United States Patent

Hocq

[15] **3,653,416**

[45] **Apr. 4, 1972**

[54] GAS LIGHTER FILLING MEANS

[72] Inventor: **Robert R. Hocq,** Boulogne-Billancourt, France

[73] Assignee: **Societe Franco-Hispano-Americaine Francispam,** Paris, France

[22] Filed: **Sept. 29, 1969**

[21] Appl. No.: **861,673**

[30] **Foreign Application Priority Data**

Sept. 30, 1968 France 168157

[52] **U.S. Cl.** ..... **141/353,** 141/367, 141/379, 206/47 R, 222/182, 222/321, 222/402.16

[51] **Int. Cl.** **B67d 5/00**

[58] **Field of Search** ..... 141/21, 25-27, 141/114, 348, 349, 351-353, 360, 367, 379, 84; 220/85 P, 23; 222/192, 207, 321, 400.5, 182, 318, 385, 402.1, 402.2, 514, 545, 402.16; 239/391, 397, 436; 206/47 R

[56] **References Cited**

UNITED STATES PATENTS

3,124,275	3/1964	Lake	222/321 X
3,387,789	6/1968	Fedit et al.	222/321 X
2,422,990	6/1947	Spanier	141/353 X
2,684,182	7/1954	Gey	141/353 X
2,881,810	4/1959	Breitenstein	222/321 X
3,195,784	7/1965	Aaland	222/545 X
3,211,346	10/1965	Meshberg	222/321 X
3,452,905	7/1969	Micallef	222/321 X
3,476,158	11/1969	Retzler	141/84
2,140,956	12/1938	Hall	184/27 X

FOREIGN PATENTS OR APPLICATIONS

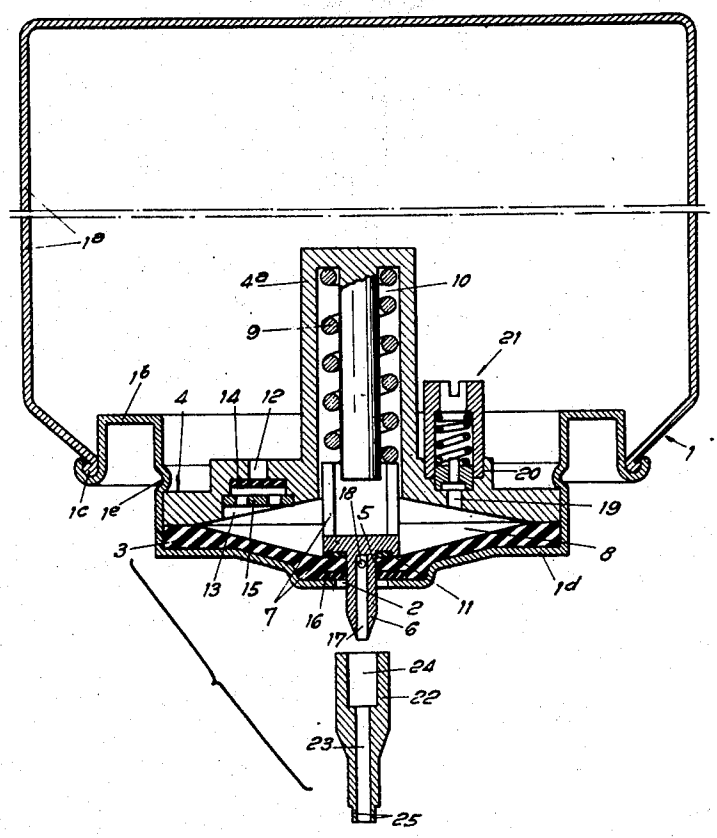
1,101,918	2/1968	Great Britain	222/182
300,932	11/1928	Great Britain	222/321

Primary Examiner—Edward J. Earls
Attorney—Curtis, Morris & Safford

[57] **ABSTRACT**

A gas bottle for filling gas lighters in which the gas bottle is provided with a pump for pumping the contents of a metering chamber in the bottle into a lighter being filled. The pump is arranged to be operated by a spigot projecting outside the lighter and which when moved opens a valve to allow the contents of the metering chamber to be expelled. The volume of the chamber is a fraction of the volume of the lighter being filled. The bottle is connected to the lighter by a detachable connection, and a cover is provided to protect the spigot and valve.

