Oct. 29, 1957 W. ZAUGG ET AL 2,811,180

AUTOMATIC CLOSURE MEANS FOR TANK FILLING LINE

Filed June 23, 1955 3 Sheets-Sheet 1

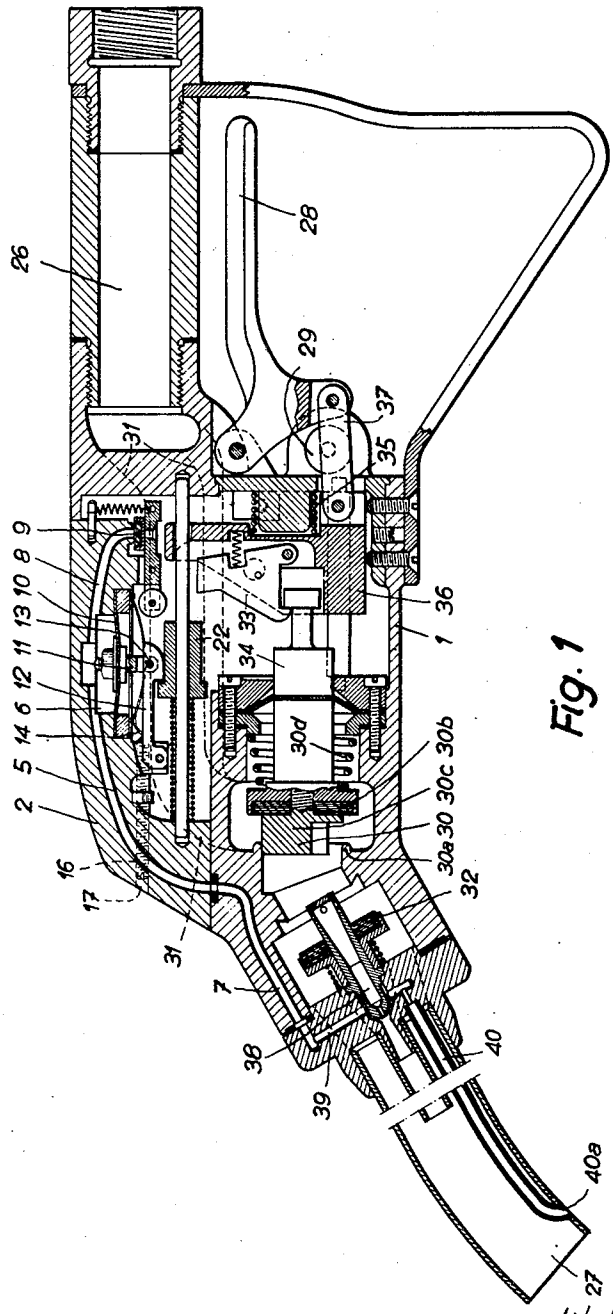

Fig. 1

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AUTOMATIC CLOSURE MEANS FOR TANK FILLING LINE

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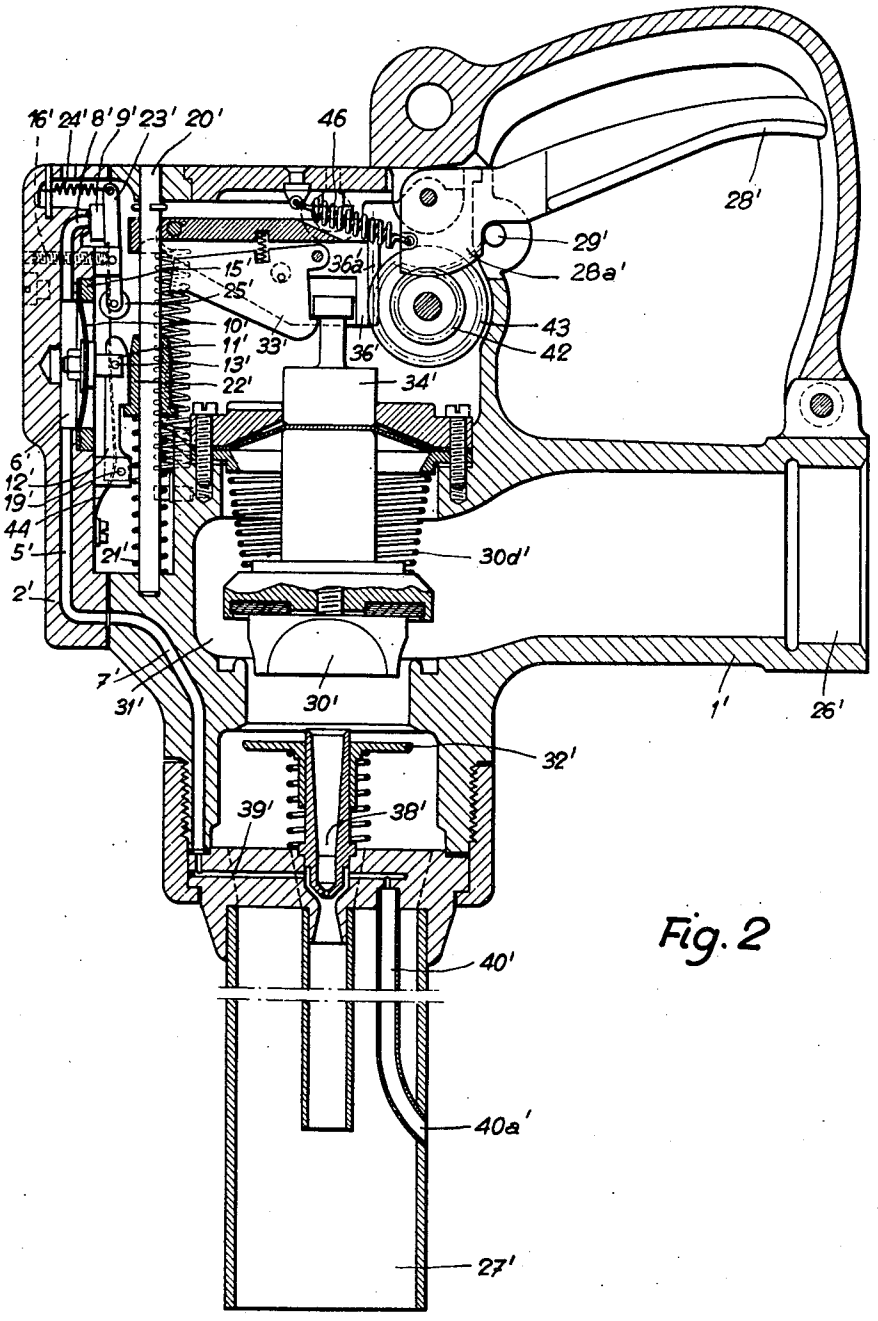

Fig. 2

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AUTOMATIC CLOSURE MEANS FOR TANK FILLING LINE

