April 21, 1959 C. ZELLWEGER 2,882,940

FILLING VALVES FOR LIQUEFIED GAS LIGHTERS

Filed Aug. 17, 1955

2 Sheets-Sheet 1

Fig. 1

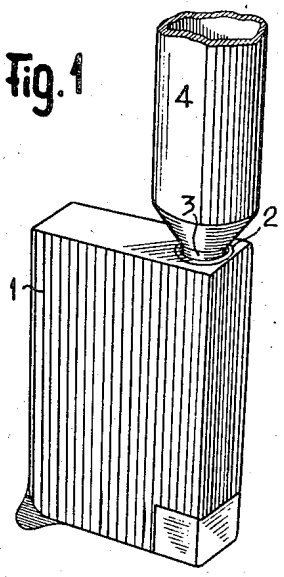


Fig. 2

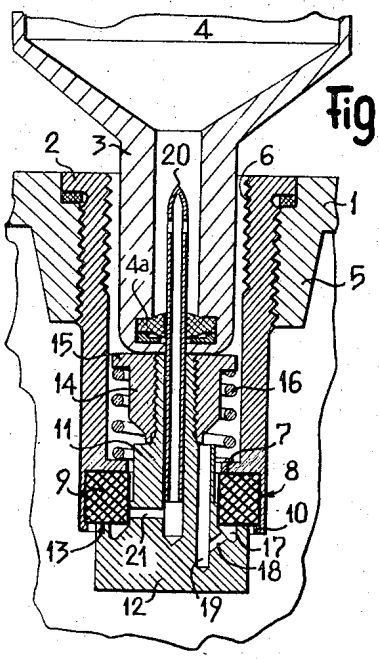


Fig. 3

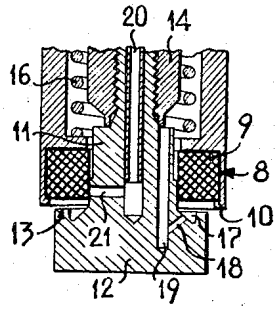
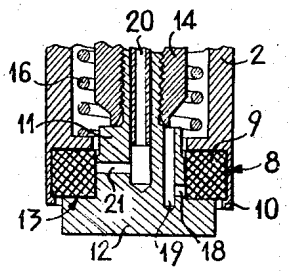


Fig. 4



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FILLING VALVES FOR LIQUEFIED GAS LIGHTERS

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Fig. 5

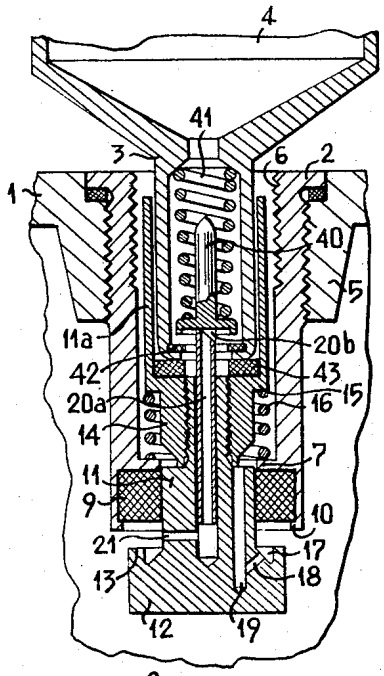
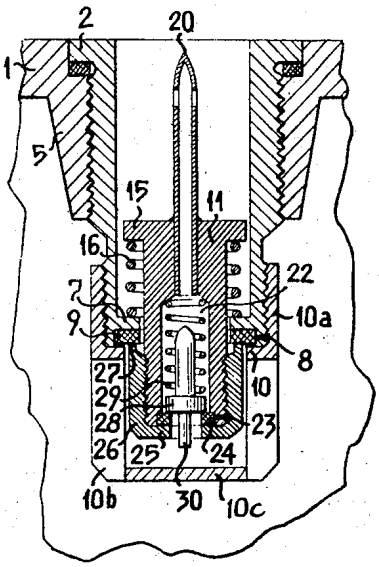


Fig. 6



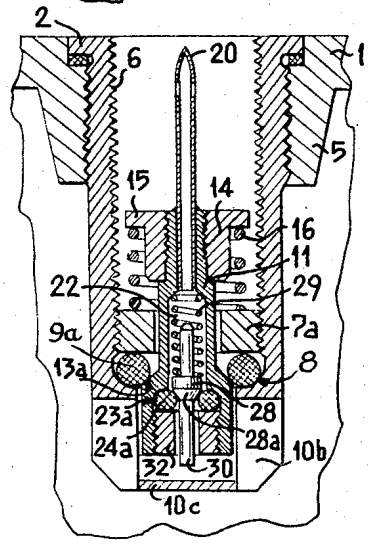


Fig. 7

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United States Patent Office 2,882,940 Patented Apr. 21, 1959

