Nov. 16, 1965 R. L. BURCHETT 3,217,762

REFILL VALVE FOR GAS LIGHTER

Filed July 19, 1963

Fig 1

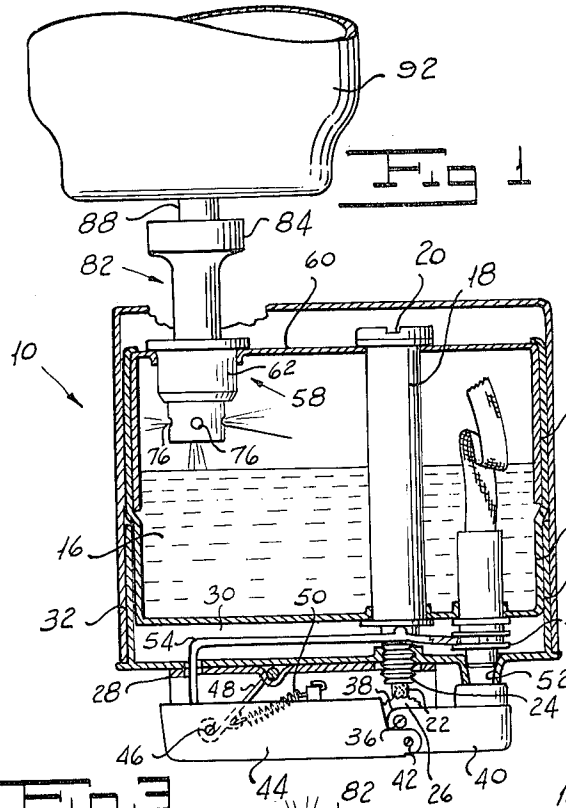


Fig 2

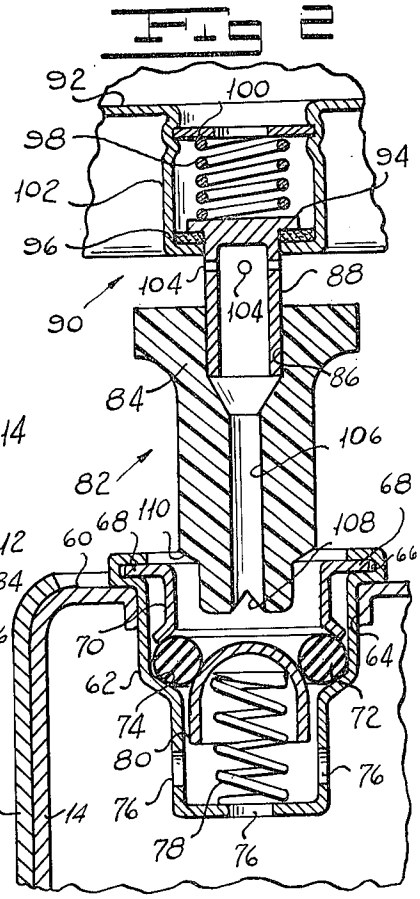


Fig 3

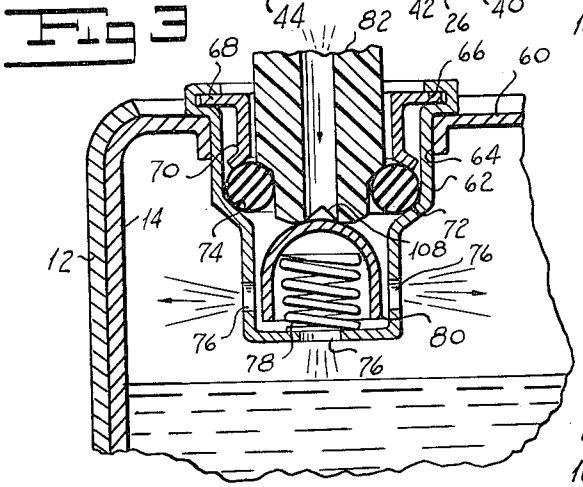


Fig 4

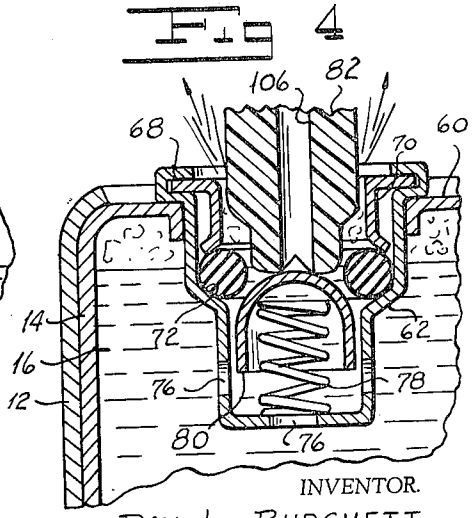
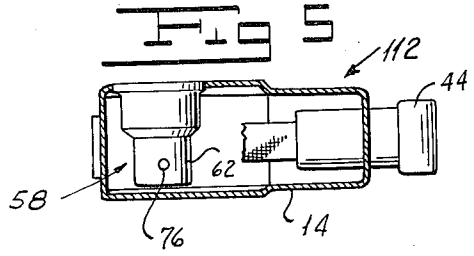


Fig 5



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REFILL VALVE FOR GAS LIGHTER

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4 Claims. (Cl. 141—349)

My invention relates to a refill valve for a gas lighter and more particularly to a simple, compact and inexpensive refill valve which prevents the lighter reservoir from being filled to excess. This application is a continuation-in-part of my copending application Serial No. 237,452, filed November 14, 1962, now abandoned for Refill Valve for Gas Lighter.

There are known in the prior art cigar and cigarette lighters which use liquefied gas as a fuel. In operation of these lighters in response to the operation of a thumbpiece or the like a valve opens to emit a jet of gas from a reservoir. At the same time an abrasive wheel strikes a shower of sparks from a flint or the like to ignite the fuel. When the valve closes the light is extinguished.

Owing to the relatively high vapor pressure of the liquefied gas fuel it had been the practice to supply reservoirs containing a predetermined amount of liquefied gas fuel to prevent the buildup of excessive pressure within the reservoir in response to heat for example. To avoid the danger of overfilling the reservoir once its supply of liquefied gas was depleted these reservoirs of the prior art were made disposable and not refillable. It will readily be appreciated that the expense of replacing the reservoir each time the supply became depleted was so expensive as to make this practice impracticable.

