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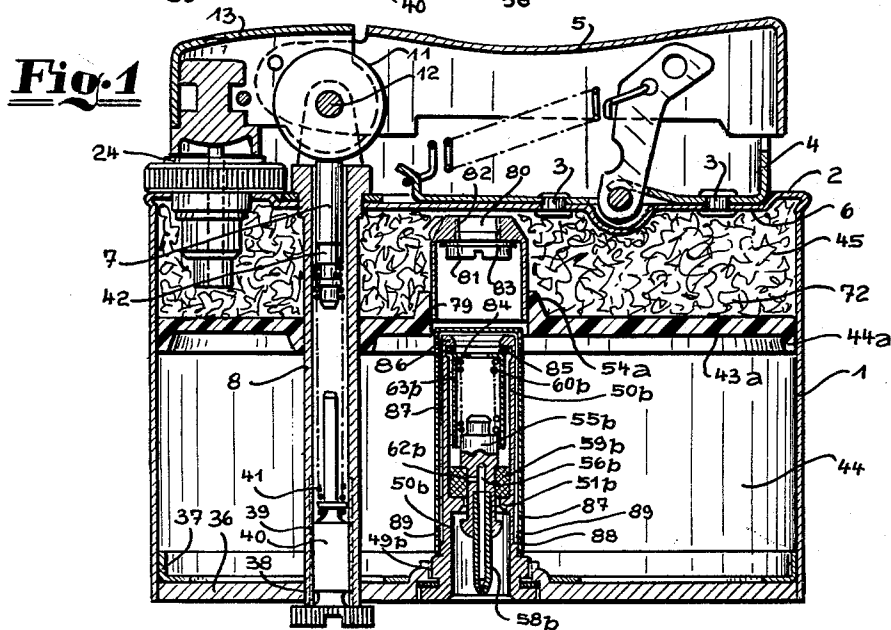
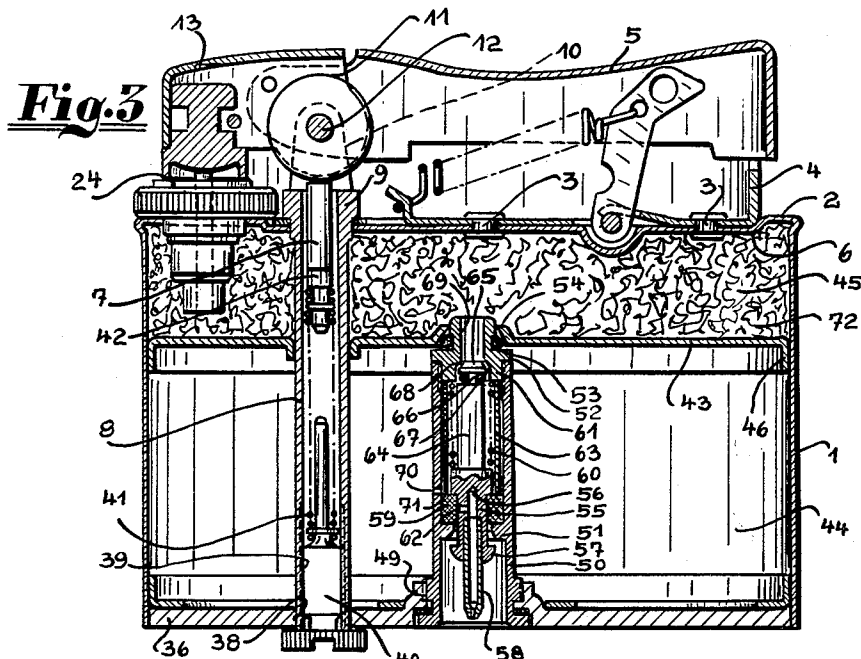
H. MALTNER ET AL

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LIGHTER OPERATED BY LIQUEFIED GAS