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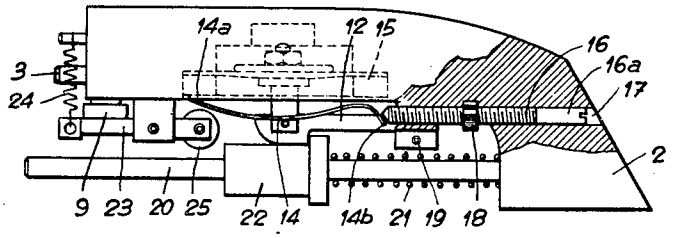

Fig. 3

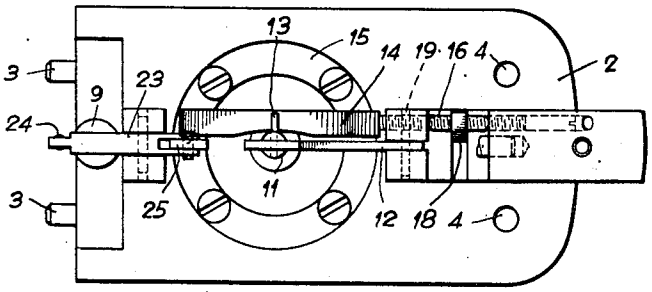

Fig. 4

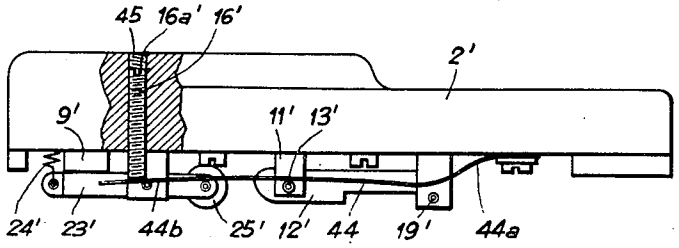

Fig. 5

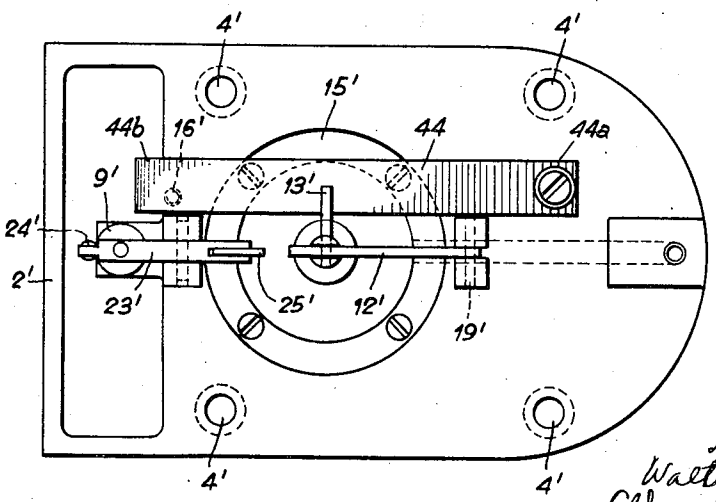

Fig. 6

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AUTOMATIC CLOSURE MEANS FOR TANK FILLING LINE

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Application June 23, 1955, Serial No. 517,628