2,882,940

FILLING VALVES FOR LIQUEFIED GAS LIGHTERS

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Application August 17, 1955, Serial No. 528,885

Claims priority, application Switzerland August 28, 1954

16 Claims. (Cl. 141—293)

In my prior U.S. application Serial No. 341,881, filed March 12, 1953, and which issued on June 14, 1955, as U.S. Patent No. 2,710,506, and which re-issued on June 5, 1956, as U.S. Patent Re. 24,163, certain forms of liquified gas fueled lighter are disclosed, wherein filling valves for the fuel reservoir are provided with inlet conduits, and also with outlet conduits, so that the reservoir is in communication with the outer air during the fuel charging operation, thus allowing a certain amount of fuel in gaseous form to escape from the fuel reservoir during the fuel charging operation. The present invention in one of its aspects pertains to a species of the broader invention disclosed in said prior application, which species differs in construction from any of the forms specifically disclosed in said prior application.

The gas most frequently used for filling lighters of this type is liquified butane, of which the co-efficient of expansion is very high, as it is 2% of its volume for an increase of 10° C.

During the filling of the lighter, the temperature of the gas contained in the reservoir and that of the casing of the lighter itself decreases substantially below the surrounding temperature by reason of the evaporation of a portion of fuel which may escape through the exhaust passage. When the contents of the reservoir of the lighter return to the degree of the surrounding temperature, the liquid fuel expands. Thus, when the reservoir has been charged up with fuel, and unless precautions are taken to prevent, the hydrostatic pressure created within the casing may become such as to cause deformation or fracture of the reservoir.

In another of its aspects the invention relates to the provision of improved means for avoiding the complete filling of the fuel reservoir with fuel in liquid form, and assuring the maintenance of a gaseous cushion so to speak, in the fuel reservoir, particularly upon completion of the fuel charging operation, which cushion will allow the volume of the liquid contents of the reservoir to increase without risk of objectionably high hydrostatic pressures as mentioned above.

Several forms of construction of the subject of the invention are shown diagrammatically and by way of example in the accompanying drawings, wherein:

Fig. 1 shows in perspective a lighter in the filling position, the filling vessel being shown only in part.

Fig. 2 shows an axial section of a first form of construction, the filling vessel being introduced into the opening of the valve, the latter being shown in the closed position.

Fig. 3 is a partial view of the valve, partly open.

Fig. 4 is a partial view of a modified form of construction.

Fig. 5 is a view of a second form of construction, similar to that of Fig. 2.

Figs. 6 and 7 are views in axial section of a third and fourth form of construction respectively.

In the figures of the drawings the same reference numerals relate to corresponding parts.

With reference to Fig. 1, a lighter is provided at the bottom of its reservoir **1** with a filling opening, in which is located a stationary part **2** of a valve, the neck **3** of a filling vessel **4** being introduced into said opening. Said figure shows the position for filling the lighter.

Fig. 2 shows that the stationary part **2** of the valve is cylindrical and screwed into the part **5** of the wall of the reservoir. Said part has a screw threaded interior **6** for a closing plug, not shown. On the other hand, said part comprises an internal circular projection **7**, beyond which is formed a seating **8** for a fluidtight member **9**, of which the outer face is covered at its edge by a flange **10**. Said part **9** is cylindrical and of quadrangular cross-section, with right angles.

The movable part **11** of the valve passes through the central opening of the part **9**. It is cylindrical and forced resiliently by the latter on a portion of its length. The movable part **11** comprises a head **12** projecting from the body **2** and of larger diameter than the part passing through the part **9** in such a manner as to form a shoulder **13** located opposite the outer face of the part **9**.

The part **11** also carries a nut **14** provided with a circular projection **15** on which rests one end of a spring **16**, the other end thereof bearing against the projection **7** of the stationary part **2**. A free space is provided between the projection **15** and the body **2**.

Said spring tends to press the shoulder **13** against the outer face of the part **9** which forms its seat.

The head **12** is provided in its shoulder **13** with a circular groove **17** connected by a bore **18** to a passage **19** leading into the interior of the emtpy space containing the spring **16**.

The movable part **11** carries a hollow needle **20**, adapted to pierce the closure plug **4*a*** of resilient material for the filling vessel **4**.

By reason of the pressure applied by the closure member **4*a*** on the needle **20**, the fluidtightness of the joint between the reservoir of the lighter and the filling vessel **4**, is ensured.

