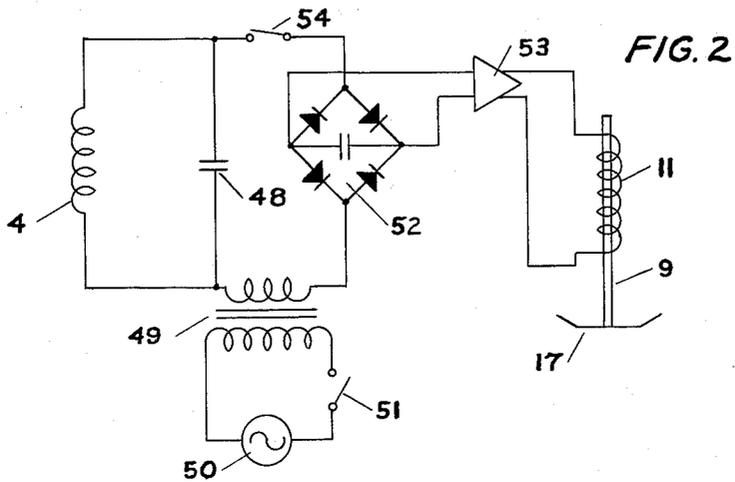


FIG. 4

FIG. 5

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1

3,259,154

APPARATUS FOR DISPENSING A FLUID

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Filed July 19, 1965, Ser. No. 473,039

4 Claims. (Cl. 141-209)

My present invention relates to an apparatus for the dispensing of fluids, especially flammable fluids such as liquid fuel (e.g. gasoline) for automotive vehicles.

Fuel pumps installed in conventional service stations are often equipped with means insuring automatic cutoff of fuel delivery to the entrance port of the fuel tank of an automotive vehicle as soon as the liquid in that tank has reached a certain level, generally near the top of the gooseneck into which the filling nozzle of the pump is inserted. Frequently, the dispenser is so designed that the cutoff occurs only when its operating handle is positioned for automatic filling, this handle being thus manipulable by the operator to continue fuel delivery even after the aforementioned level has been reached. Always, however, the delivery-blocking mechanism is ineffectual when the nozzle is withdrawn from the tank so that gasoline, diesel oil or other fuel can be spilled by a careless handling of the dispenser, the result being not only a waste of valuable liquid but also a considerable fire hazard.

It is, therefore, the general object of my present invention to provide means in such installations for positively preventing the untimely delivery of fuel or other liquid, i.e. permitting such delivery only when the dispensing nozzle is properly positioned in the entrance port of a receptacle therefor.

An ancillary object of my invention is to provide means for restricting the delivery of fuel or other liquids to specific consumers, with the dispensing mechanism inoperative (or operable only in a certain manner) in the case of other potential customers.

Although my invention is applicable to all types of fluid dispensers, its greatest utility lies in the field of flammable liquids, more specifically automotive fuels. It is therefore with reference to dispensers for such fuels that the invention will be described hereinafter.

According to an important feature of my invention, I provide two co-operating control elements on the discharge end of a dispensing nozzle and at the entrance port of a fuel tank designed to receive such nozzle, the two elements cooperating to deactivate a delivery-blocking means in the valve housing of the dispenser as soon as the nozzle and the entrance port of the tank have been placed in an operative relationship. The two co-operating elements may include a variety of devices known per se, e.g. of a mechanical, electromagnetic or photoelectric nature, an advantageous embodiment comprising an electromagnetic coil on the nozzle and a ferromagnetic armature therefor at the gooseneck of the tank. The co-operating element on the tank need not be a permanent fixture but could be carried on a separate attachment which may be given out only to special patrons of a service station, e.g. to charge-account customers of the station or of the company concerned. It is also possible to utilize this feature for the purpose of identifying the particular customer in a register of the service station (or of an associated central office) so that the purchase will be charged to his account, as disclosed in my copending application Ser. No. 147,384, filed October 9, 1961.

According to another feature of my invention, the test aperture of an air tube forming part of a conventional automatic-cutoff mechanism may be used as part of the means for preventing untimely discharge of liquid from the nozzle, the nozzle-borne control element serving in that case to obstruct this test aperture until moved into

2

a nonobstructing position by the co-operating element on the tank.

The invention will be described hereinafter in greater detail, reference being made to the accompanying drawing in which:

FIG. 1 is a sectional elevational view of a fuel dispenser of a service station and part of a vehicular fuel tank co-operating therewith, the system incorporating features of my invention;

FIG. 2 is a circuit diagram relating to the system of FIG. 1;

FIG. 3 is a view similar to FIG. 2, showing a modified circuit diagram;

FIG. 4 is a fragmentary sectional view of the discharge end of a modified dispensing nozzle according to the invention; and

FIG. 5 is a cross-sectional view taken on the line V-V of FIG. 4.