9 Claims, 8 Drawing Figures



Patented April 4, 1972

3,653,416

3 Sheets-Sheet 1

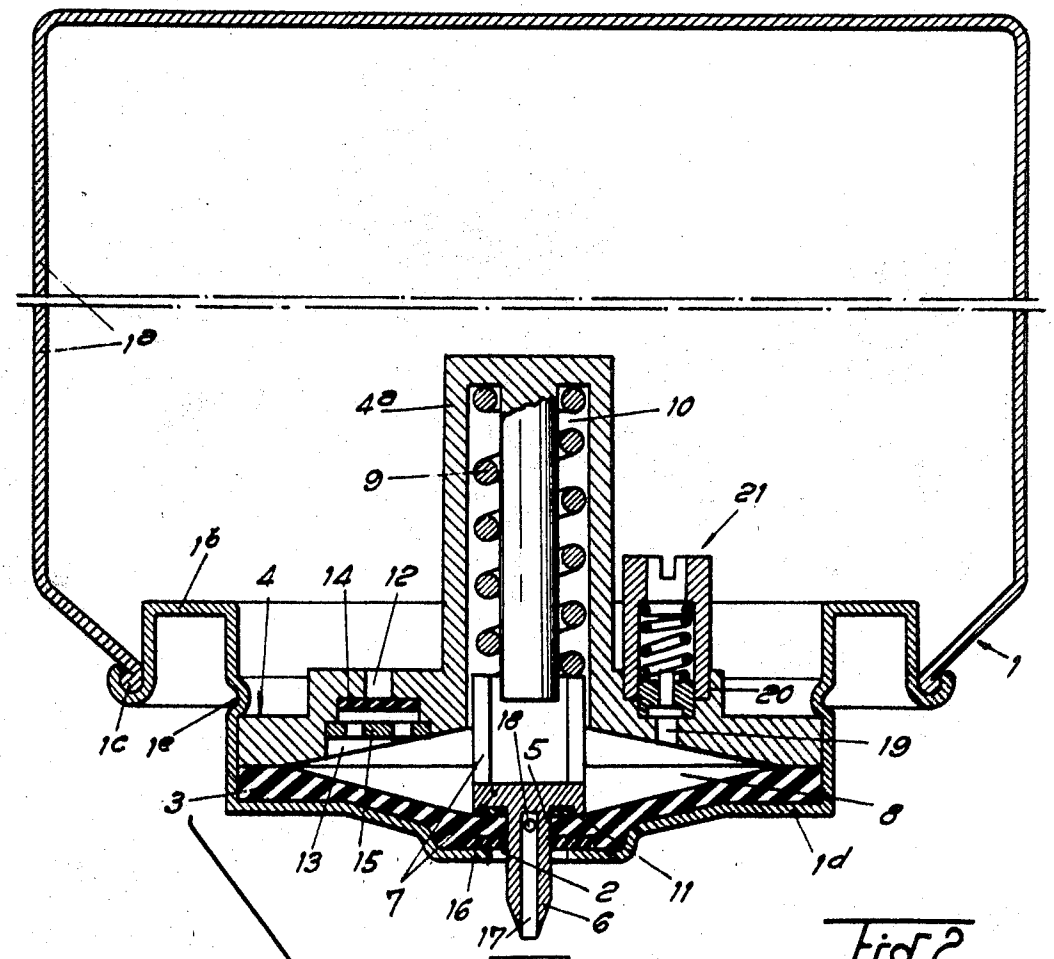


Fig. 1

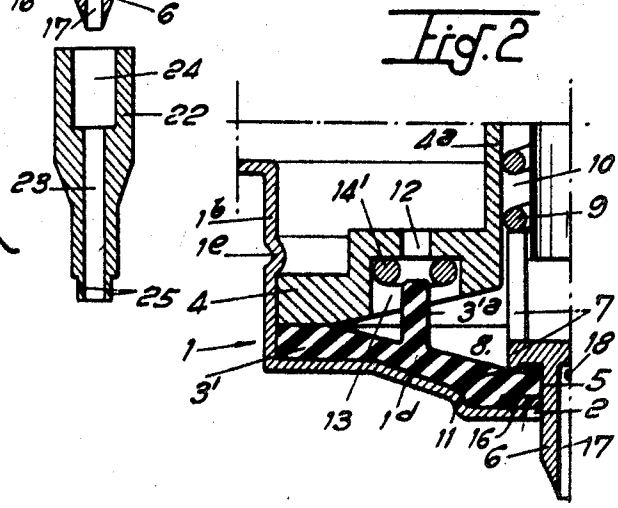