Filed June 7, 1963

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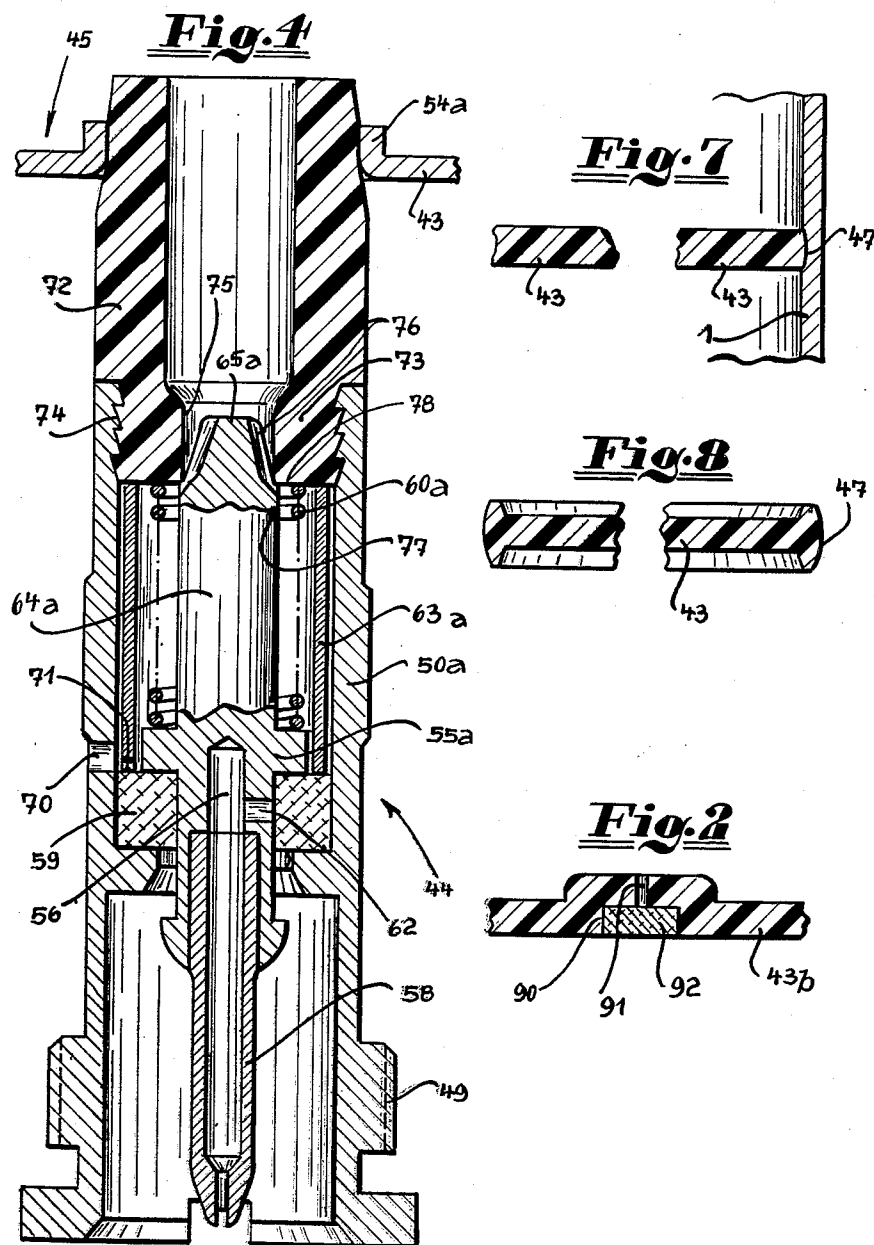
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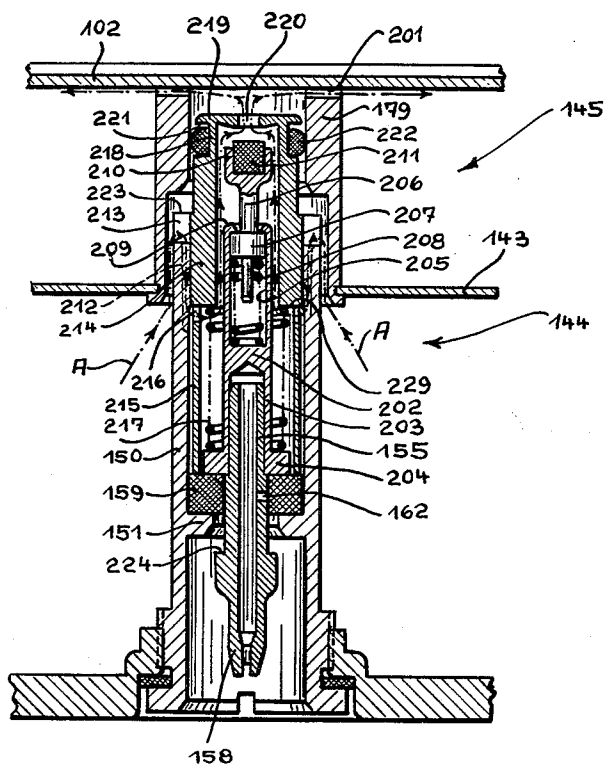
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Fig. 5



