

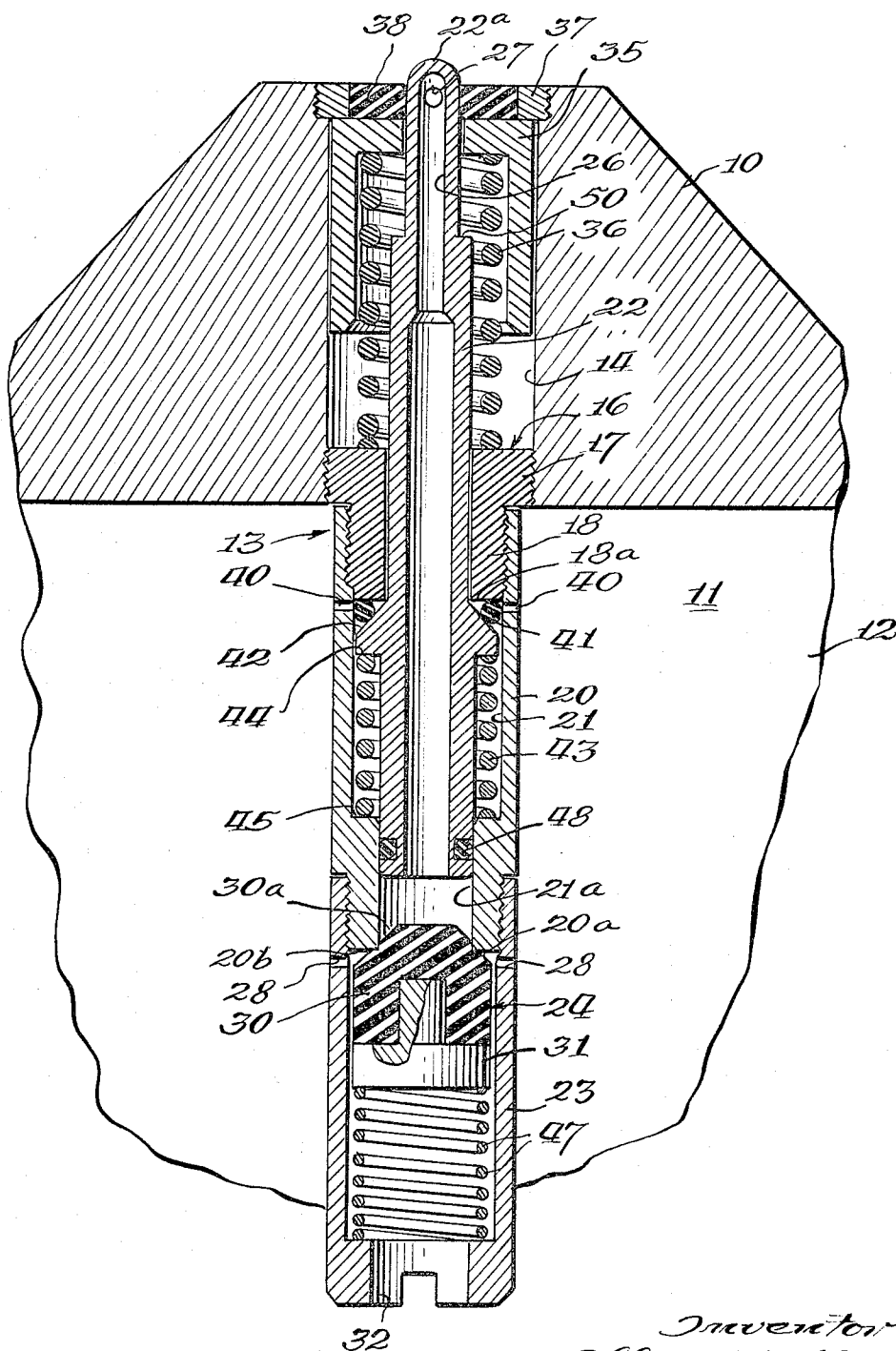
Nov. 15, 1966

A. B. GELLMAN

3,285,298

FILLER VALVE

Filed Sept. 11, 1963



Inventor
 Allen B. Gellman
 By Hoffman, Wegner, Allen, Stillman & DeCord
 Attorneys

