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PYROPHORIC LIQUEFIED GAS LIGHTERS

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Fig. 1

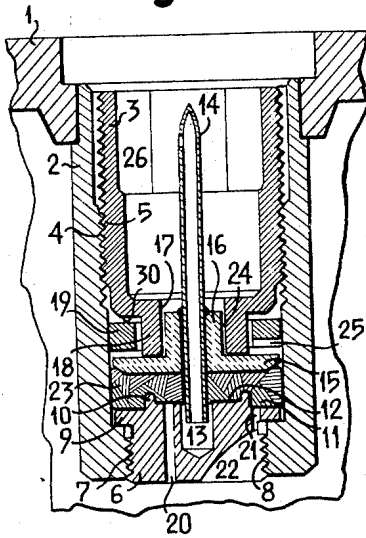


Fig. 2

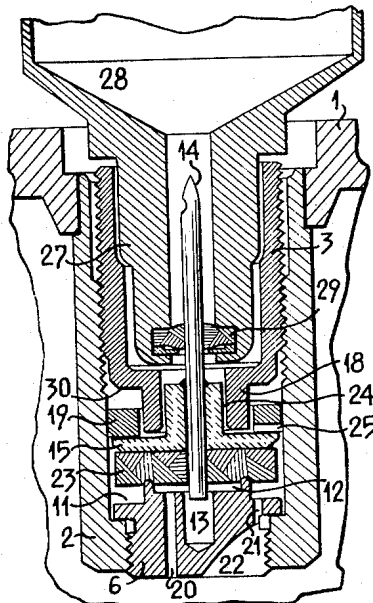


Fig. 4

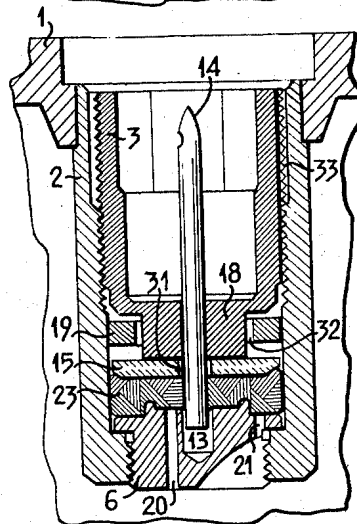
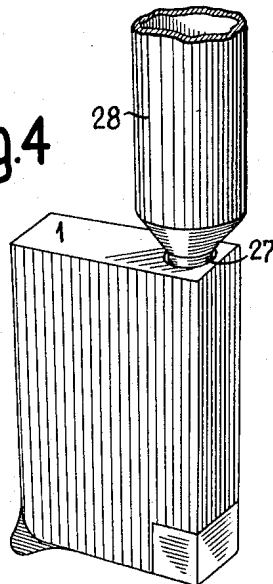


Fig. 3

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## PYROPHORIC LIQUEFIED GAS LIGHTERS

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10 Claims. (Cl. 62—1)

The present invention has for its subject a filling valve for a pyrophoric liquefied gas lighter of the type described in my application Ser. No. 341,881, filed March 12, 1953, that is to say a valve provided with a hollow needle enabling the container of the lighter to be connected to a filling vessel containing liquefied gas under pressure, said valve comprising two parts movable relatively to one another, one being secured relatively to the lighter body and having a recess in which the second part is engaged and capable of occupying two positions. In a valve of this character, two passages cause the said recess to communicate with the reservoir of the lighter, and a closure member, comprising at least a lining of flexible and resilient material, is located in the said recess.

In one of its two positions, the movable part compresses the said closure member, which produces the closing of the two passages, whilst in its second position, the closure member being pushed back, it places in communication on the one hand the hollow needle with the reservoir of the lighter, through the medium of one of the said passages, and on the other hand, the said reservoir with the outer air through the medium of the second passage.

The valve according to the invention is characterised in that it comprises a rigid part interposed between the said movable part and the closure member, a stop member being located in the said recess for limiting the movement of the said rigid part towards the outside in the filling position and for preventing any withdrawal of the said rigid part and thus the closure member or fluid-tight lining from the recess in the case of separation of the movable part from the part secured to the lighter.

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

Fig. 1 is a sectional view of a first form of construction, the valve being closed.

Fig. 2 is a view similar to the preceding one, showing the valve in the open position.

Fig. 3 is a sectional view of the second form of construction.

Fig. 4 is a view showing a lighter fitted with a valve according to the invention, during its filling.

In all the figures of the drawings, the same reference numbers indicate corresponding parts.