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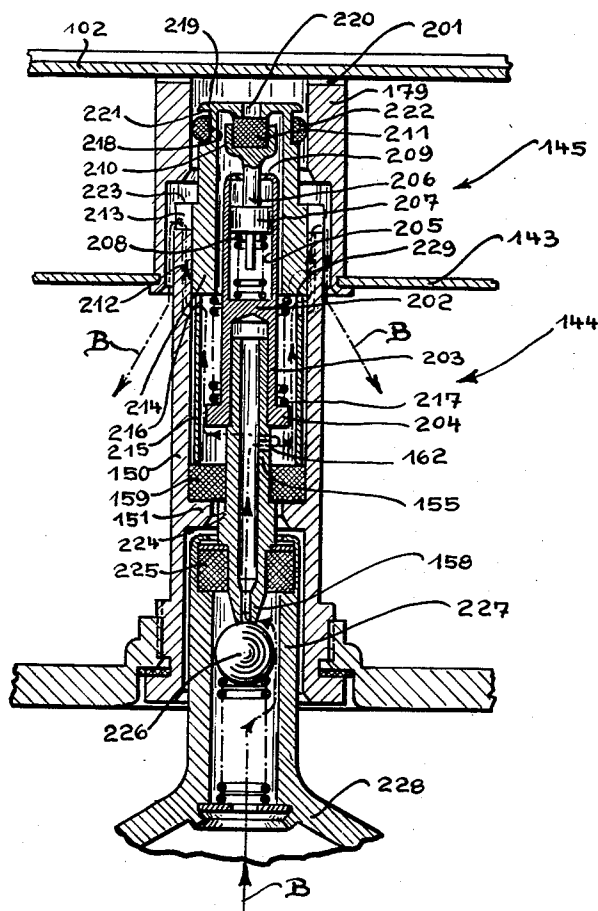
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Fig. 6



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LIGHTER OPERATED BY LIQUEFIED GAS

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The present invention concerns lighters operated by liquid gas.

With lighters operated by liquid gas, a problem exists of how to prevent communication between the fuel which has not been vaporized and the burner, since only if this is prevented can a uniform flame be maintained. It has been proposed for this purpose to arrange a valve controlled by the closure cap before the burner. This valve is, however, only able to fulfill the task for which it is intended if care is taken to ensure that the storage container is not completely filled with liquefied gas under pressure, so that a vapor chamber of greater or smaller size remains.

In connection with this arrangement, it has been proposed to associate with the filling valve of the storage container a ventilating valve the aperture of which opens out into the storage container and is located in spaced relationship relative to the container wall receiving the valve device, so that the release of liquefied fuel, indicating the end of the filling process, takes place before the storage container has been completely filled.

The invention relates to a novel mode of preventing the complete filling of the storage container of a lighter operated by liquefied gas.

According to the present invention, there is provided a lighter operated by liquefied gas and including a storage container for the fuel of a burner disposed on the storage container and connected therewith, and a filling valve, characterised in that the storage container is sub-divided by a partition into an extraction chamber and a filling chamber the extraction chamber being connected to the burner and the filling chamber being connected to the filling valve, the partition having a closable passage aperture providing connection between the two chambers.

