Jan. 8, 1952 S. B. GOLDMAN ET AL 2,582,028

LIGHTER

Filed March 16, 1950 2 SHEETS—SHEET 1

Fig. 1.

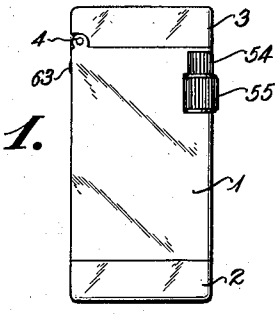


Fig. 2.

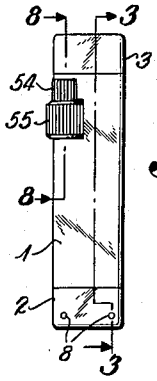


Fig. 3.

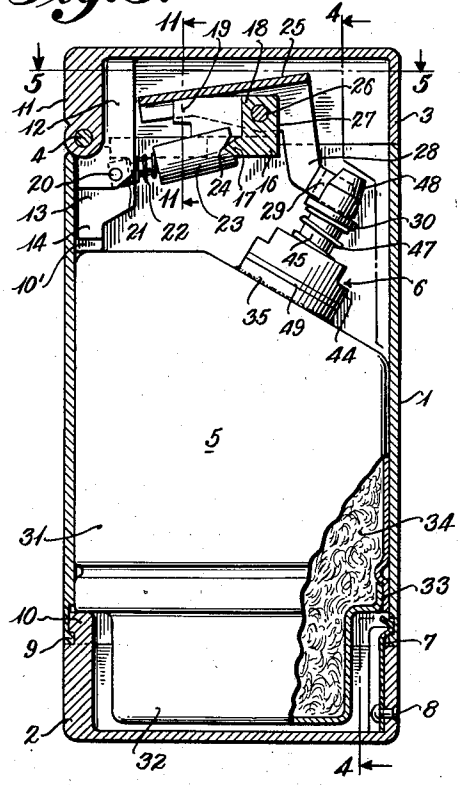


Fig. 4.

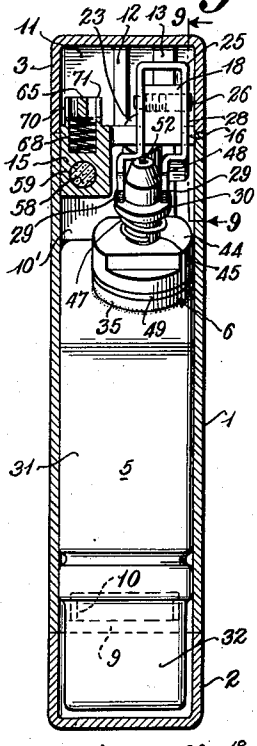


Fig. 5.

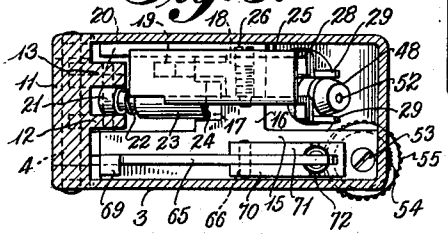
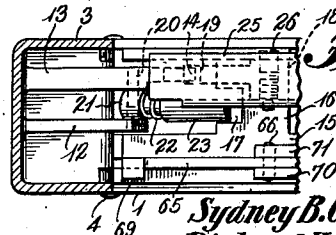


Fig. 6.



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Jan. 8, 1952 S. B. GOLDMAN ET AL 2,582,028

LIGHTER

Filed March 16, 1950 2 SHEETS—SHEET 2

Fig. 7.

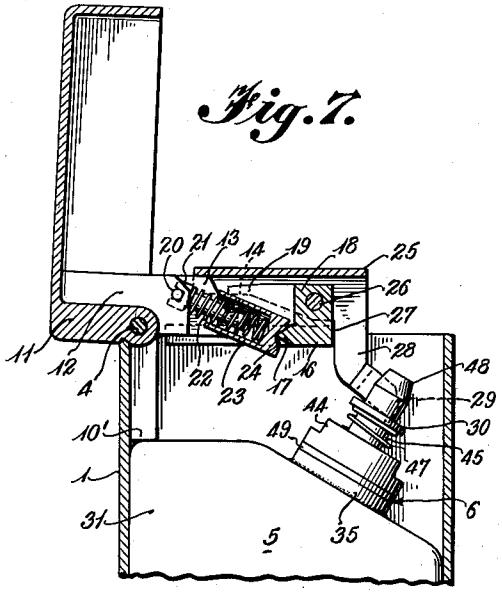


Fig. 8.