The filling valve mechanism is shown mounted in a pyrophoric lighter of a well-known type comprising a body member including walls 1 which define a reservoir for receiving and storing a suitable lighter fluid. The valve comprises two parts 2 and 3, movable relatively to one another, the first 2 being fixedly secured in a fluid-tight manner to the wall 1 of the lighter reservoir. Said part 2 having a central recess with a cylindrical wall, screw threaded at 4 over a portion of its length. The movable part 3 is formed by a body with a cylindrical wall having on its part 5 a screw thread which engages with the screw thread 4.

The bottom of the recess provided in the part 2 is formed by a flanged part 6. As shown in Figs. 1 and 2, said flanged part has a threaded portion 7, whilst the part 2 has an internal threaded bore 8 at its end. The bottom 6 is thus screwed into the part 2. The bottom 6 has a collar 9 forming a stop limiting the position of screwing the part 6 into the part 2.

The portion of the part 6 directed towards the inside of the part 2 has an annular rib 10 defining, at the bottom of the recess 2, annular grooves 11 and 12. Said annular grooves 11 and 12 are concentric to a recess 13 provided at the centre of the part 6. Said recess 13 is adapted to receive the end of the hollow needle 14 which, in the case of the form of construction shown in Figs. 1 and 2, is secured to a rigid part 15 which has the shape of a washer, having a cylindrical extension 16 in which the needle 14 is guided. The movable part 3 has a bore 17 at its inner end. The extension 16 of the part 15 engages in the said bore 17. It is to be observed that this bore 17 is provided in a part 18 of reduced diameter of the part 3.

A stop member, in the particular case a ring 19, is secured in the recess of the part 2, precisely at the level of the part 18 of reduced diameter of the part 3.

In the form of construction in Figs. 1 and 2 said ring 19 is forced into the recess of the stationary part 2.

On the other hand, the bottom of the recess of the part 2, formed by the part 6, has two passages 20 and 21 causing the interior of the reservoir to communicate with the interior of the recess of the part 2. The passage 20 leads into the circular groove 12, whilst the passage 21 leads into the circular groove 11. It is to be observed that the passage 21 is formed, along a portion of its length, by a milling 22 of the part 6. Between the bottom 6 and the rigid part 15 is located a closure member 23, formed by a washer of flexible and resilient material, for example rubber or other plastic material of the same character. In the non-compressed state (see Fig. 2) the resilient washer 23 has an external diameter less than the diameter of the recess of the part 2, so that a free passage remains enabling the interior of the reservoir to communicate with the outside through the milling 22, the passage 21, the groove 11, a groove 25 provided in the ring 19, the clearance 24 provided between the part 18 of the part 3 and the extension 16 of the part 15.

Further, as shown in Figs. 1 and 2, the movable part 3, which has an internal recess, is formed in such a manner that the said recess, in cross-section, has a hexagonal cross-section at least over a portion 26 of its length. The internal shape of the recess of the part 3 corresponds with the shape of the neck 27 of a filling vessel 28 provided for filling a lighter provided with the valve above described. This particular shape of the neck 27 and of the part 26 of the part 3 enables the latter part 3 to be set in rotation by means of the vessel 28.

Fig. 2 shows precisely the neck 27 of the filling vessel 28, fitted into the recess of the part 3 for the purpose of filling the lighter. As shown in this figure, the neck 27 is provided internally with a closing plug 29. Said plug is pierced by the needle 14 when filling the lighter.

The placing in position of the stop member 19 into the recess of the part 2, is effected in the following manner:

After having screwed the bottom 6 into the part 2, the closure member 23, together with the rigid part 15 and the needle 14 secured thereto, are introduced into the recess of the part 2.

The ring 19 is then forced into the part of reduced diameter of the recess of the part 2. The movable part 3 is then screwed completely into the said recess so

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that the shoulder 30 provided thereto comes to bear against the ring 19 and thus brings it automatically into its satisfactory position. This position is reached when the closure member 23 of flexible and resilient material has been compressed sufficiently for closing, as shown in Fig. 1, the grooves 11 and 12 and thus the passages 20 and 21. When the movable part 3 is unscrewed, the rigid part 15 moves away from the bottom 6 until it comes into contact with the ring 19. In this position of the part 15, the closure member 23 is only compressed slightly between the rib 10 and the part 15 and permits of free communication between the reservoir of the lighter and the outside through the passage 21, the groove 11, the groove 25 and the clearance 24. Further, in this position which is shown in Fig. 2, the passage 20 enables the interior of the reservoir of the lighter to communicate with the filling vessel 28 through the medium of the groove 12, the hollow 13 and the hollow needle 14.

