Sept. 22, 1964 SHINJIRO KOBAYASHI 3,149,484

LIQUID GAS FUELED LIGHTER

Filed July 31, 1962

FIG. 1.

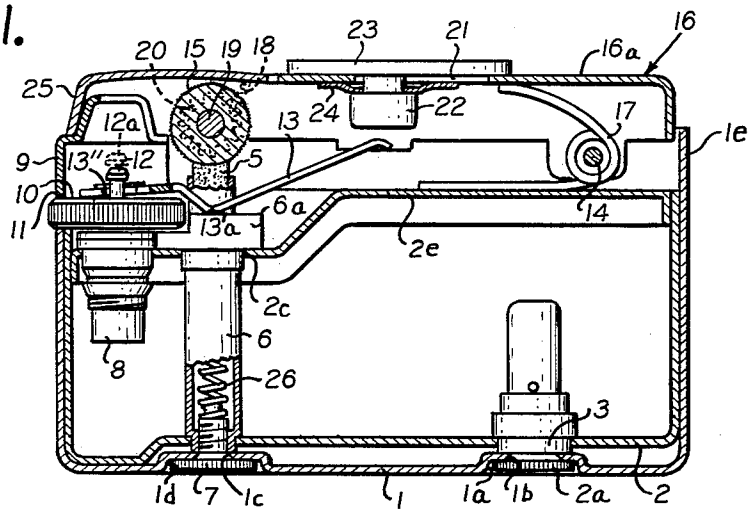


FIG. 2.

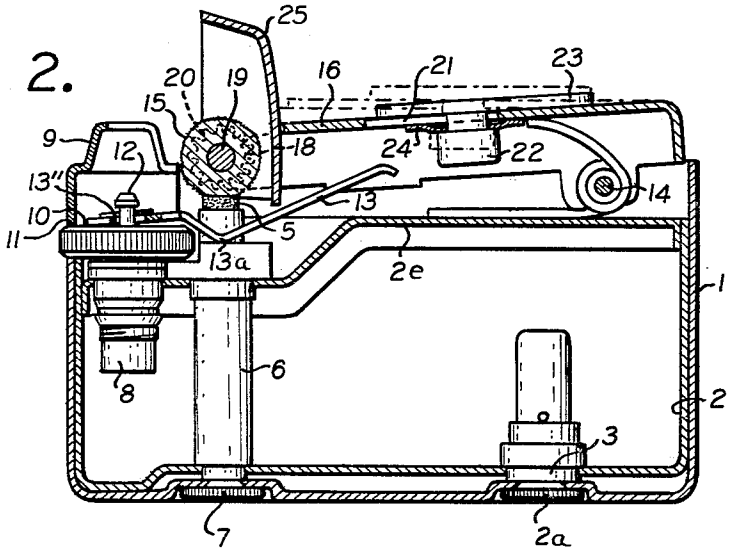
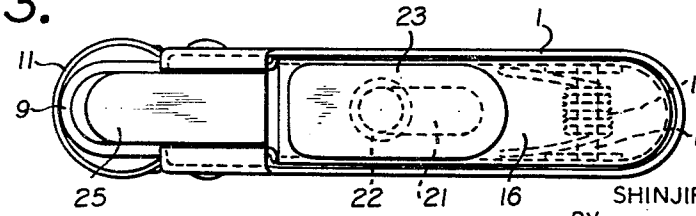


FIG. 3.



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United States Patent Office 3,149,484 Patented Sept. 22, 1964

3,149,484

LIQUID GAS FUELED LIGHTER

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Filed July 31, 1962, Ser. No. 213,679
Claims priority, application Japan, Aug. 22, 1961, 36/29,689
6 Claims. (Cl. 67—7.1)

This invention relates to a lighter wherein liquefied petroleum gas is used as a fuel.

More particularly, the present invention is concerned with pyrophoric lighters wherein the fuel is maintaned under pressure and supplied as required by means of a valve, and a sparking mechanism is provided to ignite the supplied fuel. The fuel supply and sparking mechanisms are operable either simultaneously or the sparking mechanism is operable individually.