1

3,285,298

FILLER VALVE

Allen B. Gellman, Glencoe, Ill., assignor to Elgin American International, Inc., a corporation of Illinois

Filed Sept. 11, 1963, Ser. No. 308,259

7 Claims. (Cl. 141-293)

This invention is concerned with a filler valve assembly for a liquified gas chamber and more particularly with a filler or inlet and vent valve for a butane fueled lighter or the like.

The novel valve construction of the present invention has few parts, is inexpensive to manufacture and relatively easy to assemble.

One feature of the invention is that the pressure of the gas in a filler can or container is utilized to open the valve during filling.

Another feature is that the pressure of the gas in the filled chamber is utilized to hold the valve closed following the filling operation and until the fuel supply is substantially exhausted.

A further feature is that the filler valve includes a piston movable in a cylinder which has one end connected with the inlet passage to the chamber, and the opposite end of the cylinder open to the interior of the chamber, the piston having a resilient sealing portion adjacent the shoulder. The cylinder has a shoulder at the end connected with the inlet passage. The pressure of incoming fuel from a supply container acts against the resilient portion of the filler valve forcing it away from a seated position on the shoulder allowing the fuel to enter the chamber. The fuel pressure within the chamber acts on the opposite end of the valve piston moving it toward the valve seat.

And another feature is that the valve assembly includes a vent opened by engagement with the filler can and with the inlet passage means, the vent including an O-ring forced into sealing position over a vent port by a conical shoulder on a plunger. The plunger is engaged by the filler can releasing the O-ring to vent the chamber during the filling operation.

Further features and advantages of the invention will readily be apparent from the following specification and from the drawing in which the figure is an enlarged longitudinal section through a filler valve assembly embodying the invention.

The filler valve assembly disclosed herein is particularly designed for use in the chamber or reservoir of a small butane fueled device, as a lighter, small stove or the like. Details of a lighter construction which are not pertinent to the operation of the filler valve are not illustrated in the drawing and will not be described in the specification. Reference may be had to Gellman applications Serial No. 78,491 filed December 27, 1960, now Patent No. 3,134,251 and Serial No. 211,644 filed July 23, 1962, now Patent No. 3,211,889, assigned to the assignee of this invention, if further information regarding lighter constructions is desired.

Lighters which utilize a gaseous fuel, as butane, maintained in a liquified form under a substantial pressure, as of the order of at least 30 pounds per square inch, are widely used and, in great measure, have supplanted liquid fueled lighters. The fuel supply of a butane lighter does not evaporate and, for the same size fuel chamber, a butane lighter will operate for a substantially longer period of time. However, the use of pressurized fuel system in a lighter presents certain problems. Of particular concern in the present invention is the filler valve assembly.

Liquified butane for lighters and the like is commonly supplied in a small can having the butane therein at least partially in liquid form and at a pressure of the order of

2

30 pounds per square inch, at room temperature. The supply or filler can has a spout portion which is engageable with the lighter and includes, normally in the spout, a valve which is mechanically opened upon engagement with the lighter. An inlet valve to the lighter fuel chamber must be opened to permit the fuel to flow in. This valve must be such that after filling it seals and prevents the loss of fuel from the chamber regardless of pressure conditions within the lighter.

Furthermore, unless the lighter chamber is completely empty, butane gas within the chamber maintains a high pressure, making it difficult to fill the chamber rapidly from the filler can. Accordingly, it is often desirable to provide some type of vent to relieve the pressure in the chamber during the course of the filling operation.

The filler valve assembly disclosed and claimed herein satisfies these requirements.