The system shown in FIG. 1 comprises a fuel dispenser 40 shown in the process of being introduced into the entrance port of an automotive fuel tank 41 having a cap 42 detachably mounted thereon. Dispenser 40 comprises a valve housing 2 with an inlet 1 for gasoline or other liquid fuel arriving from a conventional delivery pump (not shown). A nozzle 3, rigidly connected at 7 with housing 2, has a discharge end 22 adapted to be inserted into a central opening 43 of cap 42. Just above the end 22, nozzle 3 carries an electromagnetic coil 4 in its tubular wall. The open end 5 of an air tube 6, serving as a test aperture, is located within the insertion end 22 of the nozzle. The other end 8 of tube 6 opens into a vacuum chamber 24 whose lower wall is formed by a pressure-responsive member or piston 17 having the shape of a diaphragm. Chamber 24 communicates with a passage 20 which leads to a space 21 in the region of a valve seat 14 normally engaged by a valve body 44 under pressure of a spring 13.

Diaphragm 17 is fixedly secured to a ferromagnetic core 9 of a coil 11 of a solenoid 10; a spring 12 bears downwardly upon core 9 which has an extension 45 slidably received in a stem 46 biased upwardly by a surrounding coil spring 47. The lower end of stem 46 is articulated at 18 to a manual control lever 16 whose free end is engagable by a catch 15 in different operating positions in which the valve body 44 is maintained spaced from its seat 14, to a greater or less extent, against the force of its biasing spring 13. A vented space 25 is overlain by the diaphragm 17.

The extension 45 of solenoid core 9 has a tapering neck portion in contact with a set of ball-shaped detents 19 lodged in the top of stem 46. In the normal position of core 9, i.e. when the latter is held depressed by the spring 12, the balls 19 are cammed outwardly so as to hold the stem 46 in a raised position. Under these circumstances, upon a counterclockwise swing of lever 16 into an operated position, valve 44 is opened through the intermediary of a rod 23 and fluid is free to stream from inlet 1 to outlet 22, the suction created in passage 20 being ineffectual to produce a partial vacuum in chamber 24 on account of the communication of that chamber with the atmosphere via tube 6. When, however, the open end 5 of tube 6 is obstructed by surrounding liquid, the reduced pressure in chamber 24 raises the diaphragm 17 and, with it, the tapering pin 45 so that the balls 19 are free to move inwardly and the pressure of spring 13, acting upon handle 16 through rod 23, displaces the handle 16 with lowering of its pivot 18 and of stem 46 (against the countervailing pressure of the weaker spring) 47) so that valve body 44 re-engages its seat 14 and the flow of fluid through nozzle 3 is stopped.

Vapors developing in tank 41 may escape through a pipe 26 adapted to be connected at 27 to a venting pipe not shown.

To the extent so far described, except for the provision of coil 4 and solenoid 10, the system is substantially conventional.

Cap 42, attached to the outer surface of tank 41 by a suitable bayonet coupling 33, comprises a housing 32 internally provided with a resilient funnel-shaped packing 28, the mouth of the funnel being normally closed by a swingable lid 29 which is mounted on a bifurcate boss 35 and is biased into closed position by a spring 31. A ferromagnetic ring 30 surrounds the packing 28 and is held in place by a mounting ring 34. As will be readily apparent, introduction of the end 22 of nozzle 3 into the tank 41 via attachment 42 will have the effect of removing the lid 29 from the mouth of funnel 28, thereby allowing the test aperture 5 to enter the gooseneck of the tank, and of positioning the coil 4 within the ferromagnetic ring 30 acting as an armature therefor. Coil 4 is operatively connected with the winding 11 of solenoid 10 in a manner which will now be described with reference to FIG. 2.

As illustrated in FIG. 2, coil 4 is part of an oscillatory circuit also including a condenser 48, this circuit being energizable via a transformer 49 from a source of alternating current indicated diagrammatically at 50. A switch 51, e.g. the conventional pump switch which starts the operation of the fuel pump as soon as the dispenser 40 is lifted off its support, is in series with source 50 so that transformer 49 is energized only when the system is ready to deliver fuel. A rectifier 52, bridged across the oscillatory circuit, is connected across the input of an amplifier 53 whose output feeds the solenoid coil 11. A further switch 54 enables the open-circuiting of the input of amplifier 53 when it is desired to deactivate the protective system illustrated in FIG. 2. When the dispenser is taken off its hook so that switch 51 is closed, and with switch 54 also closed as shown, current from the secondary winding of transformer 49 readily passes through the parallel-resonant circuit 4, 48 which under these circumstances has a very low impedance so that the output of rectifier 52 will be large. Solenoid coil 11 will thus be energized and attract its core 9 together with diaphragm 17 and pin 45, with the result that any attempt to open the valve 44 by a raising of handle 16 will be unsuccessful inasmuch as pivot 18 will move downwardly together with stem 46 whose detents 19 have been rendered inoperative. As soon as the nozzle 3 has been introduced into the cap 42, however, the impedance of coil 4 is altered by the proximity of armature 30 to such an extent that circuit 4, 48 is substantially tuned to the frequency of source 50, thereby cutting off the current flow through coil 11 and allowing the dispenser to be operated in the usual manner. Naturally, cutoff will occur as soon as aperture 5 is obstructed by the liquid in the gooseneck of tank 41. If the nozzle 3 is thereafter withdrawn, no amount of manipulation of handle 16 will let further liquid pass through the dispenser.