The chamber fitted with the burner valve or both chambers may be filled with a filling of absorbent material, such as cotton wool or shaped felt elements.

The passage aperture may expediently be designed as an adjustable throttle or may constitute a closed valve during the replenishment process.

During the filling of the storage container, one of the chambers is rapidly filled with the liquid fuel, flowing-over into the other chamber carrying the burner valve taking place only slowly, due to the throttle provided between the two chambers. Alternatively the liquid fuel may be prevented altogether from flowing into said other chamber in which case the passage aperture is designed as a valve which is closed during the filling process.

Thus, even if one of the chambers is overfilled, no overfilling of both chambers can take place, due to the compensation between the two chambers which takes place only after the filling process has been completed.

The extraction chamber fitted with the burner has expediently a smaller capacity than the filling chamber.

In order to prevent the liquid fuel from being conveyed, during the filling process, directly against the throttle between the two chambers, the filling valve is expediently so arranged that its axis enclosed an angle less than 180° with that of the throttle. Furthermore, the filling valve may be covered over in the filling chamber by a deflecting cap or the like.

For a better understanding of the invention, and to

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show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

FIG. 1 is a sectional side elevation of one embodiment with a throttle which is independent of the filling valve;

FIG. 2 is a fragmentary sectional side elevation of an alternative embodiment of the throttle;

FIG. 3 is a view similar to FIG. 1 showing a section through a further embodiment having a shut-off valve controlled by the filling valve between the two chambers;

FIG. 4 is a sectional side elevation of a variant of the filling valve with a shut-off valve controlled thereby, drawn to a larger scale;

FIGS. 5 and 6 show yet a further embodiment of the filling valve in different positions; and

FIGS. 7 and 8 show two further possibilities for the design of the partition wall.

A gas-operated lighter comprises a storage container 1 for the fuel having, secured by rivets 3 on its cover plate 2, a supporting frame 4 for the actuating lever 5. The supporting frame 4 is disposed in a recess 6 in the cover plate 2 and extends only to a point over the tube 8 carrying the flint 7. The tube 8 bears in fluid-tight manner through a collar 9 on the support frame 4 and extends through the entire height of the container 1. Two parallel lugs 10 extend upwardly from the support frame 4 and the friction wheel 11 is pivotally mounted between them about a pin 12. Pivotaly mounted on the pin 12 is also a closure cap 13.

The storage container 1 is closed at its lower edge by an inserted base plate 36 which bears in fluid-tight manner against an inner collar 37 of the container 1. The flint tube 8 is guided in fluid-tight manner through a bore 38 in the base plate 36. It is formed in its lower part with an internal-screwthread 39 for receiving a bolt 40 which, acts on spring 41, which in turn is in contact with a pressure member 42 which holds the flint 7 in resilient contact with the friction wheel 11.

The above-described design of a lighter is known per se.

With reference to the invention, the container 1 contains a partition or intermediate base 43 or 43a connected in fluid-tight manner with the walls of the container 1 and the containing space of which is sub-divided into two chambers 44, 45. The intermediate base 43 also surrounds the flint guide tube 8 in fluid-tight manner.

In FIG. 3, the intermediate base 43 consists of a metal plate secured by means of a bent-over collar 46 to the walls of the container 1. An intermediate base 43a may, however, as illustrated in FIG. 1, be manufactured from an elastomeric material provided at the sealing points with bent-over and shaped-on sealing tabs 44a.

As can be seen from FIGS. 7 and 8, the peripheral surface of the intermediate base 43 can also be provided with a sealing lip.

In the embodiment illustrated in FIG. 3, a tubular sleeve 50 is screwed into a screw-threaded bore 49 in the container base 36, the said tubular sleeve extending to a point just below the intermediate base 43. The sleeve 50 is formed with an internal constriction 51 and receives at its upper end a nipple 52 which is screwed thereto and which, through the interposition of a packing ring 53, bears against a bent-up collar 54 surrounding an aperture in the intermediate base 43 to thus form a seal between the two chambers 44 and 45.