Fig. 2

INVENTOR
ROBERT RAYMOND HOCQ

BY
Curtis, Morris & Safford

ATTORNEYS

Fig. 3

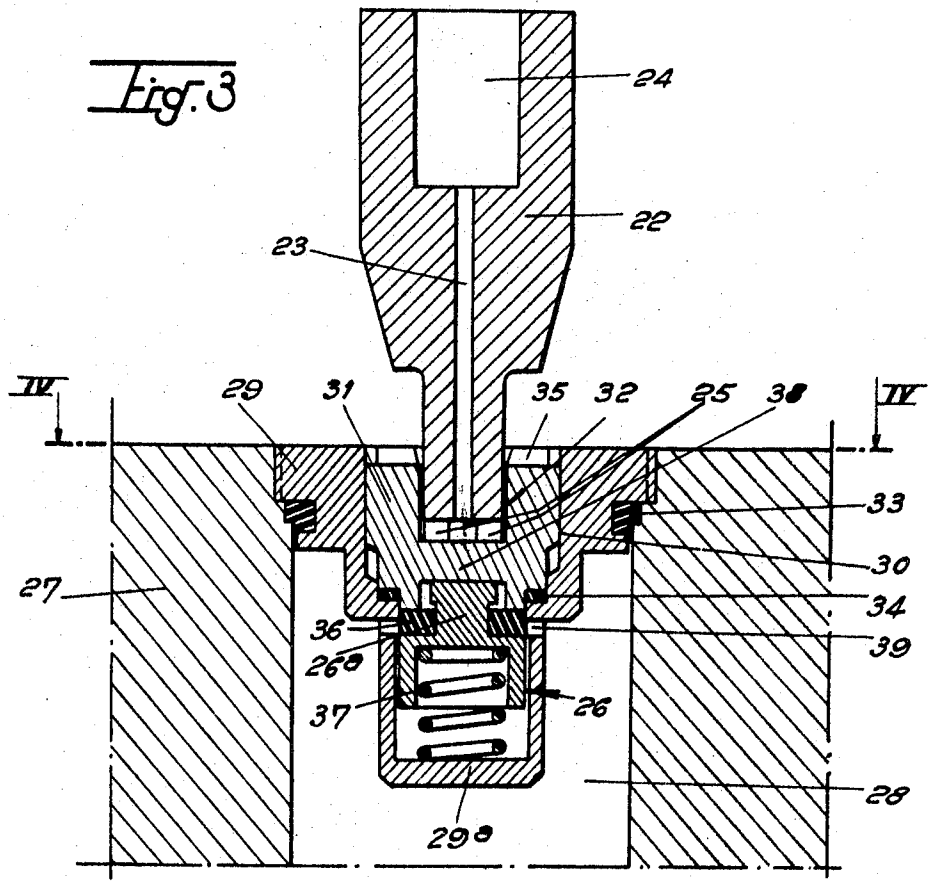
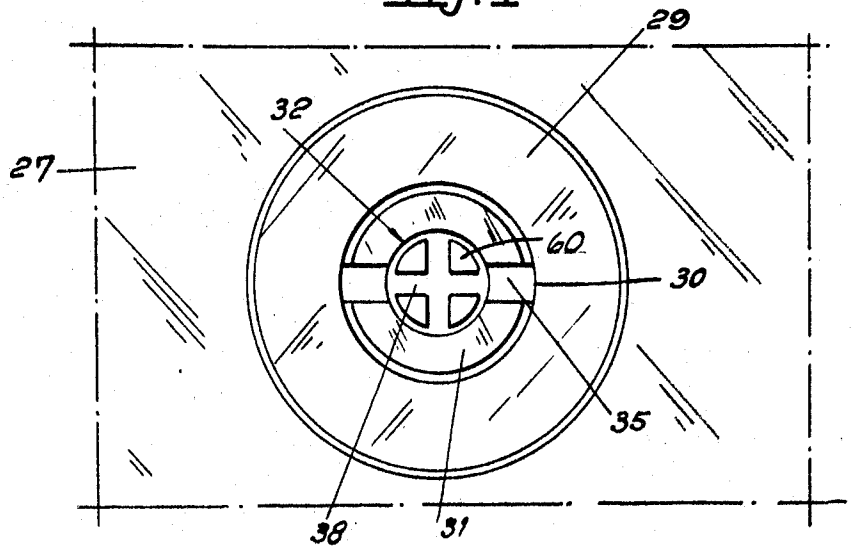