For the foregoing reasons it has also been suggested in the prior art that refillable reservoirs be used. The reservoir is provided with a valve which is normally urged closed by a spring. When the reservoir is to be refilled an adapter carried by the supply tank is screwed into the reservoir opening to bring the body of the supply tank valve into engagement with the lighter refill valve body. As this takes place the relatively stronger supply tank valve spring acts against the refill valve spring to open the refill valve. Upon further movement of the adapter a seal is provided for the adapter passage and eventually the refill valve movement is arrested and the supply tank valve is opened.

As the supply tank adapter is screwed out of the reservoir opening first the supply valve closes and then the seal between the adapter and the reservoir opening is broken. This occurs before the reservoir valve is permitted to close. In one form of this assembly either the adapter or the valve opening is provided with a groove extending across the screw threads to permit some gas to escape before the adapter is entirely removed from the opening. Alternatively either the adapter wall or the reservoir opening wall may be bored to form a passage to permit the escape of some gas as the adapter is removed from the reservoir opening.

It will readily be apparent that the refill assembly of the type described above is relatively complicated to manufacture and consequently it is expensive. Not only is this true but also it is difficult and inconvenient to use. The refilling operation is rather time-consuming. In another type of refill valve assembly known in the prior art the valve is so constructed as to permit simultaneous escape of gas from the reservoir and the charging thereof during a filling operation. The ostensible reason for this arrangement is to permit visual observation of the completion of the filling operation by formation of droplets of fuel on the adapter stem. The defects of this arrangement are readily apparent. First, fuel is wasted all during the filling operation. Secondly, the danger

exists that the escaping fuel may accidentally be ignited. Moreover the rapid escape of fuel when the filling operation is complete produces an extremely unpleasant noise which is at least annoying and which may alarm some users.