Displaceably guided in the passage aperture in the sleeve 50 formed by the constriction 51 is a valve member 55 formed with a blind bore 56. The valve member 55 has, on its underside a sleeve 57 carrying a hollow needle 58. The valve member 55 is retained in a closed position for closing construction 51 by means of a spring 60 which urges the valve member 55 against sealing member 59.

The opposite end of the spring 60 bears against a shoulder 61 on the nipple 52. Branched-off from the blind bore 56 in the valve member 55 is a radial bore 62 the opening of which is closed, in the closed position of the valve member 55, by the sealing member 59.

The sealing member 59 is, as a rule, retained with axial play on the constriction 51 by means of a tubular sleeve 63, the tubular sleeve 63 bearing with its upper end against a shoulder on the nipple 52. The valve member 55 has an upwardly-projecting stem 64 extending just under the head 65 with an annular groove 66 receiving a packing ring 67. The bore 69 in the nipple 52 has an oblique shoulder 68 over which the packing ring 67 is, when the valve member 55 is displaced into the filling position, pushed into the bore 69, so that during filling no fuel is able to enter the chamber 45.

The sleeve 50 and, if appropriate, also the sleeve 63, each have a bore 70 or 71 respectively above the sealing member 59.

For the filling or replenishment of the lighter with liquefied gas, the mouthpiece of a storage flask for the fuel is pushed against the filling needle 58, the valve body 55 being displaced upwardly against the action of the spring 60 in the sealing member 59, so that the transverse bore 62 passes over the sealing member 59. During this displacement movement, the packing ring 67 is pushed into the bore and seals off the latter, preferably before the filling conduit 62 is freed from sealing member 59. The liquefied gas then flows through the hollow needle 58, through the transverse bore 62 and through the bores 71 and 70 into the container chamber 44. While this takes place, however, no fuel is able to flow into the chamber 45. The capacity of the chamber 45 is smaller than that of the chamber 44. The chamber 45 is expediently filled with an absorbent material, for example cotton wool or felt 72.

With the drawing-off of the filling flask and the return of the valve member 55a (FIG. 4) into the closure position, the head 65a of the stem 64a again frees the passage 75, so that fuel is then able to flow also into the chamber 45.

In the embodiment illustrated in FIGS. 5 and 6, the intermediate base 143 carries, coaxially with the filling valve, a tubular sleeve 179 ending just below the cover plate 102, so that a gap 201 is provided. The valve member 150 of the filling valve is provided with an inner shoulder 151 carrying a packing ring 159 in the bore of which the valve stem 155, made in one piece with the hollow needle 158, is displaceably guided. The valve stem 155 receives a firmly-seated sleeve 203 which is divided by a transverse wall 202 and formed at its lower end with a flange 204.

Guided in the upper bore 205 of the sleeve 203 is a valve pin 206 having a collar 207, the pin 206 being retained by a spring 208 with the upper end face 203. The pin 206 has a head 210 with an inserted sealing plug 211.

The valve member 150 is formed in its upper part with an internal screwthread 212 into which is screwed a tube member 214 provided with an external collar 223. The external collar 223 has recesses 213. The tube member 214 retains, with a spacing tube 215, the sealing ring 159 on the internal collar 151 of the valve member 150. The spacer tube 215 which is guided with play in the valve member 150, has recesses 216 in its upper edge.

A spring 217 tensioned between the flange 204 of the sleeve 203 and the lower end-face-end 229 of the tube member 214 holds the flange 204 of the valve stem 155 against the packing ring 159, in which position the transverse bore 162 is located in the zone of the sealing ring 159 and is thus sealed off. The represented position is therefore a closed position.

The tube member 214 carries, on its neck 218, a closure plate 219 having an axial bore 220. Disposed in the constriction 221 formed by the neck 218 and the closure plate 219 is a packing ring 222 sealing off the chamber

144 from the chamber 145. The dimensions of the above-described parts are so calculated, that, in the closed position (FIG. 5), the inlet transverse bore 162 is closed whereas the sealing plug 211 permits the overflow of the fuel out of the filling chamber 144. Thus, pressure compensation between the two chambers 144 and 145 takes place.