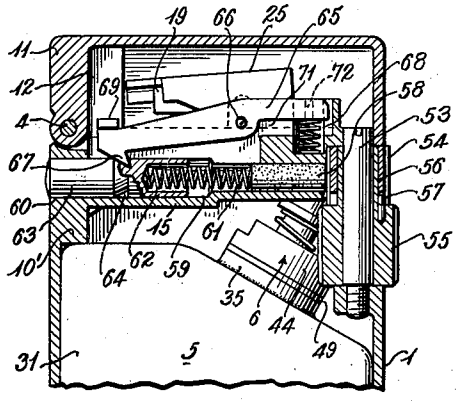


Fig. 9.

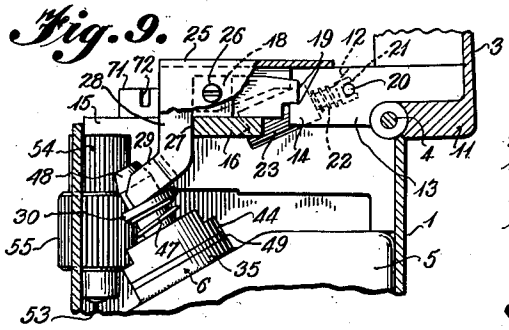


Fig. 10.

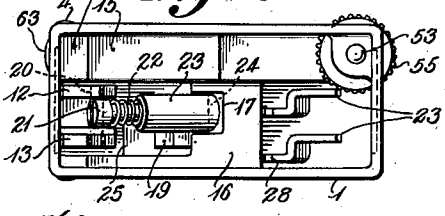


Fig. 11.

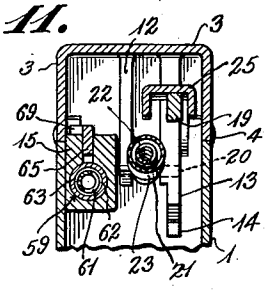


Fig. 12.

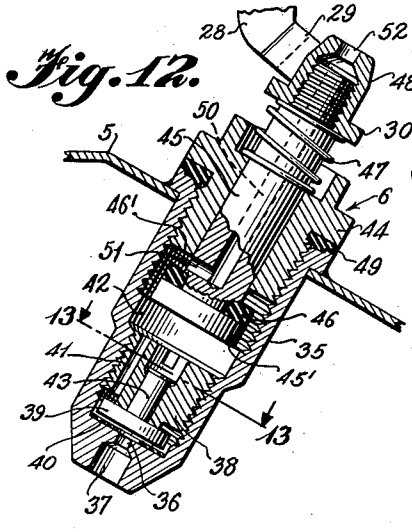
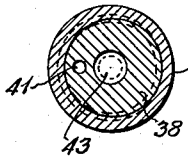


Fig. 13.



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Patented Jan. 8, 1952

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UNITED STATES PATENT OFFICE

2,582,028

LIGHTER

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Application March 16, 1950, Serial No. 150,022

4 Claims. (Cl. 67—7.1)

1

This application is a continuation-in-part of our earlier copending application Serial No. 143,506, filed February 10, 1950, now abandoned.

Our invention relates to lighters, and more particularly has reference to gas burning cigarette and cigar lighters, that is, portable lighters of the kind that operate on a normally gaseous hydrocarbon fuel, such as butane, in contradistinction to the customary liquid fuel burning lighters.

It has heretofore been proposed to fuel portable cigarette lighters with a liquefied gas carried in a closed container adapted to be inserted into and removed from the lighter case or housing. However, such devices are of rather complicated construction, quite expensive to manufacture and somewhat cumbersome in operation or use.

It is the principal object of the present invention to provide a gas fired lighter of the character indicated which is simpler in construction, cheaper in manufacture and easier to operate than the gaseous fuel burning lighters of the prior art.

A further object of our invention is to provide a gas fired lighter having a replaceable sealed cartridge for liquefied fuel gas which is automatically released from the cartridge by the opening of the cover of the lighter case.