Claims priority, application Switzerland June 26, 1954

2 Claims. (Cl. 141—209)

This invention relates to means for automatically closing the filling line of tanks and in particular to cocks as described in the U. S. Patent No. 2,402,036.

Such cocks comprise an airline the free end of which projects into the tank. When a liquid flows through the filling line, an air current is produced in the airline, and it acts on a spring-loaded membrane which operates a shut-off valve, when the free end of the airline is closed by the rising liquid level. When utilizing such known cocks in gasoline stations, troubles and disorders often arose. Investigations and tests have shown that the trouble resulted from an improper resiliency of the spring bearing on the membrane. Tests with a view to overcome such insufficiency by exchanging the springs, met with no permanent success, since it was soon found that the spring tension has to be in a certain relation to the subpressure or to the liquid pressure which produces the latter, and to the flow velocity. If it were desired to merely exchange the compression spring usually disposed on the subpressure-side of the membrane by a spring of variable resiliency, various construction possibilities would be available. The adjusting means could be mounted on the outside of the cock, but intricate sealing problems would have to be solved, thus rendering the cock more expensive. The adjusting means could also be arranged near the spring within the cock, but in order to adjust them the cock would have to be disassembled first every time.

It is therefore an object of the invention to eliminate these inconveniences and shortcomings by disposing the membrane-loading spring on the side of the membrane which is exposed to the atmospheric pressure, and by making the spring tension adjustable from the outside.

Further objects of the invention will appear in the course of the following description.

Two gasoline cocks for automobile gasoline stations and for airplane gasoline stations respectively embodying the invention are shown diagrammatically and by way of example in the drawings annexed to this specification and forming a part thereof. In the drawings:

Figs. 1 and 2 are longitudinal sections of the two cocks;

Figs. 3 and 4 show the cover of the first cocks in side view, partly in section, and bottom plan view respectively, and

Figs. 5 and 6 show the cover of the second cock in side view partly in section, and bottom plan view, respectively.

Figs. 1, 3 and 4 depict the cock for automobile gas stations, comprising a main body **1** and a cover **2**, interconnected by pins **3** and screws engaged in holes **4**. In cover **2** are disposed an airduct **5** which interconnects a chamber **6** to an airduct **7** of main body **1**, and an airduct **8** of which one end also opens into chamber **6** and of which the other end is normally closed by a spring-loaded member **9**. Chamber **6** is sealed at its bottom by a membrane **10** to which, through a pin **11**, screw-connected thereto, is pivoted a pawl **12**. A pin **13** interconnecting these two parts is pushed downwardly by a leaf spring **14** of which one end **14***a* (Fig. 3) bears in a recess in which the membrane **10** is secured by an expansion ring, while its other end **14***b* is bent downwardly and bears on the inner end of a set screw **16**. The set screw is loosely disposed in a bore **17**, being secured therein by a slotted hexagonal nut **18** (Fig. 3). Set screw **16** has a slotted head or outer end **16***a* which is protected in said bore from unintentional contact, but is readily accessible by a screw driver. By turning screw **16**, the tension of spring **14** may be varied. Pawl **12** is pivoted on a pin **19** and locates an impact cylinder **22** which is movable on an axle pin **20** and loaded by a spring **21**. Member **9** which closes duct **8**, is secured to an arm **23** of which one end is pulled into the closing position by a spring **24**, while its other end carries a roller **25** for opening duct **8** by engagement with cylinder **22**.

Main body **1** on the outside comprises an inflow port **26** (Fig. 1), a nozzle **27** and a handlever **28**. The latter is securable in the open position shown by means of a spring-loaded set pin **29** so that gasoline entering through **26** may flow through a duct **31**, a shut-off valve **30** and a safety valve **32** into nozzle **27**. Valve **30** comprises a seat **30***a*, a valve body **30***b* and a guide member **30***c*. Valve body **30***b* through a spring **30***d* is pressed against the valve seat, but is held in the open position by a pawl **33** which retains a pin **34** fixed to valve body **30***b*. Pawl **33** is pivoted to a sliding member **36** which is loaded by a spring **35** and connected to hand lever **28** through a link **37**. Between valve **32** and nozzle **27** is disposed a jet pump **38** from which the suction line **39** communicates with airduct **5** and an airline **40**. Safety valve **32** prevents any gasoline in the hose (not shown), between inflow **26** and a meter disposed in the gasoline column, from running out when opening valve **30**, without pumping fresh gasoline through said meter. The inflow apertures of jet pump **38** are so arranged that, when opening safety valve **32**, gasoline first flows through said apertures before valve **32** opens so far as to adapt the cross-section to the mass flow. The free end **40***a* of air line **40** is situated close to nozzle **27** so as to project as far into the tank to be filled as to lie below the liquid level of the full tank, so that said end is closed by the liquid.