The use of a filling valve of this character for a pyrophoric liquefied gas lighter, is effected in the following manner:

When it is desired to fill a lighter provided with a valve of this character, it is sufficient to fit, into the part 26 of the portion 3 of said valve, the neck 27 of the filling vessel 28. This engagement of the neck 27 with the part 26 causes the penetration of the hollow needle 14 through the plug 29 of the filling vessel 28. As the valve is in the closed position, no liquefied gas can penetrate into the interior of the lighter. It then suffices to unscrew the part 3 for which purpose the vessel 28 itself is used in such a manner as to reduce the compression force acting on the closure member 23.

When the release of the valve is sufficient to enable the closure member 23 to assume the shape shown in Fig. 2, the liquefied gas contained in the vessel 28 can flow into the lighter reservoir by passing through the hollow needle 14, the hollow 13, the groove 12 and the passage 20. Simultaneously, with the admission of liquefied gas into the reservoir of the lighter, there occurs an outflow of the air contained in the reservoir of the lighter as also of a portion of the gas, this passing through the passage 21, the groove 11, the groove 25 and the clearance 24.

When the liquefied gas reaches the level of the inner end of the part 2, bubbles appear along the neck 27 of the vessel 28. The appearance of these bubbles is a sign that the filling of the lighter has been completed. It is then possible to again screw in the part 3, by means of the vessel 28, for compressing the closure member 23, in a manner as to obtain a fluidtight closure of the passages 20 and 21. When the screwing in has been completed, the vessel 28 can be separated from the lighter.

It is to be observed that the portion of the internal volume of the reservoir of the lighter, located between the level of the inner end of the part 2 and the bottom 1 of the lighter, is not filled with liquefied gas during the filling operation.

In fact it has been observed that the complete filling of the total volume of the reservoir of the lighter may produce the bursting thereof in the case of an increase in temperature. It is for this reason that the filling of the said reservoir is restricted to a predetermined percentage of its total volume.

The second form of construction of the valve shown in Fig. 3 is similar to the first form of construction. It solely differs therefrom by the fact that the rigid part 15 is not secured to the hollow needle 14. In fact, in the second form of construction, the needle 14 is secured to the part 3 into which it can be either forced or welded. The part 15 is therefore provided with a central hole 31 through which the needle 14 passes freely. In this second form of construction, the connection of the reservoir of the lighter to the atmosphere is effected through the passage 21, the groove 11, a clearance 32 provided

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between the ring 19 and the reduced portion 18 of the part 3 and a milling 33 provided in the outer wall of the part 3.

The use of a valve of this character is thus effected in the same manner as hereinbefore described in connection with the first form of construction.

Numerous modifications in construction of said valve may be effected. For example, in the first form of construction, the needle 14, instead of being forced into the part 15, or welded thereto, may be formed integral therewith. Similarly, in the two forms of construction shown in the drawing, the bottom of the recess of the part 2, instead of being formed by a part 6 fitted into the part 2 may be manufactured integrally with said part 2. However, it is to be observed that it is preferable to use a separate bottom 6 as described with reference to Figs. 1 to 3, as this construction enables the reservoir of the lighter to be cleaned at the end of manufacture and also a cleaning of the passages 20 and 21 should these become obstructed by foreign bodies. It will be understood that the stop member 19 may be formed either by a closed ring or by a split ring.

In a modified form of construction, the stop member may even be screwed into the part 2 which is provided with a screw threaded portion for this purpose.

It will be understood that the portion 26 of the part 3 may be of any shape. In fact it is sufficient for the internal shape of the part 3 to correspond substantially with the outer shape of the neck 27 of the filling vessel 28.

I claim:

1. A pyrophoric lighter comprising a body member including walls defining a reservoir, a filling valve, comprising a hollow needle enabling the reservoir of the lighter to be connected to a filling vessel containing liquid gas under pressure, said valve comprising two parts movable one relatively to the other, one of said parts being stationary relatively to the body of the lighter and having a recess with which the second part engages and may occupy two positions, two passages forming communication between the said recess and the reservoir of the lighter, a closure member comprising at least a lining of flexible and resilient material, said closure member being located in said recess, said movable member in one of two positions compressing said closure member, whereby said two passages are closed, said movable part in a second position withdrawing said closure member so as to place in communication the hollow needle with the reservoir of the lighter by means of one of said passages and the said reservoir with the outside through the medium of the second passage, a rigid part interposed between the said movable part and the closure member, a stop member located in said recess for limiting the movement of said rigid part towards the outside in the filling position and for preventing any retraction of said rigid part and thus of the closure member in the recess when separating the movable part from the fixed part of the lighter.