A more specific object of the invention is to provide the sealed cartridge of the gas lighter with a burner and valve assembly normally preventing the escape of fuel from the cartridge but which is actuated by the opening movement of the cover of the lighter case to permit the release of fuel in gaseous form, the discharge of fuel from the cartridge being cut off immediately and automatically upon closing of the cover of the case. In this way, there is no escape or leakage of fuel from the cartridge when the cover is closed, while fuel is available for ignition and burning immediately upon opening of the cover. Also, the fuel release valve being actuated by the cover, no independent or other operation is required to supply fuel to the burner nozzle and to cut off the fuel supply thereto.

Still another object of the invention resides in the provision of a lighter having novel means permitting easy and rapid replacement of the customary pyrophoric flint for generating the ignition spark.

Other objects and advantages of the invention will appear from the more detailed description thereof in connection with the accompanying drawings, wherein:

2

Figures 1 and 2 are front and side elevational views, respectively, of the lighter in closed position;

Figure 3 is a vertical sectional view on the line 3—3 of Figure 2;

Figure 4 is a vertical transverse section on the line 4—4 of Figure 3;

Figure 5 is a horizontal section on the line 5—5 of Figure 3;

Figure 6 is a fragmentary horizontal section similar to Figure 5 but with the cover of the lighter case in open position;

Figure 7 is a fragmentary vertical section similar to Figure 3 but with the cover in open position;

Figure 8 is a fragmentary vertical section on the line 8—8 of Figure 2 and showing the ignition and flint release mechanism;

Figure 9 is a vertical section on the line 9—9 of Figure 4 but with the lighter cover in opened or raised position;

Figure 10 is a bottom plan view of the lighter case with the fuel cartridge removed;

Figure 11 is a detail section on the line 11—11 of Figure 3;

Figure 12 is a detail section of the valve and burner assembly for the fuel cartridge showing the gas release valve in open position; and

Figure 13 is a detail section on the line 13—13 of Figure 12.

Referring more particularly to the drawings, the improved lighter of our invention comprises an outer case or housing 1 having a removable bottom closure 2 and a cover or lid 3 which is hinged to case 1 by the hinge pin 4. Within case 1 is a cartridge or magazine 5 for a liquefied normally gaseous hydrocarbon fuel such as butane. Fuel cartridge 5 is provided at its upper portion with a valve and burner assembly indicated generally at 6. The fuel cartridge with its associated valve and burner assembly is insertable to and removable from case 1 upon removal of bottom closure member 2.

Bottom closure 2 is firmly held to the lower portion of case 1 by means of a flat hook spring 7, secured to a side of bottom 2 by rivets 8, and by a tongue and groove connection 9 on the opposite side of the lighter (Figure 3). Solid section 10 of the side wall of closure 2 holds the lower end of cartridge 5 in place when the bottom closure has been secured to the lower end of case 1, while shoulder 10' integral with the interior top portion of the case (Figure 8) acts as a stop for the upper end of the cartridge. The easy removability of bottom closure 2 renders it a

simple matter to insert and replace the fuel cartridge 5 in the lighter case.

Integral with the interior of the hinged side wall 11 of cover 3 are a pair of arms or extensions 12 and 13. The arm 13 is slightly longer than the arm 12 and has a reduced end portion or extension 14 for a purpose hereinafter described.

Integral with or attached to the top of the case on an inner side thereof is a flint housing 15 having an integral bridge piece 16 extending therefrom to and supported on the opposite side of the case. Bridge 16 has a V-shaped projection 17 (Figures 3 and 7) and extending upwardly from the bridge is an integral bearing support 18 having an integral and laterally extending stop member 19 having a reduced end portion corresponding to extension 14 of arm 13, the top of member 19 being slightly inclined toward its reduced end portion.

The interior of cover 3 carries a pin 20 which is pressed into and extends between the arms 12 and 13. A slotted spring pin 21 engages pin 20 and carries a compression spring 22 housed in a sleeve 23. The sleeve or housing 23 has a V-shaped notch 24 in its end portion resting firmly against the V-shaped projection 17 of bridge member 16 (Figures 3 and 7). The parts just described constitute a snap-action spring operating in customary fashion during the opening and closing movements of hinged cover 3.