Turning now to the drawing, a portion 10 of the body of a lighter is illustrated, having a fuel chamber 11 defined by a wall 12. The filler valve assembly, indicated generally as 13, is mounted in a bore 14 through the lighter body 10 and has a portion extending into chamber 11.

A collar 16 has a flange portion 17 threaded into the lower extremity of bore 14 with a sleeve portion 18 extending into the gas chamber. A tubular member 20 is threaded to sleeve 18 and has a bore 21 in which a plunger member 22 is slidably received. A second tubular member 23 is threaded to the bottom of tubular member 20 and defines a cylinder in which inlet piston valve 24 is longitudinally movable.

An inlet passage includes a bore 26 through plunger 22, open through a transverse port 27 at the upper end of the plunger, the lower portion 21a of the bore of tubular member 20 and inlet ports 28 through the wall of tubular member 23.

Valve 24 has a resilient sealing portion 30 carried by a stud-like member 31 of a suitable rigid material, as aluminum. The sealing surface 30a of the resilient portion of the valve is formed at an angle, as 45°, with respect to the axis of the valve assembly, to insure a continuous seal with the circular inner edge 20a of the shoulder 20b formed by the bottom of tubular member 20.

The lower end of tubular member 23 has an opening 32 therein providing communication between the interior of chamber 11 and the interior of the tubular member. Accordingly, the pressure of the contents of the chamber acts against the planar bottom surface of rigid stud 31 forcing the valve 24 upwardly against the valve seat.

The upper end of plunger 22 is guided by a cup member 35 which slides within bore 14 and is urged toward the top of block 10 by a spring 36. Cup 35 is retained within the bore by a ring 37. A washer 38 surrounds the upper end of tubular plunger 22 and prevents foreign matter from entering port 27.

Vent openings 40 are provided in the wall of the first tubular member 20, immediately below the lower face of sleeve portion 18 of collar 16. The vent openings are sealed by an O-ring 41 of resilient material which is held over the openings and against the transversely extending face 18a of the bottom of sleeve 18 by a conical shoulder 42 extending outwardly from plunger 22. Spring 43 acts between the lower face 44 of the shoulder of plunger 22 and a transverse surface 45 at the bottom of tubular member 20, urging the plunger upwardly and closing the vent valve. Gas released through vent ports 40 passes O-ring 41, upwardly between the outer wall of plunger 22 and the inner surface of ring 16 and escapes to atmosphere.

Inlet valve 24 is urged upwardly by a light spring 47, which is of insufficient strength to provide a gas tight seal in the inlet valve. This permits the incoming gas pressure acting on the valve to open it readily, as will appear.

More specifically, if the vapor pressure of the gas used at room temperature is of the order of 30 pounds per square inch, spring 47 applies a force to valve 23 which is the equivalent of 15 pounds per square inch, the actual force depending upon the area of the resilient surface 30a exposed to the incoming gas from the filler can.

The lower end of plunger 22 slides within and is sealed with bore portion 21a of tubular member 20, by an O-ring 48. This prevents incoming gas escaping from the inlet passage.

In the filling operation, the nozzle of a filler can (not shown) is slipped over the upper end 22a of plunger 22 and pressed downwardly moving washer 38 and cup 35 against the pressure of spring 36, until cup 35 seats on outwardly extending shoulder 50 formed on the plunger. At this point, the penetration of the upper portion 22a of the plunger into the filler can nozzle has opened the valve in the filler can and gas at the can pressure is present in the interior of the plunger and above the upper face of the valve 24. If the lighter is empty, the valve opens readily under the pressure of the incoming gas which passes through the inlet passage and ports 28 to the chamber 11. However, if the chamber 11 has fuel under pressure in it, this pressure acts against the lower face of inlet valve carrier 31 in opposition to the force of the incoming fuel which acts against the upper surface. As the pressures are generally substantially equal and the closing action of chamber pressure on the bottom of the valve is aided by spring 47, the valve will remain closed.