A bore **21** opening on the portion of the part **11** forced resiliently by the fluidtight part **9** is connected to the passage of the needle. The opening of said bore is located at a distance from the edge of the fluidtight member **9** which is sufficient so that during the axial movement of the movable part, from its closing position, its circular shoulder **13** is withdrawn from the face of the fluidtight member **9**, before the connecting bore **21** of the hollow passage of the needle is uncovered.

In this form of construction the inlet passage for gas is formed by a hollow needle **20**, the bore **21** and the annular space existing between the member **9** and the shoulder **13**, when the latter is raised from its seat.

The connecting portion of the inlet passage is formed by the bore **21**.

The exhaust passage is formed by the annular spaces located between the member **9** and the shoulder **13**, when the latter is raised from its seat, the circular groove **17**, the bore **18**, the passage **19** and the empty space of the stationary part **2**.

The connecting part of the exhaust passage is formed by the groove **17**, the bore **18** and the passage **19**.

The cross-sectional areas of the said inlet and exhaust passages are so selected that the delivery of the inlet passage is smaller than that of the exhaust passage so that it is not possible to exceed the level of filling determined by the height of the opening of the outlet pipe in the reservoir.

The operation of this form of construction is as follows:

The valve being in the closed position, as shown in Fig. 2, then, for filling the reservoir **1** of the lighter, the neck **3** of the vessel **4** is introduced into the fixed part of the valve and pressure is applied to the vessel so that the hollow needle **20** perforates its closure (as shown in the drawings).

The liquefied gas can then penetrate through the hollow needle **20** up to the bore **21** which is closed by the fluidtight member **9**.

By compressing the spring **16**, the shoulder **13** is first withdrawn from the head **12** of the outer face of the member **9**. The interior of the reservoir **1** of the lighter is then connected through the free space between the shoulder **13** and the face of the fluidtight member **9**, the groove **17**, the bore **18** and the passage **19** into the outer air by the part **2** (position shown in Fig. 3).

By continuing the application of pressure on the movable part **11**, the opening of the bore **21** is brought above the edge of the member **9**. At this moment the vessel **4** is connected through the needle **20**, the bore **21**, the free space between the member **9** and the shoulder **13**, to the interior of the reservoir **1** and the filling takes place until the level of liquid in the reservoir reaches the height of the shoulder **13**. The liquid then enters the groove **17** and the bore **18**, and it flows through the passage **19** towards the inlet of the filling opening. There thus remains in the reservoir **1** a space free of liquid corresponding substantially to the level of the stationary part **2** of the valve. It will be observed that the opening of the exhaust passage in the interior of the reservoir of the lighter is located at a point spaced from the wall of the reservoir carrying the valve.

On releasing the pressure applied to the movable part **11** against the action of the spring **16**, the latter firstly produces the closing of the inlet passage **21** and then that of the exhaust passage **17**, **18**, **19**.

It will be seen that in this form of construction, the inlet and exhaust passages both lead into a large common opening in the interior of the reservoir.

This opening is formed by the free circular space between the shoulder **13** and the outer face of the fluidtight member **9**.

Fig. 4 shows a modified form of construction in which the bore **18** leads, like the bore **21**, to the part of the member **11** clamped by the member **9**. However, the two bores **18** and **21** are located in different planes so that, by axial movement of the movable part, the bore **18** is uncovered before the bore **21**.

In the form of construction shown in Fig. 5, the arrangement of the members of the valve is, in principle, the same as in the form of construction according to Fig. 2. However, in this case the valve is provided for co-operation with a filling vessel **4**, provided with a closure valve **40**, subjected to the action of a spring **41**, which presses it against a fluidtight lining **42** located in the opening of the neck **3**.

The difference between the valve shown in Fig. 2 and that shown in Fig. 5 resides in the fact that the movable part **11** is provided with a tubular extension **11*a*** adapted to receive the neck **3** of the filling vessel, a fluidtight lining **43** being located in the bottom of the said extension.

The needle **20** is replaced by a tube **20*a*** having a notch **20*b*** at its end.

The operation of this form of construction is in principle the same as that described in connection with the first form of construction, except that the connection between the filling vessel **4** and the reservoir **1** of the lighter is effected through the valve **40** and the tube **20*a***, fluidtightness being ensured by the lining **20*b***. In fact, when introducing the neck **3** of the filling vessel **4** into the tubular part **11*a***, the body of the valve **40** comes into contact with the tube **20*a***, which causes said body to be raised from its seat **42**. The end of the neck **3** then comes into contact with the lining **43** and ensures fluidtightness of the connection between the neck **3** and the tube **20*a***. By continuing to apply pressure on the vessel **4**, the spring of the valve **16** is compressed, thereby provoking the opening of said latter (position shown in the drawing) the operation then being the same as described with reference to Fig. 2.