From the structure thus far described, it will be seen that when cover 3 is opened or closed, eccentric pin 20 travels circularly around hinge pin 4, compressing spring 22 until pin 20 is in line with hinge pin 4 and the stationary V-rest 17 on bridge member 16. When pin 20 passes this center line, spring 22 expands and forces cover 3 to its fully opened or fully closed position, whereby the cover is held in the opened or closed position by the pressure of spring 22. In the closed position, the rim of cover 3 acts as a stop and seats itself tightly against the upper edges of case 1. Also, as the cover is opened, extension 14 of arm 13 engages the correspondingly shaped member 19, the elements 14 and 19 acting as a stop for the cover in fully opened position, as best shown in Figures 7 and 9. By reason of this stop action, no undue pressure is exerted upon the hinged joint of case 1 and cover 3.

A valve actuating lever 25 is pivotally mounted on member 18 by means of pivot pin or bearing stud 26 extending through member 18 and around which the lever pivots. The pivotal motion of lever 25 is limited in one direction by the inclined top edge of stop member 19 and in the opposite direction by the vertical edge 27 of bridge piece 16 which is contacted by the downwardly extending arm 28 of lever 25. Prongs 29, 29 project outwardly and downwardly from arm 28 of the valve lever into proximity with shoulder or flange 30 of the valve and burner assembly 6.

As hereinafter described, the construction of assembly 6 is such that the gas release valve is normally maintained closed by spring action but is opened by a downward pressure on flange 30 to discharge fuel from cartridge 5 at the burner nozzle. The gas release valve is opened during the operation of the lighter by the action of pivoted lever 25 which is in turn actuated by the opening movement of cover 3. Thus, when the hinged cover is opened, arm 13 integral therewith contacts and lifts the end of lever 25 opposite the downward extension 28 whereby the prongs 29, 29 exert the required downward pressure on shoulder 30 to open the gas release valve.

As illustrated in Figure 3, the fuel cartridge 5 is constructed of an upper section 31 and a lower section 32 which are soldered together at their contacting edges as shown at 33. The cartridge is tightly filled with cotton or other suitable material 34 to aid the retention of liquefied gas in the cartridge. The upper section 31 of the cartridge has an inclined top portion in which is mounted the valve and burner assembly 6, illustrated in detail in Figure 12 showing the gas release valve in open position.

Soldered into top section 31 of the cartridge is an internally threaded valve body 35 having a small orifice 36 and a larger opening 37 at its lower end. The purpose of the larger opening is to prevent clogging of orifice 36 by the cotton packing or absorbent material in the cartridge. Orifice 36 is adapted to be closed by a filler plug 38 threaded into valve body 35 and which, when screwed downwardly, forces filler seat 39 against filler washer 40, thereby closing the opening in the center of washer 40. Filler plug 38 is provided with an orifice or passageway 41 extending therethrough and communicating with vapor chamber 42 within the valve body. Filler seat 39 is held in plug 38 by its shank 43 which is peened over on its end to prevent it from falling out of the filler plug. Filler seat 39 turns freely in filler plug 38. The plug 38, seat 39 and washer 40 constitute the filler valve of the assembly.

The cartridge is filled with fuel at this stage of the assembly, that is, when the valve body 35 and its associated parts constituting the filler valve have been mounted in the cartridge and before the remaining gas release valve and burner parts are assembled. This filling operation is performed at a sufficiently low temperature to maintain the normally gaseous fuel in the liquid state. In the case of butane, the temperature should be below 0° C. or 32° F. The filling is accomplished by first backing out filler plug 38 approximately one-half turn, thereby opening the filler valve. The liquefied gas is now introduced to the cartridge through the opened filler valve which is then closed. The filled cartridge is now ready for the assembly line for insertion of the gas release valve and burner parts.