Further inward motion of the filler can forces guide cup 35 against shoulder 50 and moves the plunger inwardly, releasing the pressure of conical shoulder 42 on vent valve O-ring 41. This permits gas pressure within the lighter to vent to atmosphere, as previously described. The drop in pressure in the interior of chamber 11 as a result of the venting action permits the pressure of the fuel from the filler can acting against the upper surface of inlet valve 24 to force it downwardly whereupon fuel from the filler can passes through the inlet passage into the lighter.

Upon release of the filler can, spring 43 moves plunger 22 outwardly against opening 41 sealing the vent passage. Inlet valve 24 closes and is tightly sealed by action of the pressure within the chamber 11. Spring 36 aids in removal of the nozzle of the filler can from the upper portion 22a of the plunger and returns cup centering member 35 and washer 38 to the positions shown.

An advantage of the filler valve which is opened by the pressure of gas in the filler can is that the valve is not opened when an attempt is made to fill from an empty can. In a lighter which has a valve opened mechanically by the filler can, the lighter chamber can be partially emptied if an empty filler can is used.

Furthermore, as the filler valve is sealed by gas pressure, the cup and plunger springs 36 and 43, respectively, can be lighter than in a valve where spring pressure is relied on to provide the sealing action.

I claim:

1. In a filler valve assembly for a liquified gas fueled apparatus having a fuel chamber including a mounting block with a bore therethrough, for filling the fuel chamber from a source under pressure, the improvement comprising: a collar in said bore; a tubular member extending

inwardly of said chamber from said collar, the inner end of said tubular member forming an inwardly facing valve seat; a valve carrier extending inwardly of the chamber from the inner end of the tubular member; an inlet valve in said carrier; a spring in said carrier holding said valve against said seat; a movable plunger in said tubular member extending outwardly through said collar, the inner end of said plunger being sealed with the inner end of said tubular member, said plunger having an axial inlet passage therethrough; a spring urging said plunger outwardly against a stop; a member having an annular portion surrounding said plunger and slidable in the bore of said block outside said collar; a spring urging said last mentioned member outwardly of said bore; a surface on said plunger engageable by the annular portion of said member upon inward movement thereof, to move said plunger inwardly; and a vent valve for said chamber opened on inward movement of said plunger.

2. The filler valve assembly of claim 1 wherein said vent valve comprises a vent opening in said tubular member immediately inside said collar, a sealing ring is seated against the inner end of the collar adjacent said vent opening and a surface on said plunger holds said sealing member across said vent openings in the outermost position of the plunger.

3. The filler valve assembly of claim 2 in which the holding surface on said plunger is generally conical and directed outwardly of said chamber.

4. The filler valve assembly of claim 3 wherein said second mentioned spring extends between an outwardly facing surface in said tubular member and an inwardly facing surface on said plunger, inwardly of said conical surface.

5. The filler valve assembly of claim 1 wherein stop means limits inward movement of said plunger to an amount insufficient to engage the inner end of the plunger with said inlet valve.

6. The filler valve assembly of claim 5 wherein said member having an annular portion is cup-shaped and engages said collar to limit inward movement of said plunger.

7. The filler valve assembly of claim 1 wherein said member having an annular portion is retained in said bore by a ring removably secured to said block and a washer is slidably mounted on said plunger outside said member.

References Cited by the Examiner

UNITED STATES PATENTS

2,655,932	10/1953	Lipman	251—339 X
2,655,936	10/1953	Wexler	137—543.17
2,842,337	7/1958	Pintarelli	251—339
3,039,499	6/1962	Peterson	141—348 X
3,195,590	7/1965	Iketani	141—293
3,198,016	8/1965	Poorman	251—339 X
3,200,831	8/1965	Whitfield	137—102

FOREIGN PATENTS

1,077,463	4/1954	France.
685,080	12/1952	Great Britain.

WILLIAM F. O'DEA, *Primary Examiner.*

HAROLD WEAKLEY, *Examiner.*