In the form of construction shown in Fig. 6, the stationary part **2** of the valve is formed in the same manner as in the first form of construction, with a circular internal projection **7**. Said latter serves as a support for a fluidtight member **9**, formed by a ring of rectangular cross-section. As in the first form of construction, said ring is fitted into a seating **8** of the body **2** and its outer edge is covered by a shoulder **10** of a plug **10*a*** screwed on the body **2**. It is not provided with a screw thread for the plug (not shown) adapted to cover the opening containing the needle **20**.

The movable part **11** carrying the hollow needle **20** is formed by a cylindrical part passing through the central opening of the fluidtight member **9** with a predetermined amount of clearance providing an annular clearance between the two parts. Said part **11** is provided with a circular projection **15** on which rests one end of a spring **16** of which the other end bears against the projection **7**.

The needle **20** extends into a recess **22** of the part **11**, at the open end of which is formed a seating **23** for an annular fluidtight member **24**, of which the outer face is covered by a flange **25** of a sleeve **26** screwed on to the part **11** and of which the edge **27** is pressed against the member **9** by the action of the spring **16**.

In the recess **22** is located a valve **28**, subjected to the action of a spring **29** which presses it against the fluidtight member **24**. Said valve has a part **30** projecting to the outside of the movable part **11**. The cap **10*a***, screwed on the body **2**, is provided beyond the shoulder **10** with large size openings **10*b*** and its bottom **10*c*** serves as a stop for the projection **30** of the valve **28**, at the end of the axial movement of the movable part **11**, for lifting said valve from its seat.

The operation of this form of construction is as follows:

When the needle **20** has passed through the closure of the filling vessel **4**, as shown in Fig. 2 and the spring **16** is compressed, the edge **27** of the sleeve **26** is first lowered from the fluidtight member **9**. The interior of the reservoir **1** of the lighter is then in communication with the outside through the openings **10*b*** of the cap **10*a***, the annular spaces between the edge **27** of the sleeve **26** and the member **9**, and between said latter and the movable part **11**, which with the free space of the stationary part **2**, form the exhaust passage.

By continuing the compression of the spring **16**, the projection **30** of the valve **28** abuts against the bottom **10*c*** of the cap **10*a*** whereby the valve is lifted from its seat **24**. The liquefied gas can then pass into the reservoir **1** of the lighter through the hollow needle **20**, the recess **22**, the free space between the valve **28** and its seat **24**, and the openings **10*b***, which form the inlet passage. The filling is possible until the liquid reaches the level of the shoulder **10** that is to say the opening of the exhaust passage. From this moment it is discharged through the outlet passage to the outside, so that in the reservoir **1** there is provided a space free from liquid corresponding with the distance between the shoulder **10** and the bottom of the reservoir. In this case also, it will be seen that the opening of the outlet passage in the interior of the reservoir of the lighter is at a point spaced from the wall provided with the valve.

When reducing the pressure applied to the spring **16**, the inlet passage for gas is closed first, and thereupon the escape passage.

In this form of construction the connecting portion of the inlet passage is formed by the body of the valve **28**

and that of the exhaust passage by the edge **27** of the sleeve **26**.

The fourth form of construction shown in Fig. 7 is similar to that shown in Fig. 6, and the same reference numerals in this figure refer to corresponding parts, described in the preceding example.

The fluidtight members **9***a* and **24***a* are in this case of circular cross-section. The first rests on a washer **7***a* through which the movable part **11** passes with a predetermined amount of clearance, thus leaving an open annular space between said parts. The washer **7***a* is screwed into the stationary part **2**. The movable part carries a nut **14** with a circular projection **15**, and the spring **16** is located between said latter and the washer **7***a*. The seating **8** for the member **9***a*, in the body **2**, has a rounded wall.

The movable part **11** has a conical portion **13***a* which comes into engagement with the member **9***a*, and it contains, as in the construction in Fig. 6, a valve **28** actuated by a spring **29**, and is provided with an external projection **30**. The fluidtight member **24***a* is maintained in a seating **23***a* with a rounded surface, by a nut **32** screwed into the end of the recess **22**.

The valve **28** has a conical portion **28***a* which comes into engagement with the member **24***a*.

The operation is the same as that of the form of construction shown in Fig. 6.

In this form of construction the inlet passage is formed by a hollow needle **20**, the recess **22**, the free space between the valve **28** and its seat **24***a* and the openings **10***b*. The connecting part is formed by the valve **28**.