The parts now to be inserted into valve body 35 include threaded valve stem guide 44, valve stem 45 having a bottom flange 45', neoprene washer 46, valve spring 47 and valve head or burner nozzle 48 threaded onto the outer end of stem 45. Washer 46 seats against seat 46' of the assembly and is tightly held against the seat by the action of spring 47 in the normal or closed position of the valve. Before inserting the gas release valve assembly, a valve body gasket 49 is slipped over the threads of guide 44 and filler plug 38 slightly cracked open to permit the escape of gas through orifice 41 of plug 38. The gas release valve and burner assembly, constructed of parts 44, 45, 45', 46, 47 and 48, is then promptly screwed tightly into valve body 35. The cartridge by this time having attained atmospheric temperature, vaporized fuel now enters gas chamber 42 to be released therefrom when valve stem 45 is moved downwardly to unseat washer 46 from seat 46' as shown in Figure 12. A gas passageway or orifice 50 extends longitudinally within valve stem 45 and through valve head or burner nozzle 48. An orifice 51 extends laterally from the lower por-

tion of passageway 50 to the periphery of the valve stem. The burner nozzle and valve stem are normally forced upwardly by spring 47 so that passageways 50 and 51 are closed off from vapor chamber 42 by the engagement of washer 46 with its seat 46'.

As hereinbefore described, the gas release valve is actuated by the pivoted lever 25 and its associated prongs 29, 29, the valve lever being tilted by the opening movement of hinged cover 3 through the medium of arm 13 carried thereby. When the lever is thus tilted, prongs 29, 29 contact flange 30 of valve head 48 and force the latter downwardly against the action of spring 47, thereby sliding valve stem 45 in its guide 44 and unseating washer 46 from seat 46' to establish communication between chamber 42 and orifice 51, as shown in Figure 12. Gas is now free to escape from chamber 42 through passages 51 and 50 for ignition at burner port 52 of valve head 48. Upon closing of the cover 3 of the case and the resultant disengagement of arm 13 with the end of lever 25, spring 47, acting on flange 30 of the valve head, again forces the valve upwardly to seat washer 46 against seat 46' and close the communication between gas chamber 42 and orifice 51.

The gaseous fuel is ignited at burner nozzle 48 by a spark generated adjacent thereto in a conventional manner. A stud 53 is mounted in case 1 on the side thereof adjacent the gas release valve assembly (Figure 8). Rotating on this stud is a finger wheel 55 having a shank 56 on its upper end. Abrasive wheel 54 has a sliding fit over shank 56 of finger wheel 55. A pin 57 is pressed into wheel 55 and prevents the latter from turning on shank 56. Rotation of finger wheel 55 turns abrasive wheel 54 in contact with pyrophoric flint 58 to generate a spark adjacent burner nozzle 48, thereby igniting the gas escaping through burner port 52. In this igniter assembly, the flint wheel is easily replaced by removing stud 53 on which the finger wheel assembly is mounted. The flint wheel is then pulled off shank 56 of finger wheel 55, a new abrasive wheel substituted and the assembly replaced in the case. In making this replacement, the flint should first be removed so that no pressure is exerted upon the flint wheel by the flint and its associated spring.

From the foregoing, it will be seen that we have provided an easily operable and convenient mechanism for opening a normally closed gas discharge valve of the fuel cartridge by the opening movement of a hinged cover of the lighter case. Our invention further includes novel flint-releasing mechanism now to be described and best illustrated in Figure 8.

The flint housing 15 integral with the side of the case at the top thereof has a bore or passageway 59 extending longitudinally therethrough and communicating with a port 60 in the side wall of the case opposite flint wheel 54. This bore 59 houses flint 58 which is slidable therein. The flint is inserted into and removed from bore 59 through opening 60 in the case. A coil spring 61 is also slidably mounted in bore 59 and is adapted to force flint 58 against flint wheel 54. The opposite end of spring 61 is carried in and its first turn has a tight fit with a bore 62 in spring stud or pin 63 having an annular groove 64 intermediate its ends.

A flint release lever 65 is pivotally mounted at 66 on the top of housing 15. One end thereof (the left-hand end in Figure 8) terminates in a hook 67 normally passing through a slot in the top of housing 15 and fitting into annular groove 64 of spring stud 63. The opposite end of lever 65 is forced upwardly by coil spring 68 mounted in housing 15 whereby to hold hook 67 in annular groove 64. In this normal position of lever 65, pin 63 and its associated spring 61 are securely locked in passageway 59 of housing 15, with the spring forcing flint 58 against flint wheel 54. However, by exerting a slight pressure on the end of lever 65 over spring 68, hook 67 is displaced from groove 64 whereby stud 63 and the spring 61 secured thereto are ejected from bore 59 through opening 60 in the side wall of the case. The flint is now free to drop out of bore 59 and a new flint is inserted. Stud 63 with its associated spring 61 is then pushed into bore 59 whereupon it will be automatically locked in place by hook 67 of flint release lever 65. The latter is provided, at its hooked end, with a stop lip 69 which engages the top of flint housing 15 to limit the downward movement of hook 67 when stud 63 has been removed.