Fig. 4



INVENTOR
ROBERT RAYMOND HOCQ

BY
Curtis, Morris & Safford
ATTORNEYS

Fig. 7

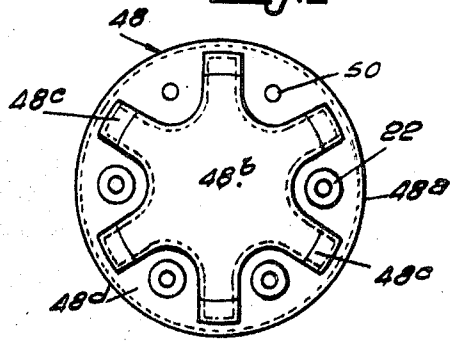


Fig. 6

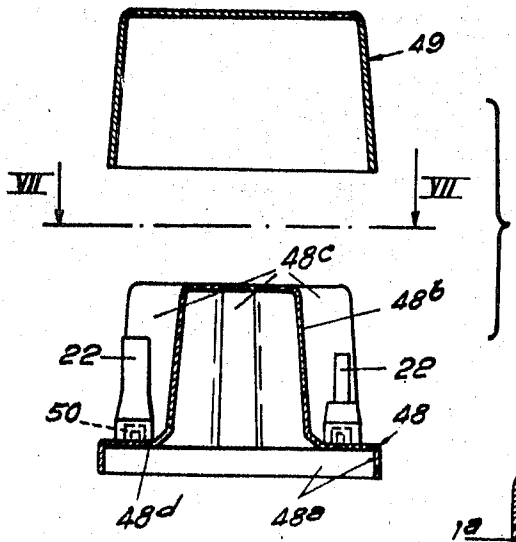


Fig. 8

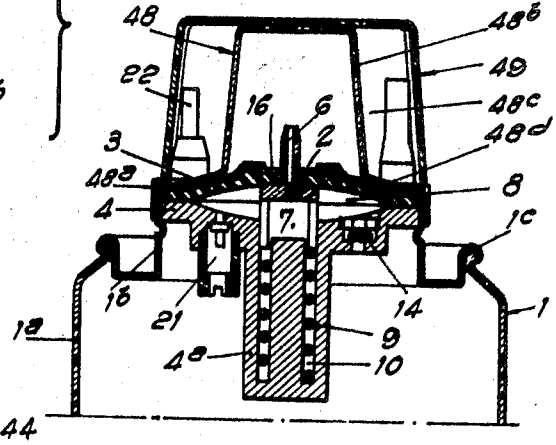
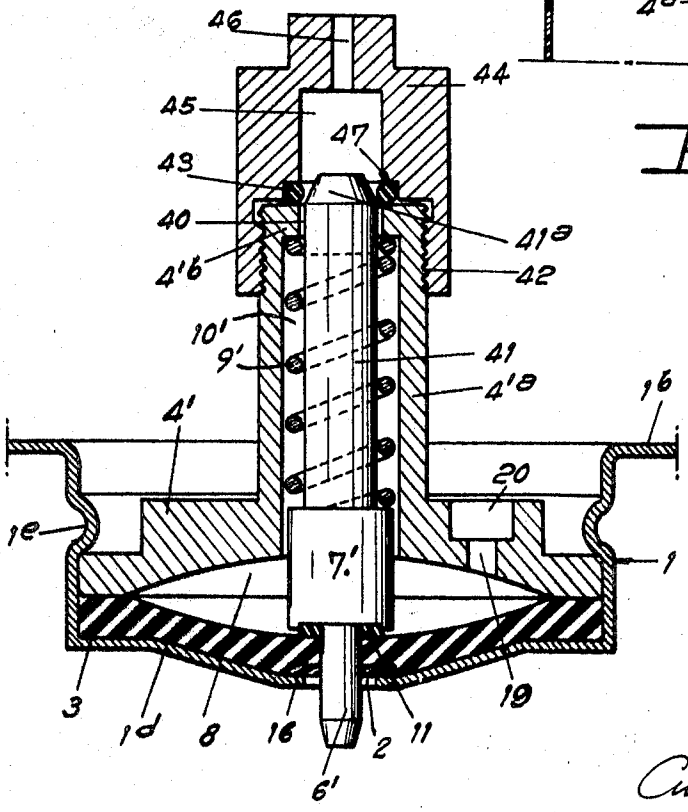


Fig. 5



INVENTOR
ROBERT RAYMOND HOCQ

BY
Curtis, Morris & Safford

ATTORNEYS

GAS LIGHTER FILLING MEANS

This invention relates to gas operated lighters (herein referred to as gas lighters) and is concerned with filling means therefor.

The filling of gas lighters the reservoir of which is located in the body of the lighter, is a delicate operation for the following reasons:

1. The transfer of liquid gas from a gas bottle to the reservoir of the lighter can only be effected by providing a higher gas pressure in the bottle. This is generally obtained by heating the bottle or by cooling the lighter. In the case of a cartridge which only contains a refill quantity, it is generally sufficient for the user to hold it for a moment in the palm of his hand in order to warm it up, but in the case of a large-capacity vessel, heating is a difficult matter. As far as cooling the lighter is concerned, this is virtually impossible to effect in practice except in the factory.

2. Except if an individual cartridge is being used, the quantity of liquid transferred is always unknown; sometimes it may be very small, sometimes very large. If the temperature difference created has enabled maximum filling to be effected, the free space required for the expansion of the gas will be too small. This can cause leakage or distortion of the lighter body in the event of a rise in temperature.

It is an object of the present invention to overcome these drawbacks.

According to the present invention a gas bottle for filling gas operated lighters includes a body for containing a liquid gas, a metering chamber the volume of which is a sub-multiple of the volume of the lighter to be filled, not-return valve means permitting flow from the body into the chamber, pumping means for expelling the contents of the chamber into the lighter, a valve for closing the connection between the chamber and the exterior of the bottle and adapted to be opened by a spigot which projects outside the bottle, a detachable connector for connecting the bottle to the lighter being filled, and a detachable cover for protecting the spigot and the valve.

Thus the liquid gas can be injected by manual pumping whatever the temperature conditions and the quantity of liquid delivered with each pump stroke can be measured. Therefore any type of lighter can be filled with the optimum quantity of liquid for the particular model. The number of pump strokes can be fixed for each model.

The spigot may have a passage therein adapted, when the valve is opened, to provide communication between the chamber and the exterior of the bottle, and the detachable connector may also be arranged to fit over the spigot for connecting the spigot to a lighter to be filled.