The exhaust passage is formed by the openings **10***b*, the free space between the conical part **13***a* and the member **9***a*, the free space between the movable part **11** and the washer **7***a* and the empty space of the fixed part **2**. The connecting part is formed by the conical part **13***a*.

In all the forms of construction described, the inlet and exhaust passages are dimensioned as described with reference to Fig. 2.

I claim:

1. A lighter constructed to be charged with liquified gas fuel under pressure and including in combination, a casing having therein a fuel reservoir, and fuel charging means carried by the casing and affording simultaneous escape of gas from the reservoir and the charging thereof with liquified gas fuel under pressure, said fuel charging means including an outer valve member fixed with respect to the casing and having therein a socket, an inner valve member mounted to move in said socket between open and closed positions as hereinafter set forth, said inner valve member having a fuel charging passage extending therethrough from an outer portion to an inner portion thereof, said outer portion including a part engageable with a filling container to afford a flow of fuel from such a container to said fuel charging passage, said fuel charging means being constructed to provide an outwardly extending passage affording the outward escape of gas therethrough to the outer air during charging, said fuel charging means also including sealing means activated during movement of said inner valve member between closed and open positions, said last mentioned means providing a seal against the flow of fuel through the passage in said inner valve member into said reservoir when said inner valve member is in closed position, and also providing a seal against the flow of fuel outwardly from said reservoir through said escape passage when said inner valve member is in closed position; said sealing means affording communication through the passage in said inner valve member into said reservoir when said inner valve member is in open position, and also affording communication from said reservoir through said escape passage to the outer air when said inner valve member is in open position, the aforesaid inner valve member being mounted to afford substantially rectilinear sliding movement thereof inwardly and outwardly with respect to said outer valve member, whereby said inner valve member slides with respect to said outer valve member in moving between the aforesaid open and closed positions of said inner valve member, and a spring urging said inner valve member toward its aforesaid closed position.

2. A lighter constructed to be charged with liquified gas fuel under pressure and including in combination, a casing having therein a fuel reservoir, and fuel charging means carried by the casing and affording simultaneous escape of gas from the reservoir and the charging thereof with liquified gas fuel under pressure, said fuel charging means including an outer valve member fixed with respect to the casing and having therein a socket, an inner valve member mounted to move in said socket between open and closed positions as hereinafter set forth, said inner valve member having a fuel charging passage extending therethrough from an outer portion to an inner portion thereof, said outer portion including a part engageable with a filling container to afford a flow of fuel from such a container to said fuel charging passage, said fuel charging means being constructed to provide an outwardly extending passage affording the outward escape of gas therethrough to the outer air during charging, said fuel charging means also including sealing means activated during movement of said inner valve member between closed and open positions, said last mentioned means sealing the inner portion of said passage in said inner valve member from communication with said reservoir when said inner valve member is in closed position and also providing a seal against the flow of fuel outwardly from said reservoir through said escape passage when said inner valve member is in closed position; said sealing means affording communication between the inner portion of said passage through the inner valve member and said reservoir when said inner valve member is in open position and also affording communication from said reservoir through said escape passage to the outer air when said inner valve member is in open position, the aforesaid inner valve member being mounted to afford substantially rectilinear sliding movement thereof inwardly and outwardly with respect to said outer valve member, whereby said inner valve member slides with respect to said outer valve member in moving between the aforesaid open and closed positions of said inner valve member, and a spring urging said inner valve member toward its aforesaid closed position.

3. A lighter constructed to be charged with liquified gas fuel under pressure and including in combination, a casing having therein a fuel reservoir, and fuel charging means carried by the casing and affording simultaneous escape of gas from the reservoir and the charging thereof with liquified gas fuel under pressure, said fuel charging means including an outer valve member fixed with respect to the casing and having therein a socket, an inner valve member mounted to move in said socket between open and closed positions as hereinafter set forth, said inner valve member including a hollow needle protruding outwardly from the body of said valve member into said socket, said inner valve member having a fuel charging passage therein which extends from the protruding portion of said needle through an inner portion of said inner valve member, said fuel charging means being constructed to provide a passage extending outwardly through said socket between said inner and outer valve members to afford the outward escape of gas through said last mentioned passage to the outer air during charging, sealing means activated during movement of said inner valve member between closed and open positions, said last mentioned means sealing the inner portion of said first mentioned passage in said inner valve member from communication with said reservoir when said inner valve is in closed position, and also providing a seal against the flow of fuel outwardly from said reservoir through said escape passage when

said inner valve member is in closed position; said sealing means affording communication between said reservoir and the inner portion of said first mentioned passage through the inner valve member when said inner valve member is in open position, and also affording communication between said reservoir and said escape passage when said inner valve is in open position, the aforesaid inner valve member being mounted to afford substantially rectilinear sliding movement thereof inwardly and outwardly with respect to said outer valve member, whereby said inner valve member slides with respect to said outer valve member in moving between the aforesaid open and closed positions of said inner valve member, and a spring urging said inner valve member toward its aforesaid closed position.