2. A valve according to claim 1, wherein the bottom of the recess of the stationary part has an annular rib determining, on said bottom, two circular grooves, one of the said passages leading into one of said grooves and the second of said passages leading into the other of the said grooves, in the filling position of said lighter, the said stop member determining one position of the closure member in which said closure member remains in contact with said rib and thus separates said two passages from one another, said passages being closed by said closure member in the position of closure by compression of the flexible and resilient material, of which it is formed, in the said circular grooves.

3. A pyrophoric lighter comprising a body member including walls defining a reservoir, a filling valve, comprising a hollow needle enabling the reservoir of the lighter to be connected to a filling vessel containing liquid gas under pressure, said valve comprising two parts

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movable one relatively to the other, one of said parts being stationary relatively to the body of the lighter and having a recess with which the second part engages and may occupy two positions, two passages forming communication between the said recess and the reservoir of the lighter, a closure member comprising at least a lining of flexible and resilient material, said closure member being located in said recess, said movable member in one of two positions compressing said closure member, whereby said two passages are closed, said movable part in a second position withdrawing said closure member so as to place in communication the hollow needle with the reservoir of the lighter by means of one of said passages and the said reservoir with the outside through the medium of the second passage, a rigid part interposed between the said movable part and the closure member, said rigid part being secured to the hollow needle, a stop member located in said recess for limiting the movement of said rigid part towards the outside in the filling position and for preventing any retraction of said rigid part and thus of the closure member in the recess when separating the movable part from the fixed part of the lighter.

4. A valve according to claim 3, wherein the rigid part is in the form of a washer having a central cylindrical extension serving to guide said needle, said movable part having a bore with which the said cylindrical extension engages.

5. A valve according to claim 3, wherein the hollow needle is welded to said rigid part.

6. A valve according to claim 3, wherein the hollow needle is forced into the rigid part.

7. A pyrophoric lighter comprising a body member including walls defining a reservoir, a filling valve, comprising a hollow needle enabling the reservoir of the lighter to be connected to a filling vessel containing liquid gas under pressure, said valve comprising two parts movable one relatively to the other, one of said parts being stationary relatively to the body of the lighter and having a recess with which the second part engages and may occupy two positions, the one being the closure position and the other the filling position of the lighter, said second part being screwed into the recess of the stationary part, two passages forming communication between the said recess and the reservoir of the lighter, a closure member comprising at least a lining of flexible and resilient material, said closure member being located in said recess, the bottom of the recess of the stationary part having an annular rib determining, on said bottom, two circular grooves, one of the said passages leading into one of said grooves and the second of said passages leading into the other of the said grooves, a rigid part interposed between the said movable part and the closure member, a stop member formed by a ring secured in said recess for limiting the movement of said rigid part towards the

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outside in the filling position and for preventing any retraction of said rigid part and thus of the closure member in the recess when separating the movable part from the fixed part of the lighter, the said stop member determining one position of the closure member in which said closure member remains in contact with said rib and thus separates said two passages from one another, said passages being closed by said closure member in the position of closure by compression of the flexible and resilient material, of which it is formed, in the said circular grooves.

8. A valve according to claim 7, wherein the bottom of said recess is formed by a part fitted into the said stationary part.

9. A valve according to claim 7, wherein said ring is forced into said recess, its placing in correct position being effected during the first engagement of the movable part in said recess.

10. A pyrophoric lighter comprising a body member including walls defining a reservoir, a filling valve, comprising a hollow needle enabling the reservoir of the lighter to be connected to a filling vessel containing liquid gas under pressure, said valve comprising two parts movable one relatively to the other, one of said parts being stationary relatively to the body of the lighter and having a recess with which the second part engages and may occupy two positions, the hollow needle being secured to said second part, two passages forming communication between the said recess and the reservoir of the lighter, a closure member comprising at least a lining of flexible and resilient material, said closure member being located in said recess, said movable member in one of two positions compressing said closure member, whereby said two passages are closed, said movable part in a second position withdrawing said closure member so as to place in communication the hollow needle with the reservoir of the lighter by means of one of said passages and the said reservoir with the outside through the medium of the second passage, a rigid part interposed between the said movable part and the closure member, the hollow needle passing freely into a central hole provided in said rigid part, a stop member located in said recess for limiting the movement of said rigid part towards the outside in the filling position and for preventing any retraction of said rigid part and thus of the closure member in the recess when separating the movable part from the fixed part of the lighter.

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