I have invented a refill valve for a gas lighter which overcomes the disadvantages of gas lighter refill valves pointed out hereinabove. My valve is simple in its construction and relatively easy to manufacture. Consequently it is relatively inexpensive. My refill valve assembly is so constructed as to prevent the reservoir from being overfilled. When using my refill valve arrangement the refilling operation can be rapidly and expeditiously performed. I construct my refill valve assembly to prevent the escape of fuel from the reservoir during the filling operation to avoid the concomitant undesirable results.

One object of my invention is to provide a refill assembly for a gas lighter which overcomes the disadvantages of gas lighter refill valves of the prior art.

Another object of my invention is to provide a gas lighter refill valve which prevents the lighter reservoir from being overfilled.

A further object of my invention is to provide a refill valve for a gas lighter which permits the refilling operation to be performed in a rapid and expeditious manner.

Still another object of my invention is to provide a refill valve for a gas lighter which is simple and inexpensive to manufacture.

Yet another object of my invention is to provide a common seat for the reservoir valve and the refill tank adapter.

A still further object of my invention is to provide a refill valve for a gas lighter in which the escape of fuel during the course of a filling operation is prevented.

Other and further objects of my invention will appear from the following description:

In general my invention contemplates the provision of a refill valve assembly in which a seal provided by an O-ring in the lighter reservoir access opening and an adapter is broken after the supply tank valve closes and before the reservoir valve closes as the adapter is withdrawn from the access opening to permit some gas to escape to prevent the reservoir from being overfilled.

In the accompanying drawings which form part of the instant specification and which are to be read in conjunction therewith and in which like reference numerals are used to indicate like parts in the various views:

FIGURE 1 is a sectional view of one form of gas lighter with which my improved refill valve can be used.

FIGURE 2 is a fragmentary sectional view of my improved refill valve and the adapter used therewith.

FIGURE 3 is a fragmentary sectional view of my refill valve showing the relative positions of the parts when the lighter is being filled.

FIGURE 4 is a fragmentary sectional view of my refill valve and adapter illustrating the position of the parts as the adapter is withdrawn from the lighter opening.

FIGURE 5 is a sectional view of a lighter in which my refill valve is disposed in the side of the lighter reservoir.

Referring now to the drawings one form of lighter indicated generally by the reference character 10 with which my refill valve is used includes a reservoir formed by an upper half 12 assembled on a lower half 14 by any suitable means known to the art and adapted to contain a supply of fuel 16 such as liquefied petroleum gas. A tube 18 extending through the tank houses a flint feeding mechanism of any suitable type known to the art having a screw 20 adapted to be turned to advance a length of flint 22 through a flint guide 24 toward an abrasive wheel 26. A frame having a base 28 is provided with side walls 30 and is frictionally assem-

bled on the upper tank half 12 by arms 32 and 34. A screw 36 passes through both side walls 30 and through ears 38 on a flame snuffer or cap 40. In this manner the snuffer 40 is pivotally supported on the frame. A pair of screws 42, one of which is shown in FIGURE 1, pivotally connect a thumbpiece 44 to the snuffer 40. A screw 46 carries a link 48 connected at its other end to the base 28. A spring 50 extending between the link 48 and the base 28 normally urges the parts of the assembly to the position shown in FIGURE 1.

Structures of the type thus far described are known in the art. When the lighter is to be operated, thumbpiece 44 is pressed to swing the snuffer 40 away from a flame opening 52 in the base 28. At the same time, as is known in the art, wheel 26 turns to direct a shower of sparks toward the opening 52. As the thumbpiece 44 moves toward base 28 it pivots a lever 54 in a manner known to the art to open a valve 56 to permit gas to escape through the opening 52. When the thumbpiece is released the valve 56 closes and the snuffer 40 moves down over the opening 52 to extinguish the flame.