4. A lighter constructed to be charged with liquified gas fuel under pressure and including in combination, a casing having therein a fuel reservoir, and fuel charging means carried by the casing and affording simultaneous escape of gas from the reservoir and the charging thereof with liquified gas fuel under pressure, said fuel charging means including an outer valve member fixed with respect to the casing and having therein a socket, an inner valve member mounted to move in said socket between open and closed positions as hereinafter set forth, said fuel charging means being constructed to provide an outwardly extending passage affording the outward escape of gas therethrough from said reservoir to the outer air during charging and also to provide inward passage of liquified gas therethrough into said reservoir during charging, in a path different from the path of said outwardly escaping gas, said inner valve member having an outer portion provided with a part engageable with a filling container to afford flow of fuel from such a container to said inward passage, said fuel charging means including sealing means activated during movement of said inner valve member between closed and open positions, said last mentioned means sealing the inner portions of said passages against communication with said fuel reservoir and also against communication with each other when said inner valve member is in closed position, said sealing means opening communication from said reservoir through each of said passages when said inner valve member is in open position, the aforesaid inner valve member being mounted to afford substantially rectilinear sliding movement thereof inwardly and outwardly with respect to said outer valve member, whereby said inner valve member slides with respect to said outer valve member in moving between the aforesaid open and closed positions of said inner valve member, and a spring urging said inner valve member toward its aforesaid closed position.

5. A lighter constructed to be charged with liquified gas fuel under pressure and including in combination, a casing having therein a fuel reservoir, and fuel charging means carried by the casing and affording simultaneous escape of gas from the reservoir and the charging thereof with liquified gas fuel under pressure, said fuel charging means including an outer valve member fixed with respect to the casing and having therein a socket, an inner valve member mounted to move in said socket between open and closed positions as hereinafter set forth, said inner valve member having a fuel charging passage extending therethrough from an outer portion to an inner portion thereof, said outer portion including a part engageable with a filling container to afford a flow of fuel from such a container to said fuel charging passage, said fuel charging means being constructed to provide an outwardly extending passage affording the outward escape of gas therethrough to the outer air during charging, said fuel charging means also including sealing means activated during movement of said inner valve member between closed and open positions, said last mentioned means providing a seal against the flow of fuel through the passage in said inner valve member into said reservoir when said inner valve member is in closed position, and also providing a seal against the flow of fuel outwardly from said reservoir through said escape passage when said inner valve member is in closed position; said sealing means affording communication through the passage in said inner valve member into said reservoir when said inner valve member is in open position, and also affording communication from said reservoir through said escape passage to the outer air when said inner valve member is in open position, the aforesaid valve members, fuel charging passage and escape passage being constructed and arranged to open said escape passage prior to the opening of said fuel charging passage, and seal said fuel charging passage prior to the sealing of said escape passage.

6. A lighter constructed to be charged with liquified gas fuel under pressure and including in combination, a casing having therein a fuel reservoir, and fuel charging means carried by the casing and affording simultaneous escape of gas from the reservoir and the charging thereof with liquified gas fuel under pressure, said fuel charging means including an outer valve member fixed with respect to the casing and having therein a socket, an inner valve member mounted to move in said socket between open and closed positions as hereinafter set forth, said inner valve member having a fuel charging passage extending therethrough from an outer portion to an inner portion thereof, said outer portion including a part engageable with a filling container to afford a flow of fuel from such a container to said fuel charging passage, said fuel charging means being constructed to provide an outwardly extending passage affording the outward escape of gas therethrough to the outer air during charging, said fuel charging means also including sealing means activated during movement of said inner valve member between closed and open positions, said last mentioned means sealing the inner portion of said passage in said inner valve member from communication with said reservoir when said inner valve member is in closed position and also providing a seal against the flow of fuel outwardly from said reservoir through said escape passage when said inner valve member is in closed position; said sealing means affording communication between the inner portion of said passage through the inner valve member and said reservoir when said inner valve member is in open position and also affording communication from said reservoir through said escape passage to the outer air when said inner valve member is in open position, the aforesaid valve members, fuel charging passage and escape passage being constructed and arranged to open said escape passage prior to the opening of said fuel charging passage, and seal said fuel charging passage prior to the sealing of said escape passage.