For replenishing the lighter with fuel which is subjected to pressure and is thereby liquefied, the neck 227 of a replenishing ampoule 228, is pushed over the needle 158. The neck has a spring-loaded non-return valve 226 behind a packing ring 225. As this is done, the valve stem 155, 158, 203 is displaced against the action of the spring 217 relatively to the packing ring 159. The valve stem 206 also participates in this movement, so that the plug 211 seals off the bore 220 in the end plate 219. Due to the resilient guiding of the valve stem 206 in the outer stem 155, 158, 203 and the height-position of the transverse bore 162 in the external stem 155, 158 relatively to the packing ring 159, the plug 211 bears against the end plate 219 of the tube member 124 before the outer stem 155, 158, 203 has been lifted to such an extent that the transverse bore 162 reaches a position free from the packing ring 159. Thus, during the filling process no fuel is able to overflow out of the filling chamber 144 into the supply chamber 145. During the filling process, the fuel can only be supplied into the filling chamber 144 in the direction of the arrowline B in FIG. 6.

The lighter illustrated in FIG. 1 corresponds, with respect to its fundamental design, to that of FIG. 3, so that reference should be made to the appropriate description in respect of FIG. 3 in connection with the two-chamber design, the actuating device, the design of the burner, and the mechanism for producing the spark.

Inserted in fluid-tight manner in the aperture 54a in the partition 43a is a cap 79 which projects into the chamber 45 to a position just below the cover plate 2, 6 and has an axial bore 80 formed with a screwthread 82 into which a screw 81 is screwed.

The throughflow of fuel can be pre-regulated by the adjustment of a screw 81 carrying furthermore a paper or felt disc 83, the parts 82, 83 acting as a throttle point.

Screwed in fluid-tight manner into the base 36 is a sleeve 50b having a screwthreaded portion 49b and extending approximately as far as the intermediate base 43a. The sleeve 50b is provided with an internal collar 51b. Disposed on the internal collar 51b is an annular packing member 59b retained in position by a tubular sleeve 63b inserted in the sleeve 50b.

Arranged in the bore in the packing member 59b is the valve member 55b formed in its underside with a blind bore into which a hollow needle 58b is inserted.

The valve member 55b is retained by a spring 60b in against closure position on the sealing member 59b, the upper end of the spring 60b bearing against an internal collar 84 of the tubular sleeve 63b retained by a snap ring 85 engaging under an inner shoulder 86 on the sleeve 50b.

From the blind bore 56b extends a radial bore 62b which, in the closure position of the valve member 55b, is covered by the sealing member 59b. The tubular sleeve 63b is shorter than the inner length of the sleeve 50b or is formed at its lower end with apertures.

The sleeve 50b is covered over by an upwardly closed tubular cap 87 pushed on a collar 88 of the sleeve 50b and formed with apertures 89.

With this design, therefore, the throttle point 80-83 between the two chambers 44, 45 is not directly influenced by the inflowing liquid. When the filling flask is applied on the hollow needle 58b, so that the valve body 55b is lifted, the transverse bore 62b passes above the sealing member 59b, so that the fuel is able to flow via the sealing member 59b into the chamber delimited by the sleeve 50b. As it does so, it is prevented from direct outflow against the throttle 80-83 by the tubular

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cap 87 and is guided away downwardly through 180° in the annular chamber between the said cap 87 and the sleeve 50b, whereafter it is able to flow out into the chamber 44 through the bores 89 or through a radial gap.

It is true that, with this design, it is possible for fuel to flow over into the chamber 45 during the filling process, through the throttle point 80-83, but the throughflow is delayed to such an extent by the throttle point 80-83 that a vapor chamber still remains in the chamber 45 at the end of the filling process.

In the embodiment illustrated in FIG. 2, there is formed in the intermediate base 43b a shouldered bore 90, 91 into the lower portion 90 (having the larger diameter) of which a disc 92 of felt, paper or similar absorbent material is inserted.