In conventional pyrophoric lighters liquid fuel is provided under atmospheric pressure. Its volatility is relatively low and it is stored in the casing of the lighter. A wick is immersed at one end in the liquid fuel and the other end projects outwardly from the casing to a point adjacent the sparking wheel. As long as there is fuel in the casing, the wick remains saturated and readily ignitable and no valve is provided to regulate the supply of fuel.

In the conventional pyrophoric lighters in which fuel is maintained under pressure no wick is provided and the fuel supplied is usually in excess of the amount required for the purpose of producing a flame. A conventional valve is used to permit the gas to escape when needed and to shut off the flow of gas when it is no longer needed. Two types of lighters are now provided which use valves to deliver the fuel; one type of lighter requires a two-finger operation and the other type requires a single-finger operation. The two-finger operated lighter provides for no mechanical connection between the valve mechanism and the sparking mechanism, whereas the single-finger operated lighter provides for the mechanical interconnection between the valve mechanism and the sparking mechanism but includes no means to operate the sparking mechanism individually or simultaneously with the valve mechanism.

It is a principal object of the presnet invention to provide a liquefied gas fueled lighter in which the gas supply mechanism and the sparking mechanism are operable simultaneously or the sparking mechanism is operable individually.

A further object of the invention is to provide a single-finger operated liquefied gas fueled lighter having selective mechanical connection means between the fuel spout valve operating mechanism and the spark operating mechanism.

Another object of the invention is to provide a liquefied gas fueled lighter, which is so constructed that an underisable spurt of fuel gas can be effectively prevented and thus an otherwise possible considerable loss of the fuel may be reduced to a minimum.

Another object of the invention to provide an improved gas fueled lighter, which prevents effectively an unintentional ignition of spouting gas, thereby eliminating any fear of fire damage to the human body and the like.

Yet another object of this invention is to provide a gas lighter in which the opening operation spark producing operation may be effected separately so as to inspect the operating status separately, and consequently, any obstruction or any defectively operating part in either of the sparking or valve mechanisms may be easily ascertained.

In order to attain the above objects, there is provided control means to establish an intentional operative connection between said both mechanisms. Under these conditions, the spouting of fuel gas flow and the production of igniting sparks can be simultaneously carried out upon depression of a conventional operating member by the tip end of a finger. With the control means shifted to its non-operative position, the aforementioned operative connection is broken so that a depression of the operative member will not invite fuel gas spouting, yet accompanied by the production of sparks.

In a preferred form of the invention, the control means is formed into a slide, which is slidably mounted in a slot formed in the aforementioned operating member and provided with a pusher. This pusher is adapted to act upon the free end of a gas spout nozzle operating lever, when the operating member is depressed.

Yet another object of the present invention is the provision of an improved lighter of the above character which is of simple design and construction, economical to manufacture, and highly efficient in the accomplishment of its intended purpose.

The objects, advantages and nature of the invention will be fully understood from the following description of a preferred embodiment of the invention, shown, by way of example, in the accompanying drawing, in which:

FIG. 1 is a sectional side elevation view of a gas lighter made in accordance with this invention especially showing the control means positioned in its operative position and the whole mechanisms are ready for operation.

FIG. 2 is part of a sectional side elevation view of the gas lighter, wherein the control means is shifted to its off-service position so that the gas spout nozzle is kept in its ineffective or closing position, yet the control member has been depressed from its normal position shown in dash-dotted lines to its working position so as to turn a sparking wheel and a burner cap to their working position.

FIG. 3 is a top plan view of the lighter in its closed position shown in FIG. 1.

In order to simplify the drawing, portions of the lighter and its operating mechanism not essential to an understanding of the invention have been omitted.

Referring now to FIGS. 1 to 3 of the drawing, a gas fueled lighter is shown which includes an outer casing **1** having a hollow interior for the reception of a fuel container or tank **2** adapted to be filled with a combustible gas fuel such as butane or propane gas, maintained in the liquid phase under a pressure higher than atmospheric pressure.