7. A lighter constructed to be charged with liquified gas fuel under pressure and including in combination, a casing having therein a fuel reservoir, and fuel charging means carried by the casing and affording simultaneous escape of gas from the reservoir and the charging thereof with liquified gas fuel under pressure, said fuel charging means including an outer valve member fixed with respect to the casing and having therein a socket, an inner valve member mounted to move in said socket between open and closed positions as hereinafter set forth, said inner valve member including a hollow needle protruding outwardly from the body of said valve member into said socket, said inner valve member having a fuel charging passage therein which extends from the protruding portion of said needle through an inner portion of said inner valve member, said fuel charging means being constructed to provide a passage extending outwardly through said socket between said inner and outer valve members to afford the outward escape of gas through said last mentioned passage to the outer air during charging, sealing means activated during movement of said inner valve

member between closed and open positions, said last mentioned means sealing the inner portion of said first mentioned passage in said inner valve member from communication with said reservoir when said inner valve is in closed position, and also providing a seal against the flow of fuel outwardly from said reservoir through said escape passage when said inner valve member is in closed position; said sealing means affording communication between said reservoir and the inner portion of said first mentioned passage through the inner valve member when said inner valve member is in open position, and also affording communication between said reservoir and said escape passage when said inner valve is in open position, the aforesaid valve members, fuel charging passage and escape passage being constructed and arranged to open said escape passage prior to the opening of said fuel charging passage, and seal said fuel charging passage prior to the sealing of said escape passage.

8. A lighter constructed to be charged with liquified gas fuel under pressure and including in combination, a casing having therein a fuel reservoir, and fuel charging means carried by the casing and affording simultaneous escape of gas from the reservoir and the charging thereof with liquified gas fuel under pressure, said fuel charging means including an outer valve member fixed with respect to the casing and having therein a socket, an inner valve member mounted to move in said socket between open and closed positions as hereinafter set forth, said fuel charging means being constructed to provide an outwardly extending passage affording the outward escape of gas therethrough from said reservoir to the outer air during charging and also to provide inward passage of liquified gas therethrough into said reservoir during charging, in a path different from the path of said outwardly escaping gas, said inner valve member having an outer portion provided with a part engageable with a filling container to afford flow of fuel from such a container to said inward passage, said fuel charging means including sealing means activated during movement of said inner valve member between closed and open positions, said last mentioned means sealing the inner portions of said passages against communication with said fuel reservoir and also against communication with each other when said inner valve member is in closed position, said sealing means opening communication from said reservoir through each of said passages when said inner valve member is in open position, the aforesaid valve members, fuel charging passage and escape passage being constructed and arranged to open said escape passage prior to the opening of said fuel charging passage, and seal said fuel charging passage prior to the sealing of said escape passage.

9. In a lighter constructed to be charged with liquid gas fuel under pressure from a container and including a casing having a fuel reservoir, and fuel charging means carried by a wall of the casing and affording simultaneous escape of gas from the reservoir and the charging thereof with liquefied gas fuel under pressure, said fuel charging means comprising an outer valve member having an outwardly opening socket and fixed with respect to the casing, the terminal portion of said member in the reservoir including an orifice spaced inwardly from said wall to define a gas cushioning chamber in the casing, sealing means in the orifice, an inner valve member mounted for reciprocal sliding movement in said socket and normally spring biased to close said orifice and to open said orifice under pressure of a liquid gas container manually inserted in the said socket, said inner valve member having a fuel charging passage extending therethrough from an outer to an inner portion thereof, and also having a passage affording the escape of gas from the cushioning chamber to the outer air during charging, means on the inner valve member normally cooperating with said sealing means in the orifice to prevent escape of gas to the outer air and said means together with the fuel charging means during initial inward sliding movement of said inner valve member first opening said orifice to connect the chamber and reservoir with the outer air, the continuing inward sliding movement of the inner valve member then establishing communication between the fuel charging passage and the reservoir until the liquid level therein reaches substantially the orifice of the outer valve member.

10. In a lighter constructed to be vented to the air while being charged with liquid gas fuel under pressure from a storage container, a casing having a fuel reservoir, and fuel charging means carried by a wall of the casing, said means including, an outer valve member fixed to a wall of the casing and having an externally opening socket and an internal orifice spaced from the inner face of said wall to define a cushioning gas chamber in the casing, a valve seat in said orifice, an inner valve member mounted for sliding movement in the outer valve member and spring biased outwardly, said inner valve member including a body and a head having normal sealing engagement with said valve seat to close communication between the reservoir and the air, said inner valve member provided with an inlet passage having a port and also with an outlet passage, said inner valve member when pressed inwardly by the storage container initially connecting the reservoir with the outlet passage and as inward pressure continues connecting said port with the reservoir until liquid gas reaches the orifice to trap gas in said chamber and flow through the outlet passage to signal that the reservoir is full.