Circumstances may arise which make it necessary to dispense fuel even when the circuit 4, 48 is not tuned by the proximity of an armature 30. The attendant can do so by opening the switch 54, which may be controlled by a special key. Thus, the attachment 42 with its magnetic armature 30 may be mounted only on the cars of special customers entitled to serve themselves, other customers being required to call upon the services of the attendant. If, on the other hand, no discrimination between customers is intended and the system is to be used merely for the prevention of spillage and the elimination of a fire hazard, coil 4 could be so designed as to be tunable by some ferromagnetic element invariably present at the entrance port of the fuel tank of any vehicle, e.g. by the metallic gooseneck itself.

In FIG. 3 I have shown the coil 4 together with its condenser 48 as constituting the tank circuit of an oscillator 55 energizable via pump switch 51 from a source 56 of direct current. Oscillator 55 works into a band-pass filter 57 whose output is delivered via a transformer 58 to solenoid coil 11. A frequency discriminator 59 in parallel with transformer 58 operates a selector 60 which, in the manner disclosed in my aforementioned copending application Ser. No. 147,384, actuates one of several registers individually assigned to particular charge-account customers. In this instance, the armatures 30 of different customers are of different size and/or configuration so that the oscillator 55 will be tuned to different frequencies, all within the pass band of filter 57, when the nozzle 3 (FIG. 1) is inserted into the tank. The particular frequency characterizing a respective customer is then detected by discriminator 59 and triggers the selector 60. In this instance, solenoid core 9 is assumed to be normally biased into a raised position by means of a tension spring 12', replacing the compression spring 12 of FIG. 1, and to be lowered upon the passing of current through transformer 58 to permit filling of a tank in the aforescribed manner; the force of coil 11 is, however, less than the combined strength of spring 11' and the partial vacuum in chamber 24 when the aperture 5 is blocked. If the coil 4 of the nozzle is not juxtaposed with an armature 30 (FIG. 1), oscillator 55 will produce no output capable of traversing the band-pass filter 57 so that the dispenser will be inoperative.

In FIGS. 4 and 5 I have illustrated a modified system wherein the cutoff mechanism of a dispenser is controlled by mechanical rather than electrical means. Nozzle 3', received in the gooseneck of a tank 41', has a shutter 61 normally obstructing the open end of air tube 6' under pressure of a spring 62. A lug 63 on the gooseneck of tank 41' raises the shutter 61, against the force of spring 62, with reference to the nozzle 3' upon the insertion thereof into the entrance port of the tank. As best seen in FIG. 5, this entrance port as well as the nozzle 3' may be given a peculiar configuration so that, as in the system of FIG. 1, only specially equipped tanks may be served by this dispenser. Thus, the discharge end 22' of the nozzle acts in effect as a key fitting into a correspondingly shaped hole, i.e. the port of tank 41'.

Various modifications of the system described and illustrated, notably with reference to the specific control elements disclosed, are possible without departing from the spirit and scope of my invention as defined in the appended claims.

I claim:

1. A fuel-dispensing apparatus for automotive vehicles, comprising a valve housing provided with inlet means for liquid fuel to be dispensed, a fuel-discharge nozzle on said housing insertable into a tank of an automotive vehicle to be powered by said fuel, valve means in said housing normally blocking the passage of fuel from said inlet means to said nozzle, manual operating means for displacing said valve means into an unblocking position whereby said fuel is allowed to flow into said nozzle for discharge therefrom, and control means for disabling said operating means in the absence of an operative relationship between said nozzle and an entrance port of said tank, said control means including a first element on said nozzle and a co-operating second element on said entrance port, said housing containing a vacuum chamber communicating with said inlet means in the unblocking position of said valve means for the creation of suction in said chamber and means including a pressure-responsive element in said chamber for restoring said valve means to blocking position independently of said manual operating means upon a drop in the pressure of said chamber below atmospheric level, said chamber being provided with an air tube extending therefrom within said nozzle and having a test aperture at the insertion end of said nozzle normally connecting said cham-

5

ber with the atmosphere whereby said pressure-responsive element is rendered effective to block the passage of fuel upon the liquid level in said tank reaching said test aperture, said first element normally obstructing said test aperture and being displaceable by said second element into a nonobstructing position upon insertion of said nozzle into said entrance port.

2. An apparatus as defined in claim 1 wherein said tank is provided with a removable attachment at said entrance port, said second element being mounted on said attachment.

3. An apparatus as defined in claim 1 wherein said first element comprises an electromagnetic coil and said

6

second element includes a ferromagnetic armature for said coil.

4. An apparatus as defined in claim 3 wherein said ferromagnetic armature has the shape of a ring surrounding said entrance port.

References Cited by the Examiner

UNITED STATES PATENTS

3,148,713 9/1964 Jones ----- 141-346

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