In one convenient construction the body of the bottle is closed by a cap having a central opening therein, and in which cap there are arranged a flexible diaphragm and a diaphragm mounting, an orifice in the mounting communicating with the interior of the body, and non-return valve means adapted to close the orifice and arranged to permit gas to flow from the interior of the body into the metering chamber, the latter conveniently being constituted by the spaced defined between the diaphragm and the diaphragm mounting. The valve may be constituted by a spring-biased valve member arranged to bear against the diaphragm and assembled in a boss in the diaphragm mounting so that it projects into the interior of the body of the bottle, a seal being arranged between the diaphragm and the closed end of the cap, the spigot being integral with the valve member and passing through the diaphragm and the seal, and the protective cover fits over the cap.

Preferably, a partition is provided between the interior of the bottle and the metering chamber which contains a safety valve which enables gas to return to the body of the bottle in the event of excess pressure in the metering chamber, and which also enables the bottle to be initially filled or refilled at the factory.

If the bottle contains a diaphragm and a diaphragm mounting, then it is in the latter that the safety valve is assembled.

In one embodiment the non-return valve means to the metering chamber comprises a sealing washer arranged in a counterbore of the orifice which provides communication between the metering chamber and the bottle interior, the washer being arranged to seat on the annular shoulder constituted by the junction between the orifice and the counterbore, under the influence of the pressure in the metering chamber, and being maintained in the counterbore by an appropriate retainer.

In a modification applicable to the case where the dosing chamber is limited by a flexible diaphragm, the non-return valve means comprise a projection on the diaphragm which, when the diaphragm is distorted, sealingly engages in a toroidal seal located in a recess in the said orifice.

In an alternative embodiment, the valve member of the valve may extend into the interior of the bottle in the form of a rod which closes off the orifice through which the metering chamber communicates with the bottle interior, the boss supporting the diaphragm and serving to guide the recoil movement of the valve head, being pierced at its internal end by a central opening for the passage of the aforesaid rod and said boss fitting in a cupped formation the base of which contains a narrow bore communicating with the interior of the bottle, this being arranged to be closed by the rod, by means of a seal, when the valve head is at the end of its travel towards the interior of the bottle.

In addition, the protective cover may comprise two components, namely a base in the form of a plate containing locations for receiving various connectors for adaptation to different kinds of lighter-filling valves, its centre having a boss from which separating partitions extend, and a cap (preferably transparent) which holds said connectors in position, the plate having a peripheral rim facing in the opposite direction to the boss and designed to fit around the flange on the bottle.

Finally, if the lighter valve is of the kind generally described in U.S. Pat. No. Re. 26,193 or of similar kind, the valve body will advantageously contain a transverse bar, or a cross, which helps to break up the gas jet and improves filling of the reservoir.

The invention may be performed in many ways and one specific embodiment of the invention, and two alternative embodiments, will now be described by way of example with reference to the accompanying drawings, in which:

FIG. **1** is a longitudinal section taken centrally through a bottle according to the invention,

FIG. **2** is a partial half-section, similar to part of FIG. **1**, of a modification which can be made to the embodiment shown in FIG. **1**,

FIG. **3** is a section showing the introduction of a connector of the kind shown in FIG. **1**, into the filler valve of a lighter of the general kind described in the afore-mentioned U.S. Patent,

FIG. **4** is a view of the line IV—IV of FIG. **3**, with the connector removed,

FIG. **5** is a similar view to a part of FIG. **1**, showing a variant embodiment with however the safety valve omitted,

FIG. **6** is an exploded view of an embodiment of the bottle cover,

FIG. **7** is a view on the line VII—VII of FIG. **6**, and

FIG. **8** is a partial section, similar to part of FIG. **1**, showing the covers of FIGS. **6** and **7** in position on the bottle.

The bottle shown in FIG. **1** comprises a casing **1** conveniently formed from two sections attached together by crimping and/or welding, namely a cylindrical body **1***a* open at one end, and a cap **1***b*. The body **1***a* and the cap **1***b* are connected in sealed relationship at **1***c*. The cap **1***b* is itself virtually completely closed at one end, at **1***d*, with the exception of a central opening **2**. In the cap there is a flexible diaphragm **3** and a diaphragm mounting **4**. The diaphragm **3** contains a central hole **5** for the passage of a spigot **6** which is integral with a valve head **7** which isolates from the bottle exterior a dosing or metering chamber **8** formed between the diaphragm **3** and the mounting **4** and whose volume is a sub-multiple of the volume of the reservoir of a normal gas-lighter. The valve head **7** is

biassed by a spring 9 guided in an annular housing 10 formed in a boss 4*a* in the diaphragm mounting 4, the boss 10 projecting axially inside the body 1*a* of the bottle and the spring 9 biasing the valve head 7 against the internal face of the diaphragm 3, a seal 11 being interposed between the diaphragm and the valve head.