What we claim is:

1. A lighter operable with liquefied gas comprising a fuel storage container, means dividing the container into a lower chamber for liquefied fuel under pressure and an upper chamber for fuel in a vapor state, the lighter having a burner in communication with the vaporized fuel in the upper chamber, and valve means in said lower chamber movable between an open and a closed position, said valve means in the open position providing external communication with the lower chamber to permit filling the same with liquefied fuel, while throttling communication between the upper and lower chambers to leave vapor in the upper chamber after the lower chamber has been filled, said valve means in the closed position closing external communication with the lower chamber while providing communication between the upper and lower chambers to permit liquefied fuel in the lower chamber to vaporize and flow to the upper chamber, said lighter further comprising a tubular cap surrounding said valve means and having a lower opening constituting an outflow aperture, said valve means including a valve body supported in the lower chamber and a spring loaded valve member displaceably supported in the body for movement between first and second positions corresponding respectively to open and closed positions for the lower chamber, said valve body having a bore which is in communication with the outflow aperture with the valve member in the first position, said bore being closed from communication with the outflow aperture in the second position of the valve member, said means which divides the container comprising a partition having an opening in which projects said tubular cap to provide a throttled passageway for the flow of vaporized fuel from the lower chamber to the upper chamber, and a second cap supported in the opening in the partition and extending into the upper chamber, said second cap having a preadjusted throttled passageway for the flow of vaporized gas into the upper chamber after having passed through the first of said throttled passageways.

2. A lighter comprising a fuel storage container, a partition in said container dividing the same into a lower chamber for containing liquefied fuel under pressure and an upper chamber for containing fuel in a vapor state, said lighter having a burner in communication with vaporized fuel in the upper chamber, valve means supported in said lower chamber for opening and closing external communication therewith to fill the lower chamber with liquefied fuel, said valve means including a body supported in the container and a slidable valve member in said body displaceable between first and second posi-

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tions in which the lower chamber is respectively open and closed for filling purposes, said body and valve member defining an open passageway for the escape of vaporized fuel from the lower chamber to the upper chamber in the second position of the slidable member, said valve member in the first position thereof closing said passageway whereby liquefied fuel as it is being supplied to the lower chamber is restricted from passing to the upper chamber, said lighter further comprising sealing means operatively coupled to the valve member for being displaced thereby, to close communication between the upper and lower chambers as the valve member is displaced towards the first position thereof, said valve member having a transverse bore which establishes external communication with the lower chamber when the valve member is in the first position thereof, said bore being respectively located with regard to the sealing means such that the sealing means closes communication between the upper and lower chambers prior to the establishment of external communication with the lower chamber via said bore as the valve member approaches the first position thereof.

3. A lighter as claimed in claim 2 wherein said body of said valve means includes a tubular housing supported in the lower chamber and a nipple secured to the tubular housing and projecting in sealing contact through an aperture provided in the partition, said nipple having a bore which establishes communication between the upper and lower chambers when the valve member is in the second position thereof, said valve member including a stem, said sealing means comprising a packing ring on said stem for being displaced into the bore of the nipple as the valve member is displaced to the first position thereof to close said bore and thereby close communication between the upper and lower chambers.

4. A lighter as claimed in claim 2 wherein said valve member includes a spring loaded pin supported on the valve member and displaceable therewith, said pin including a head portion in which is accommodated said sealing means, said valve body including a first tube member in said upper chamber and secured to said partition and a second tube member within the first tube member in sealing relation and accommodating the valve member for sliding movement with clearance, said first and second tube members having openings which establish communication between the upper and lower chambers when the valve member is in the second position, said sealing means being supported on said pin in alignment with the opening in the second tube member to close the same as the valve member is moved to the first position thereof.

5. A lighter as claimed in claim 2 in which the partition comprises a sealing lip which is retained in clamping manner against the container wall, said sealing lip facing the lower chamber.

6. A lighter as claimed in claim 2 in which the partition has an edge of wedge-shape which is held in clamping manner against the container.

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