The tank **2** is formed in the bottom wall thereof with a reception opening **2***a*, in which a fuel inlet assembly **3** of the conventional design and having therein a non-return valve (not shown) is tightly fitted, as shown in FIG. 1, although the sealing means is omitted for the simplicity of the drawing. The bottom wall of the outer casing is recessed as at **1***a* and provided therein with a reception opening **1***b*, through which the outwardly projecting reduced end of said fuel inlet assembly passes. Although not shown, the reduced end is male-threaded and a screw cover **4** is screwed on from the outside of the outer casing, while the major part of the inlet assembly is positioned within the interior space of tank **2**.

A couple of registering tapped openings **2***c* and **2***d* are formed through the upper wall **2***e* and the aforementioned bottom wall of tank **2** and a single-wall, open-ended flint tube **6** having an enlarged portion **6***a* is snugly screwed into said both tapped openings until the portion **6***a* abuts against the upper tank wall as shown, thereby assuring flint tube **6** to be held in position as shown. Conventional sealing means are also provided for ensuring

effective sealing around each of said two tapped openings 2*c* and 2*d*, respectively, although not shown in the drawing for simplicity.

At the open upper end of the tube 6, a flint 5 is loosely inserted and urged upwardly by a coiled spring 26 for obtaining pressure engagement with a rotatable serrated sparking wheel 15 of the usual type. The other end of the tube projects from the bottom of tank 2 and is closed by a screw plug cap 7. The cap 7 is screwed through a plain passage opening 1*c* in the casing bottom snugly into the female-threaded lower end of flint tube 6 for holding the coil spring. The casing bottom is formed with a recess 1*d* for the reception of the enlarged head of plug cap 7, just in the same manner as the recess 1*a* for screw cover or plug 4. By such provision and arrangement of these plugs 4 and 7 as above described, the tank 2 is held in its working position within the interior of outer casing 1 with superior stability. On the other hand, the through arrangement of flint tube 6 as described above serves also considerably to increase the rigidity of tank 2.

Adjacent the flint tube 6 and threadedly passing through the top wall 2*e* of tank 2, there is provided a valve casing 8 of the conventional design removably secured to the top wall and a wind shield 9 is positioned above the casing so as to form a space gap 11 between the front end of the tank top and the lower front margin of said shield 9. A conventional gas flame adjusting knob 10 is turnably assembled with valve casing 8 and partially projects outward through said space gap 11, thus giving access to the knob for manual operation thereof when it is desired to control the gas flame as in the conventional technique.

A fuel emission valve mechanism is, although not shown, contained within valve casing 8 to provide communication with the interior of tank 2 and includes a spout nozzle or burner head 12, projecting a distance upwardly from said valve casing. Such a construction is conventional, so that only the latter is shown and described herein for the simplicity of description. Briefly, the valve mechanism normally impedes the spouting or emission of gas contained in the tank 2 and is closed and opened by the up and down or vertical movements of the gas spout nozzle. The movement of the nozzle is constrained to move in a direction along the axis of valve casing 8.

The gas lighter comprises a valve operating lever 13 to effect a valve closing and opening for the gas contained in tank 2. The lever is abruptly bent at its intermediate point so as to provide a pivot edge 13*a*, which abuts on a radial flange surface formed on the enlarged portion 6*a* of flint tube 6. The left or operating end of lever 13 is mechanically connected to the gas spout nozzle so that when the right or free end of the lever is depressed, the nozzle or burner head 12 is elevated in its position as shown by a dotted line 12′ to allow the spouting or emission of gas contained in the tank 2 through the nozzle. Upon release of the pressure acting on the lever, on the other hand, the gas spout valve or nozzle is caused to descend under the influence of a spring contained in the valve casing 8, as in the conventional art, so as to impede the gas flow spouting through the nozzle. Such a conventional construction is shown and described more in detail in FIG. 5 of the drawing and the related description in the specification in my copending U.S. application Ser. No. 105,759 filed April 26, 1961. If necessary, therefore, reference shall be had thereto.