The diaphragm mounting 4 is in contact at its periphery with the diaphragm 3 and is maintained in position in the cap 1*b* by a crimped bead 1*e* formed after the assembly of the diaphragm and its mounting in the cap, and preferably prior to the assembly of the cap with the body. The mounting 4 contains an orifice 12 counterbored at 13 and providing communication between the interior of the body 1*a* and the chamber 8. In the counter bore 13, a sealing washer 14 is located which is biassed by the pressure prevailing in the chamber 8 against the seat formed around the opening of the orifice 12 into the counterbore 13. An arbitrary retainer device 15, for example screwed into the counterbore 13, prevents the sealing washer 14 from falling into the chamber 8 either under the effect of gravity if the bottle is in the position shown in FIG. 1, i.e. with the cap downwards and ready for the filling of a lighter which would be located at the bottom in the figure, or under the effect of the pressure prevailing internally in the body 1*a* if the chamber 8 is empty and therefore under vacuum. The washer 14 only allows gas flow in the direction from the interior of the body 1*a* to the chamber 8.

A sealing washer 16 which surrounds the spigot 6 is located around the opening 5 and between the wall 1*d* of the cap 1*b* and the diaphragm 3.

The spigot 6 contains an axial bore 17 into which a radial bore 18 opens which, in the inoperative condition, is located within the thickness of the diaphragm 3 and does not communicate with the chamber 8.

The mounting 4 preferably also contains a bore 19 and an opening 20 adapted to receive a safety valve 21 of any known type, which enables the gas to return to the interior of the body 1*a* in the event of excess pressure in the chamber 8.

The orifice which provides the one-way connection between the interior of the body 1*a* and the chamber 8, may be designed in a manner other than that just described. For example, in the alternative embodiment of FIG. 2, the diaphragm 3′ has a projection 3′*a* which can co-operate with a toroidal seal 14′ located in the counter bore 13 and held in position by any suitable means, for example by an adhesive.

In order to link the bottle 1 with the filler valve of a lighter, a connector 22 is used, the general shape and dimensions of which are such as to correspond with the particular type of lighter being refilled, the connector shown being designed to co-operate with a lighter having a filler valve of the kind shown in FIGS. 3 and 4. The connector comprises an axial bore 23 and a counterbore 24 co-axial with the former and designed to receive the spigot 6. At the end of the connector remote from the counterbore are two fingers 25 designed to bear on a valve member indicated generally at 26 of the valve (FIG. 3) in order to open it, while leaving sufficient space between the top face of the valve member and the bottom end of the connector, for the gas to flow through.

In FIGS. 3 and 4, it can be seen that the valve of a lighter which can be refilled by means of the bottle in accordance with the invention, is of the general kind described in U.S. Pat. No. Re. 26,193 mentioned above. In the body 27 of the lighter a fuel reservoir 28 is formed. The valve includes a cylindrical housing 29 which is screwed into the wall of the reservoir 28 and contains an axial threaded bore 30 into which an externally threaded cylindrical valve body 31 is screwed, the body itself containing a smooth axial bore 32 whose diameter is slightly larger than the external diameter of the spigot 22. The housing 29 is sealingly assembled in the body 27 of the lighter by means of an annular seal 33, whilst the valve body 31 is assembled in sealed fashion in the bore 30 by means of an annular seal 34. A transverse groove 35 formed in the top face of the body 31 enables a screwdriver or similar tool to be introduced in order to screw the body 31 into position to seal it.

The bottom face of the body 31 acts as the seat for a seal 36 carried by the valve member 26. The latter is normally biassed against the seat on the body 31 by a spring 37 which bears against the base 29*a* of the housing 29. The seal 36 is arranged around a head 26*a* of the valve member, which, under the action of the spring 37, bears against the bottom face of a cruciform shaped member 38 carried by the body 31, the shape of which is clearly visible in FIG. 4 and which defines sector-shaped apertures 60 through which the gas flows from bore 23 into connector 22. The cruciform shaped member 38 could be replaced by a diametral bar, or other suitably shaped member as long as passages are provided for the gas to flow through when the valve of the bottle is open, while maintaining contact between the fingers 25 and the top face of the head 26*a* of the valve member 26. As described in the aforementioned U.S. patent a slot 39 in the housing 29 provides communication between the bore 32 and the reservoir 28 when the valve member 26 is in the open position, that is to say when the annular seal 36 has been lifted away from its seat.