11. In a lighter according to claim 10, wherein, the outer valve member has an internal annular rib at the inner end of the socket, and the outer body portion of the inner valve member has a flange, and a spring confined between the flange and the rib.

12. In a lighter according to claim 10, wherein the valve seat in the orifice of the outer valve member is resilient and the inner face of the head of the inner valve member is provided inwardly of its periphery with an annular channel which is closed when the head is in contact with the seat, and, wherein, the body of the inner valve member is provided with an outlet passage communicating with said channel, and an inlet passage having a port closed by the valve seat until the inner valve member is moved inwardly far enough to cause said port to clear the valve seat.

13. In a lighter according to claim 10, wherein the outlet passage includes a portion parallel with the inlet passage and said parallel portion is connected with the channel by an angularly disposed bore.

14. In a lighter constructed to be vented to the air while being charged with liquid gas fuel under pressure from a storage container, including, a casing having a fuel reservoir, and fuel charging means carried by a wall of the casing, said fuel charging means, comprising, an outer valve member fixed to a wall of the casing and having an externally opening socket and an internal orifice spaced from the inner face of said wall to define a gas cushioning chamber in the casing, a valve seat in said orifice, an inner valve member mounted for sliding movement in the outer valve member and spring biased outwardly, said inner valve member including a body in normal sealing engagement with said valve seat to close communication between the reservoir and the air, the body of said inner valve including an upwardly extending tubular extension to receive the neck of the container, a resilient lining at the inner end of said extension, said inner valve member provided with an inlet passage having a port and also with an outlet passage, said inner valve member when pressed inwardly by manual pressure on the storage container initially connecting the reservoir with the outlet passage and as inward manual pressure on the container continues connecting said port with the reservoir until liquid gas reaches the orifice to trap gas

in said chamber and thereafter the gas flows through the outlet passage to signal that the reservoir is full.

15. In a lighter constructed to be vented to air while being charged with liquid gas fuel under pressure from a storage container, including, a casing having a fuel reservoir, and fuel charging means carried by a wall of the casing, said fuel charging means, comprising, an outer valve member fixed to a wall of the casing and having an externally opening socket and an internal orifice spaced from the inner face of said wall to define a gas chamber in the casing, an annular abutment in said socket, a valve seat in said orifice and having one side in engagement with said abutment, an inner valve member including a body having an inlet passage and slidable in but out of contact with the inner face of said valve seat to provide a portion of an exhaust passage leading to the atmosphere through said socket, a flange on the body, a spring confined between said flange and abutment normally to outwardly bias the inner valve member, a sleeve fitted over the inner end of the body and having its outer edge normally engageable with said valve seat and the inner end of the sleeve being turned inwardly, a washer within said inturned edge of the body, an inlet valve in said inlet passage spring pressed toward said washer, a stem on said inlet valve projecting beyond the end of the sleeve, and a cage fitted to the outer valve member and having a transverse portion in the path of the stem, whereby, as initial manual pressure on the container unseats the edge of the sleeve from the valve seat the reservoir will be connected with the air, and continuing manual pressure on the container moves the valve stem to engage said transverse portion to unseat the inlet valve and connect the reservoir with the container while the reservoir is still vented to the air.

16. In a lighter constructed to be vented to air while being charged with liquid gas fuel under pressure from a storage container, including, a casing having a fuel reservoir, and fuel charging means carried by a wall of the casing, said fuel charging means comprising, a tubular internally threaded outer valve member having an internal shoulder and fixed to a wall of the casing to provide a socket opening to the atmosphere and also having an

internal orifice spaced from the inner face of said wall of the casing to define a gas chamber within the container, an annular abutment having external threads engaging the internally threaded portion of the outer valve member, an annular sealing member confined between said abutment and said shoulder, an inner valve member including a body slidable in said annular abutment and having a bore including different diameters providing a shoulder therebetween, a filling needle on the body communicating with said bore, a spring confined between a portion of the body of the inner valve member and the annular abutment normally to urge the inner valve member against said annular sealing member, a spring pressed inlet valve in the bore of the body, a stem on said inlet valve having one end extending beyond the inner valve member, a sealing member fitted to the said shoulder of the bore and providing a seat for said inlet valve, and a transverse member on the outer valve member and in the path of the stem, whereby, initial manual pressure on the container unseats the inner valve member relative to said sealing member to connect the reservoir with the air, and continuing pressure on the container moves the inlet valve stem to engage said transverse portion to unseat the inlet valve and connect the reservoir with the container while the reservoir is still vented to the air.

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