When the supply of the liquefied gas fuel 16 within the tank is depleted the tank may be refilled. I mount my refill valve structure indicated generally by the reference character 58 in the base 60 of the tank bottom 14. This is accomplished in any suitable manner as by welding or soldering the valve housing 62 in an opening 64 in the base 60. I form the housing 62 with an annular recess 66 for receiving an annular flange 68 on an adapter guide 70 which retains an O-ring 72 in position against a seat 74 leading into a narrowed portion of the housing 62 the lower end of which is provided with openings 76 through which refilling fuel can pass in a manner to be described. This O-ring forms a common seat for the reservoir valve and the refill tank adapter in a manner hereinafter described. A spring 78 bearing between the bottom of the housing and a valve plug 80 normally urges the plug to move in a direction at which it seats against the inner surface of the O-ring 72 to prevent the escape of fuel from the tank.

My improved refueling valve includes an adapter indicated generally by the reference character 82 having an end 84 provided with an enlarged bore 86 for receiving a tube 88 of the valve assembly indicated generally by the reference character 90 of a refilling tank 92.

The upper end of the tube 88 is formed with a head 94 which normally is urged to a position at which it rests on a resilient seat 96 to prevent the escape of liquefied gas fuel from the tank 92. The valve 90 includes a spring 98 bearing between an annular shoulder 100 in the tank outlet 102 and the head 94 normally to seal the valve 90. When, in a manner to be described, head 94 is urged to move out of engagement with the seat 96 the fuel is permitted to flow into the tube 88 through openings 104 in the tube wall.

The enlarged bore 86 in the adapter 82 leads into a reduced bore 106 of the adapter. I form the outlet of the bore 102 with notches 108 or the like for preventing the bore 106 from being closed off when the adapter 82 engages the valve 80 in a manner to be described. I provide the outer surface of the adapter with a shoulder 110 for engaging the outer surface of the O-ring 72 with a gas-tight seal. I so construct my refill valve that spring 78 is appreciably weaker than is spring 98. Owing to this arrangement the refilling tank valve 90 is never open unless the seal between O-ring 72 and shoulder 110 is established. That is, when the adapter 82 is inserted into valve assembly 58 valve 80 moves out of engagement with the O-ring 72 and the seal between the O-ring and shoulder 110 is established before valve 98 opens. Conversely, when the tank 92 is moved away from valve assembly 58, stronger spring 98 maintains the adapter seated on the O-ring 72 until valve 90 closes and before the seal between O-ring 72 and shoulder 110 is broken. Continued upward movement of the tank will then permit a slight amount of gas to escape until the valve 80 seats. In this manner I ensure that at no time during the course of a filling operation does there exist communication between the atmosphere and the interior of the refilling tank 92. At no time will there be a simultaneous escape of gas from the reservoir and from the refilling tank.

Referring now to FIGURE 5 there is shown a form of lighter indicated generally by the reference character 112 in which the refill valve 58 is located in the side of the lighter reservoir. The operation of this form of lighter is substantially the same as that of the form of lighter illustrated in FIGURES 1 to 4.

In operation of my refill valve for a gas lighter such as the lighter 10 the tank 92, the outlet 88 of which carries the adapter 84, is moved into the access opening of retainer 70 from the position shown in FIGURE 2 to the position shown in FIGURE 3. In the course of this movement the lower end of the adapter engages the valve 80 and moves it against the action of spring 78 away from the O-ring 72. Thus the reservoir valve is opened to permit the refilling operation to take place. Upon continued movement of the adapter its shoulder 110 seats on the O-ring 72 to provide a gas-tight seal for preventing the passage of gas from the bore 106 of the adapter to the atmosphere. After this takes place further pressure in this direction moves the head 94 away from the gasket 96 against the action of spring 98 until gas can flow from the tank 92 through openings 104 and into the passage 106. In this position of the parts gaseous fuel under pressure flows into the reservoir through notches 108 and openings 76 to fill the tank 60 to the level of the openings 76. The remainder of the space in the tank 60 is gas under pressure. When the user believes the tank to be full he withdraws the adapter 82 from the retainer 68. Before this takes place as the tank 92 is moved away from the lighter 10 head 94 engages the gasket 96 so that the supply tank outlet valve is closed. It will be appreciated that until this happens the seal between the shoulder 110 and the O-ring 72 remains unbroken. Now as shown in FIGURE 4 when the adapter is withdrawn first the seal between shoulder 110 and the O-ring 72 is broken. This occurs before the valve 80 is permitted to engage the O-ring 72 so that some gas can escape through the space between the adapter 82 and the opening in the retainer 70. This ensures that sufficient space is left for gas within the reservoir to prevent heating of the liquefied gas from expanding the liquid to distort the reservoir or otherwise damage the parts of the mechanism. It will be appreciated that where the reservoir is completely filled with liquid it might well be that the tank would rupture and explode causing severe injury to the user.