The operation of the bottle shown in FIG. 1 in order to fill the lighter 27 by means of the valve shown in FIG. 3, is as follows:

It will be assumed that the lighter 27 is held with the valve directed upwards and that the bottle is tilted upside down, the spigot 6 being directed downwards (position shown in FIG. 1). The appropriate connector 22 for the particular lighter is fitted to the spigot 6 and the bottom end of the connector is introduced into the bore 32 until the fingers 25 which extend through but do not fill apertures 60, are in contact with the head 26*a* of the valve member. By continuing to press the connector 22 downwards, for example by bearing on the base of the body 1*a* of the bottle, the valve member 26 is opened as the load of the spring 37 is overcome, the latter being weaker than the spring 9 in the manner described in the aforementioned patent. When the valve member 26 is fully open, the spring 9 is compressed in turn until the connector 22 begins to compress the seal 16 (FIG. 1) of the diaphragm 3. At this moment, the transverse passage 18 is in communication with the space 8 and the gas located in said space can flow to the reservoir 28 through the passages 18 and 17 in the spigot 6, the passage 23 in the connector 22 (the bore 24 of which is fully occupied by the tip of the spigot 6), the space between the fingers 25 and the walls of opening 60, the bore 32 and the slot 39. The pressure exerted upon the base of the bottle is continued and the diaphragm 3 is distorted by the connector 22 so that the gas contained in the space 8 is effectively expelled through the path just described. The sealing washer 14 (FIG. 1) prevents this gas from returning to the body 1*a* of the bottle. When the diaphragm 3 reaches the end of its travel, the space 8 is virtually closed up and the whole of the gas will have passed into the reservoir 28. The user than releases the pressure and the valve closes under the action of the spring 9, and the same time the gas lifting the washer 14 and refilling the chamber 8. Then, a new pump action can be initiated and, if required, pumping recommenced until the reservoir 28 has been filled with the desired quantity of gas, this advantageously being indicated in the operating instructions for the bottle as a function of the kind of lighter being filled. This quantity is calculated so as to leave within the reservoir 28 the desired free space which will prevent any dangerous excess pressure build-up.

In the alternative embodiment shown in FIG. 5, the general principle of operation remains the same although there are slight differences in detail. In this embodiment, the valve 7′ is closely linked with the means which provides the one-way gas flow passage from the bottle to the dosing chamber. In this embodiment, the mounting 4′ for the flexible diaphragm no longer contains any orifice 12, 13, but the boss 4′*a* of the mounting 4′ is provided at its internal end 4′*b* with an opening 40 for the passage of a rod 41 integral with the valve 7′. The spring 9 then seats around the opening 40. The boss 4′*a* is screw-threaded at 42, a seal 43 being interposed in a component 44 of inverted cup form containing a bore 45 in which

the rod 41 can slide and which is separated from the screw-thread portion 42 by a shoulder against which the base 4'*b* of the boss 4'*a* can abut. The base of the component 44 contains a narrow axial orifice 46 through which the bore 45 can communicate with the interior of the bottle, and the seal 43 is located in a groove 47 in the bore 45 surrounding a frusto-conical projection 41*a* with a certain degree of clearance, said projection terminating the rod 41 and acting as a valve. The length of the bore 45 will preferably be such that when the valve head 7' is at the end of its inward travel, the projection 41*a* bears against the orifice 46 in order to seal it off.

The principle of operation of this variant embodiment is substantially the same as the embodiment shown in FIGS. 1 and 2 except in the fact that in the inoperative condition, the orifice 46 allows the liquid gas to flow through the bore 45, the annular space defined between the projection 41*a* and the seal 43, the annular space defined between the cylindrical part of the rod 41 and the opening 40, and the interior of the boss 4'*a*, in order to arrive in the chamber 8. When the spigot 6' is retracted to the maximum by compressing the spring 9, in the same manner described in relation to the spigot 6 and the spring 9, the projection 41*a* closes off the orifice 46 and at the same time the seal 43 comes into intimate contact with the cylindrical part of the rod 41 and completes the seal. If, as a consequence of the construction, there is no sealing contact between the projection 41*a* and the orifice 46, or if this contact is not achieved for some accidental reason or other, the seal 43 nevertheless ensures that the interior of the boss 4'*a* is gas-tight, i.e. isolates the chamber 8 from the interior of the bottle.

If, for any reason, the pressure within the chamber 8 becomes excessive (for example as a consequence of accidental blocking of the path followed by the gas), the safety valve 21 shown in FIG. 1 comes into operation and enables a desired quantity of gas to return to the interior of the bottle. It also enables the bottle to be refilled at the factory if no special filling opening is provided.

In practice, it is necessary to protect the spigot 6 of the valve head 7 in order to prevent the bottle being operated inadvertently. This kind of protection is obtained when the bottle has not been used, by means of the protective cover which fits the periphery of the flange 1*b*. It is advantageous to use this cover as a mounting for different sized connectors 22 which can be used to adapt to different kinds of lighters.

A cover in accordance with the invention is shown in FIGS. 6 to 8. It will be seen from the drawings that it is made up of two parts: a base indicated generally at 48, and an outer cap 49 (FIG. 6). The base 48 is provided on its periphery with a skirt portion having a rim 48*a* which fits the flange 1*b* (FIG. 8), and a central boss 48*b*. As FIG. 7 shows, the boss 48*b* comprises a central cylindrical portion and a number of hollow ribs 48*c*. Between the ribs 48*c* extends a plate 48*d* equipped with means for storing a number of connectors 22. These means may for example take the form of punched projections or separately inserted components, which lodge in the bore 24 of each connector 22; punched formations of this kind can be seen at 50 in FIG. 6. The outer cap 49 is preferably transparent; it fits on the base 48 in order to keep the connectors 22 in position and prevent them falling out. Any desired means can be provided for fixing the outer cap 49 to the base 48. FIG. 8 shows the cover fitted to the flange of the bottle and with the connectors 22 in position. The number of these connectors is arbitrary, in the example of FIG. 7, there are six of them.