In Fig. 1, the cock is opened and its handlever **28** is locked by set pin **29**. When gasoline starts to flow through port **26**, duct **31**, valves **30** and **32** and nozzle **27**, a sucking air current is produced in line **40** by jet pump **38**. When the gasoline level in the tank rises up to mouth **40***a* of air line **40**, the latter is shut off and a subpressure is produced in the interconnected lines **40** and **5** and in chamber **6**, as that membrane **10** is sucked into the latter against the action of spring **14**. As membrane **10** through pin **11** is connected to pawl **12**, the latter is raised also and cylinder **22** may snap to the right (Fig. 1). Said cylinder rocks arm **23** so that air flows through duct **8** into chamber **6** in order to prevent aspiration of gasoline by said subpressure. Cylinder **22** also rocks pawl **33** so as to release pin **34** and close shut-off valve **30** by spring **30***d*.

When manually moving set pin **29**, spring **35** pushes slide member **36** to the left (Fig. 1) so that handlever **28** which is connected to the latter through link **37**, is swung downwardly. Cylinder **22** follows pawl **33** until it is retained by pawl **12**. Pawl **33** returns into its initial position, and the cock is again ready for operation. When swinging lever **28** upwardly, pawl **33** is engaged to pin **34**, the valve is opened and gasoline flows through again.

The subpressure produced by jet pump **38** depends on the gasoline flow velocity, and the latter on the available pressure and the state and condition of the feed lines.

With the aid of set screw **16**, the spring tension may

be adapted to the operating conditions of the filling station, for which purpose only a screw driver is required.

Fig. 2 illustrates a cock as used by airplane filling stations, and the associated cover is shown on a larger scale in Figs. 5 and 6. The parts and portions of this cock which are similar to those of the first example, have the same reference numerals which, however, are primed. In a constructional respect, there are two differences between the two cocks. While in the cock of Fig. 1 handlever **28** is connected to sliding member **36** through link **37**, handlever **28'** of the second cock comprises a tooth segment **28***a'* which meshes with a gear wheel **42**. The latter is integral with a gear wheel **43** which meshes with a rack **36***a'* which forms part of sliding member **36'**. In place of spring **35**, a spring **46** is provided. The second constructional difference between the two cocks shown is the use of a spring **44** (Figs. 5 and 6), which is fixed at its end **44***a* in place of spring **14**. The other end **44***b* of the spring bears on screw **16'** the axis of which is at right angles to the spring axis. The set screw itself is disposed in a threaded hole **45**. This second cock operates in a similar manner as the first described above.

It is to be understood that the forms of this invention, herewith shown and described are to be taken as preferred examples of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention, or the scope of the subjoined claims.

We claim:

1. In a tank filling apparatus for liquids, a casing, a liquid discharge pipe connected to the casing, fluid passage means in the casing for the flow of fluid to the discharge pipe, fluid valve means for controlling the flow of the fluid, manually operable means for opening said fluid valve means, a jet pump in said fluid passage means and including an air intake carried by the discharge pipe and adapted to be closed by the liquid when the tank is filled, said casing having a chamber connected by air conduit means to the air intake, a diaphragm forming one wall of said chamber and hermetically sealing the chamber, spring means positioned externally of the chamber and connected to the diaphragm for urging it outwardly of the chamber, means operable by the diaphragm, upon inward movement thereof when a predetermined pressure is present within the chamber upon closing of the air intake by the liquid in the tank, for automatically closing the fluid valve means, adjusting means supporting one end of the spring means and positioned in said casing outside of the chamber for adjusting the tension of the spring means from the outside of the casing, said casing being formed with means housing said adjusting means against accidental movement and adapted to accommodate a tool to actuate the adjusting means.

2. A tank filling apparatus as claimed in claim 1, wherein said last means includes a bore in the casing extending below the diaphragm and said adjusting means includes a rotatable screw housed in the bore and movable axially therein and against the inner end of which one end of the spring bears, said spring being a leaf spring and said screw having an outer end disposed a certain distance within the bore from the outside of the casing and said outer end being formed with means to accommodate a tool insertable in the bore to engage and rotate the screw.

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