It will be seen that I have accomplished the objects of my invention. I have provided a refill valve for a gas lighter which is simple in construction and operation. It prevents a lighter reservoir from being overfilled, thus avoiding the danger of injury to the lighter or the user. A refilling operation can readily be accomplished in a simple and expeditious manner. I achieve this result without at any time permitting communication between the atmosphere and the interior of the refilling tank. My assembly provides a common seat for the reservoir valve and for the refill tank adapter. My assembly is simple and inexpensive to construct.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of my claims. It is further obvious that various changes may be made in details within the scope of my claims without departing from the spirit of my invention. It is, therefore, to be understood that my invention is not to be limited to the specific details shown and described.

Having thus described my invention, what I claim is:

1. A refill assembly for filling a liquefied gas fuel reservoir having an opening in the wall thereof from a refill tank having an outlet valve normally closed by a spring of predetermined strength including in combination, a common valve seat, means mounting said valve seat adjacent said opening whereby the outer surface of said seat faces the atmosphere and the inner surface of said seat faces the interior of the reservoir, the portion of said mounting means exterior of said seat being impervious to the passage of gas, a valve plug and a spring having a strength less than said predetermined strength for urging said plug into engagement with the inner surface of said seat, means forming a gas passage for connecting said tank to said reservoir, said gas passage forming means being movable with reference to said tank to open said tank valve, said gas passage forming means having an end for engaging said plug to move said plug away from said seat, said gas passage forming means having a shoulder spaced from said end for engaging the exterior surface of said seat to provide a seal, the spacing of said shoulder from said end being such that said plug is displaced from said seat before said shoulder engages said exterior surface as said passage forming means moves inwardly of said reservoir.

2. A refill assembly for filling a liquefied gas fuel reservoir having an opening in the wall thereof from a refill tank having an outlet valve normally closed by a spring of predetermined strength including in combination, a common valve seat, means mounting said valve seat adjacent said opening whereby the outer surface of said seat faces the atmosphere and the inner surface of said seat faces the interior of the reservoir, the portion of said mounting means exterior of said seat being impervious to the passage of gas, a valve plug and a spring

having a strength less than said predetermined strength for urging said plug into engagement with the inner surface of said seat, means forming a gas passage for connecting said tank to said reservoir, said gas passage forming means being movable with reference to said tank to open said tank valve, said gas passage forming means having an end formed with a notch, said gas passage forming means having a shoulder spaced from said end for engaging the exterior surface of said seat to provide a seal, said gas passage forming means being adapted to move to engage said end with said plug to move said plug away from said seat and to engage said shoulder with said seal to permit gas to flow through said passage and through said notch into said reservoir, the spacing of said shoulder from said end being such that said shoulder moves away from said exterior surface before said plug seats as said passage forming means moves away from said reservoir to permit communication between said reservoir interior and the atmosphere.

3. A refill assembly as in claim 2 wherein said common valve seat comprises an O-ring.

4. An assembly as in claim 2 in which said common valve seat comprises an O-ring and in which said valve plug has a hemispherical surface for engagement with said O-ring and for engagement by said passage forming means.

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