An operating mechanism or cover member 16 is provided at one end thereof with gear rack teeth 18 geared with the gear wheel 20 to operate a sparking wheel 15 and rotate a burner cap 25, and the other end of the operating mechanism is pivoted on a shaft 14 mounted on an inward side near the end of the upper peripheral edge 1*e* of the outer casing 1 at the end opposite valve casing 8 and burner head 12. If necessary, the gear wheel 20 may be increased to two. The operating member 16 is spring-

biased in an upward direction by means of a torsion spring 17 which has one leg pressing against the underside of cover member 16 and the other leg pressing against the top wall 2*e* of the tank.

In the top wall 16*a* of the operating member, an elongated slot 21 extends longitudinally a distance at the central area of the member, for the slidable reception of a control piece 23, which has a pusher 22 at the lower end thereof passing through said slot. A couple of leaf springs 24 are fixedly attached to the stem of control piece 23 and kept in pressure, yet slidable engagement with the underside of the member 16 so as to exert a reasonable frictional resistance. Thus, an intentional and considerable effort must be given to the control piece to shift it horizontally and longitudinally of the member 16 in either direction. When the control member is slidably shifted from its normal or non-operative position shown in FIG. 2 to its left extreme operative position, FIG. 1, the pusher 22 will occupy a position opposite the right or free end of valve operating lever 13, yet at a distance therefrom, as clearly seen from FIG. 1. On the contrary, when the control member is at its right extreme position, it is kept in its perfectly non-operative position, thus there being no possibility of interference with the valve operating lever regardless of the position of the operating member 16.

Burner cap 25, gear wheel 20 and sparking wheel 15 are fixed on the shaft 19 so as to rotate together as a unit with the flint in engagement with the sparking wheel to provide sparks upon rotation of cap 25 and uncovering a wind shield 9, which is fixedly positioned above the gas spout nozzle at a proper distance therefrom, so as to protect the ignited gas flow from occasional extinction by a strong wind. In order to initiate and ignite the gas flow, the control piece 23 is brought into its operative position, FIG. 1, by a finger's end as in the aforementioned way and then the operating member 16 is depressed by the same finger's end such as the thumb of a hand so as to exert a pressure upon the free end of valve operating lever 13 for turning it about pivot edge 13*a* in the clockwise direction when seen in FIG. 1. By the operative engagement of gas spout nozzle 12 with the lever 13 at its left or operative end, preferably formed into a fork for this purpose, although not shown in detail, the nozzle is elevated in to its spouting position as described hereinbefore, so as to release the gas contained in the tank through the nozzle to form a gas flow to be ignited. At the same time, the gear wheel 20 is actuated by rack teeth 18 on the member 16 to turn the mounting shaft 19 in the clockwise direction, so that sparking wheel 15 and cap 25 are rotated in the same direction as said above, thereby the cap being brought into its vertical open position as illustrated in FIG. 2. By the rotation of sparking wheel 15 kept in pressure engagement with flint 5, sparks will be released for the desired igniting purpose.

With the control piece 23 positioned at its non-operative position, FIG. 2, so as to remove its pusher 22 from the working range with the free end of operating lever 13, however, a depression of the operating mechanism 16 into its otherwise operative or downmost position as illustrated in full line in FIG. 2 will result in no influence upon the lever 13, thus the spout nozzle 12 being kept in its non-operating position as before. In this case, therefore, a gas flow through the spout nozzle will not establish, so that even though the rotation of both the cap 25 and the sparking wheel 15 is caused to take place as before, any ignition will not be invited. It will be thus clear from the foregoing that the selective positioning of control piece 23 will provide a possibility to avoid unintentional fuel gas purge and ignition thereof even when the operating mechanism has been unintentionally depressed, which fact means decidedly a remarkable technical progress in the conventional art.

While there has been described what is at present con-

sidered to be the preferred embodiment of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the scope of the invention.