The embodiments described and illustrated here have been given purely by way of example and are open to numerous modifications without departing from the scope of the invention. In particular, the pumping means could comprise a piston operable from the exterior of the bottle, the valve normally being maintained against its seat by a spring whose load is overcome by the piston. In another embodiment, these means could be constituted by a flexible deformable wall which would constitute the wall of the dosing or metering chamber and could be distorted by the user in order to operate in accordance with the principle of a rubber bulb, the flexible wall being to this end rendered integral with a rod for example which projects outside the bottle.

In addition, a plunger tube could be arranged inside the bottle, or at any suitable position if the tube were flexible and weighted at the end forming the liquid connection, this in order to avoid the need to tip the bottle upside down for the purpose of filling the lighter.

What I claim as my invention and desire to secure by letters patent of the United States is:

1. A gas bottle for filling gas lighters comprising a body for containing liquid gas, a cap closing one end of said body and having a central opening therein, a diaphragm mounting member secured to said cap, a diaphragm mounted on said mounting member and cooperating therewith to define a metering chamber whose volume is a submultiple of the volume of the lighter to be filled, said diaphragm mounting member having an orifice therein providing communication between the interior of said body and said metering chamber, non-return valve means in said orifice for opening and closing the orifice to selectively permit gas to flow from the interior of the body into said metering chamber, said diaphragm having an opening therein contiguous with said opening in the cap, valve means for closing said openings to selectively discharge gas from said metering chamber including a spring biased valve member forms a partition between the interior of the body and the metering chamber, said partition containing safety valve means communicating said metering chamber with the interior of said body for returning gas from said metering chamber to the body of the bottle when a predetermined pressure is developed in said metering chamber, said safety valve means further providing member arranged to engage said diaphragm adjacent said diaphragm opening and having a spigot projecting through said openings, said spigot having a passage therein for providing communication between said metering chamber and the exterior of said body, said passage being normally closed by said diaphragm and opened upon compression of said diaphragm against said spring bias, wherein said diaphragm mounting member forms a partition between the interior of the body and the metering chamber, said partition containing safety valve means communicating said metering chamber with the interior of said body for returning gas from said metering chamber to the body of the bottle when a predetermined pressure is developed in said metering chamber, said safety valve means further providing means to fill or refill said body in pressurized liquid gas, and means operatively associated with said spigot for compressing said diaphragm upon engagement with a filling valve in said lighter.

2. A bottle as defined in claim 1 wherein said diaphragm mounting member includes a boss formed therein, said valve member being assembled in said boss and projecting inside said body.

3. A bottle as defined in claim 2 wherein said diaphragm includes a sealing washer surrounding said spigot at said cap opening, said cap opening having a diameter sufficient to receive said connector in engagement with said sealing washer.

4. A bottle as defined in claim 2 wherein said boss has said orifice formed in its internal end and said non-return valve means comprises a generally cupped shaped component secured to said boss having a bore therein providing communication between the interior of said body and said orifice and metering chamber, an annular seal secured in said bore and an elongated rod secured to said diaphragm for closing said bore by engagement with said annular seal when said diaphragm is compressed.

5. A bottle as claimed in claim 1 in which the safety valve means is assembled in the mounting of the diaphragm.

6. A bottle as claimed in claim 1 in which the non-return valve means comprises a sealing washer arranged in a counterbore of the orifice which provides communication between the interior of the body and the metering chamber, said

washer being arranged to bear against the annular shoulder formed at the junction between the orifice and the counterbore, under the influence of the pressure prevailing in the metering chamber, and means for retaining said washer in the counterbore.

7. A bottle as claimed in claim 1 in which the non-return valve means comprise a projection on the diaphragm which, when the diaphragm is distorted, sealingly engages in a toroidal seal located in a recess in the said orifice.

8. A bottle as claimed in claim 1 including a protective cover for said spigot comprising a base in the form of a plate containing locations for holding different detachable connectors for adaptation to various kinds of lighter filler valves, said connectors forming said means operatively associated with said spigot for compressing said diaphragm, the center of said plate having a boss from which separating partitions extend, and a cap for retaining the connectors in position, said plate having a peripheral rim directed in the opposite direction to the plate boss and designed to fit around the cap of said body.

9. A bottle as claimed in claim 8 in which the cap is transparent.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,653,416 Dated April 4, 1972

Inventor(s) Robert R. Hocq

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 6, lines 28-34, delete "member forms a partition---said safety valve means further providing"; and

Column 8, line 9, insert--protective cover -- before "cap".

Signed and sealed this 15th day of August 1972.

(SEAL)
Attest;

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334