In order to prevent accidental release of spring stud 63, protecting bars 70 and 71 (Figures 4 and 5) are provided on opposite sides of flint release lever 65 between the pivot 66 and the end of the lever adjacent spring 68. These bars extend upwardly from flint housing 15 to approximately the height of the spring actuated end of the lever. They are slotted as shown at 72 (Figures 5 and 8) and the construction is such that lever 65 and its hooked end 67 can be released only by pressing a fingernail or knife edge into slots 72 to force the protected end of lever 65 downwardly against the action of spring 68.

It will thus be seen that our invention provides, in addition to and in combination with the improved valve actuating means, a novel mechanism and arrangement for permitting ready replacement of the pyrophoric flint in cigarette and cigar lighters. While we have shown only one form of mechanism for accomplishing the stated purposes, it will be obvious to those skilled in the art to which the invention relates that many modifications and variations can be made in details of construction and arrangement of parts without departing from the spirit and scope of the invention as defined in the appended claims.

Having described our invention, we claim:

1. In a lighter, the combination of a case adapted to receive a fuel cartridge having a discharge valve, said case comprising an open-ended body portion, a removable bottom closure for the lower end of said body portion and a cover having a side wall thereof hinged to said body portion and constructed and arranged to close the upper end of the body portion, a flint housing within and at one side of said body portion near the upper end thereof, a bridge piece extending from said housing to the opposite side of the body portion, a stop member extending upwardly from said bridge piece, a lever pivotally mounted on said stop member and constructed and arranged to open said valve when tilted, a snap-action spring for said cover having one end thereof supported by said bridge piece, and an arm carried by the hinged side wall of said cover constructed and arranged to tilt said lever and to engage said stop member.

2. In a lighter, the combination of a case adapted to receive a fuel cartridge having a discharge valve, said case comprising an open-ended body portion, a removable bottom closure

for the lower end of said body portion and a cover having a side wall thereof hinged to said body portion and constructed and arranged to close the upper end of the body portion, a flint housing within and at one side of said body portion near the upper end thereof, a bridge piece extending from said housing to the opposite side of the body portion, a stop member extending upwardly from said bridge piece, a lever pivotally mounted on said stop member and constructed and arranged to open said valve when tilted, a snap-action spring for said cover having one end thereof supported by said bridge piece, an arm carried by the hinged side wall of said cover constructed and arranged to tilt said lever and to engage said stop member, a flint in said housing and an abrasive wheel coacting therewith to create sparks, a spring-actuated flint retaining element slidably mounted in said housing, a flint release lever pivotally mounted on said housing and having locking means at one end thereof engaging said flint retaining element, and a spring between the opposite end of said release lever and said housing.

3. In a lighter, the combination of a case comprising an open-ended body portion, a removable bottom closure for the lower end of said body portion and a cover hinged to a side wall of said body portion and constructed and arranged to close the upper end of the body portion, a fuel cartridge slidable in said body portion and retained in the latter by said bottom closure, a discharge valve at the upper end of said cartridge and spring means normally holding the valve in closed position, a lever supporting member between opposite side walls of said body portion at the upper end thereof, a lever pivotally mounted on said supporting member and constructed and arranged to open said valve when tilted, and means actuated by the opening movement of said hinged cover for tilting said lever.

4. In a lighter, the combination of a case comprising an open-ended body portion, a removable bottom closure for the lower end of said body portion and a cover hinged to a side wall of said body portion and constructed and arranged to close the upper end of the body portion, a fuel cartridge slidable in said body portion and retained in the latter by said bottom closure, a discharge valve at the upper end of said cartridge, a spring associated with said valve and normally holding the valve in closed position, a lever supporting member between opposite side walls of said body portion at the upper end thereof, a lever pivotally mounted on said supporting member and constructed and arranged to compress said spring when tilted whereby to open said valve, and means carried by said hinged cover for tilting said lever when the cover is opened.

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RICHARD H. KRUEGER.

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