What I claim is:

1. A lighter of the type described comprising a casing, a fuel tank in said casing, means connected to said tank for allowing the introduction of fuel into said tank, a valve connected to said fuel tank and movable between a valve open position wherein the fuel in said tank is allowed to flow from said tank and a valve closed position wherein no fuel is allowed to flow from said tank, means biasing said valve to the closed position, a cover member rotatably mounted adjacent one end thereof to said casing and adapted to be depressed from a normal position, spring means biasing said cover to the normal position, sparking means adjacent said valve connected to said cover member for producing a spark when said cover member is depressed, and interconnecting means movably mounted to said cover and connected to said valve and movable between a position wherein said interconnecting means is operative to move the valve to the valve open position when said member is depressed and a position wherein said interconnecting means is inoperative to move said valve to valve open position when the cover member is depressed.

2. A lighter of the type described comprising a casing, a fuel tank in said casing, means connected to said tank for allowing the introduction of fuel into said tank, a valve connected to the top of said fuel tank and movable between a valve open position wherein fuel in said tank is allowed to flow therethrough and a valve closed position whereby no fuel is alowed to flow therethrough, means biasing said valve to the valve closed position, a cover member mounted to said casing and adapted to be depressed from a normal position, biasing means biasing said cover to the normal position, spark means adjacent said valve connected to said cover for producing a spark when said cover is depressed which causes the fuel flowing from the valve to ignite connecting means connected to said valve for moving said valve to valve open position, slide means slidably mounted to said cover and adapted to be moved between a position wherein said slide means engage said connecting means to move said valve to valve open position when the cover member is depressed and a position wherein said slide means does not engage said connecting means when said cover member is depressed.

3. A lighter of the type described comprising a casing, a fuel tank in said casing, means connected to said tank for allowing the introduction of fuel into said tank, a valve on said fuel tank axially movable between a valve open position whereby fuel in said tank is allowed to flow therethrough and a valve closed position whereby no fuel is allowed to flow therethrough, means biasing said valve to the valve closed position, a spark wheel rotatably mounted in said casing adjacent said valve, a flint in said casing in abutment with said wheel, a cover member rotatably mounted adjacent one end thereof to said casing and adapted to be depressed from a normal position, spring means biasing said cover to the normal position, means connecting said wheel and said cover and operative to rotate said wheel when said cover is depressed, a lever

connected to said valve and pivotally mounted within said casing for moving said valve from the valve closed position to the valve open position, a longitudinally extending slot in said cover, and means slidably received within said slot and movable between a position wherein said means pivots said lever to move said valve to valve open position when said cover is depressed and a position wherein said means does not pivot said lever when said cover member is depressed.

4. A lighter of the type described comprising a casing, a fuel tank in said casing, means connected to said tank for allowing the introduction of fuel into said tank, a valve on said fuel tank being movable between a valve open position whereby fuel in said tank is allowed to flow through said valve and a valve closed position whereby no fuel is allowed to flow through said valve, means biasing said valve to the valve closed position, a cover member rotatably mounted adjacent one end thereof to said casing and adapted to be depressed from a normal position, spring means biasing said cover to the normal position, a burner head rotatably mounted to said casing and operable to cover said valve, means connecting said burner head and said cover member for rotating said burner head to a position wherein said valve is uncovered when said cover member is depressed, a spark wheel rotatably mounted on said casing adjacent said valve, means connecting said wheel with said cover member for rotating said wheel when said cover is depressed, a flint tube having a flange near one end thereof extending through said tank below said wheel, a flint carried in said tube projecting above the end of said tube in abutment with said wheel, biasing means in said tube biasing said flint into engagement with said wheel, a lever connected to said valve and pivotally mounted in said casing being adapted to move said valve from the valve closed position to the valve open position when rotated about the pivot, and a slider slidably mounted on said cover member and being adapted to be positioned to engage and rotate said lever about said pivot when said cover is depressed and being further adapted to be moved to a position whereby said lever is not engaged by said slider when said cover is depressed.

5. A device as defined in claim 4, and a longitudinally extending slot in said cover member for receiving said slider, said slider comprising a longitudinally extending top portion above the cover and an integral lower portion below the cover interconnected by a stem, said lower portion being normally spaced from the lever when the slider is in said lever engaging position and the cover member is in said normal position.

6. A device as defined in claim 4, wherein said lever has a sharp bend therein intermediate the ends, said sharp bend abutting the flange on said flint tube to form said pivotal mounting for said lever.

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