

[54] BUTANE GAS LIGHTER

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[51] Int. Cl. .... F23d 13/04

[58] Field of Search. .... 431/130, 131, 143, 150, 344; 222/3

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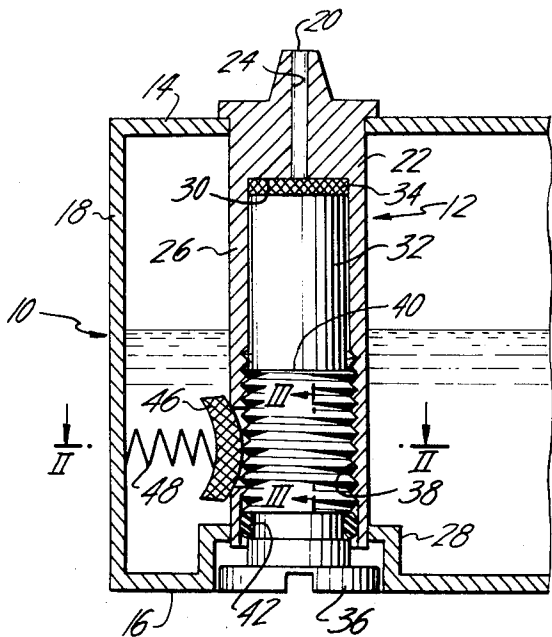
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[57] ABSTRACT

A liquefied gas lighter has a tank for containing liquefied butane or like fuel, and a burner unit that extends from an external orifice through the top of the tank to or near the bottom of the liquid in the tank. The burner is smoothly adjustable. A porous member with fine pin holes covers the opening from the tank to deliver low-pressure gas from the high-pressure liquid, stabilizing the flame. A small-bore passage extends from the external burner orifice to an internal transverse abutment at the top of a large-bore tubular part of the burner unit. A compressible gas-permeable disc is squeezed between the transverse abutment and the top of a rod. In one form, there is an adjustment screw that presses against the bottom of the rod. In another form, the transverse abutment and the burner orifice form a top part that is screw-threaded into a tubular part of the burner unit and the bottom of the rod bears against a stop.

1 Claim, 4 Drawing Figures



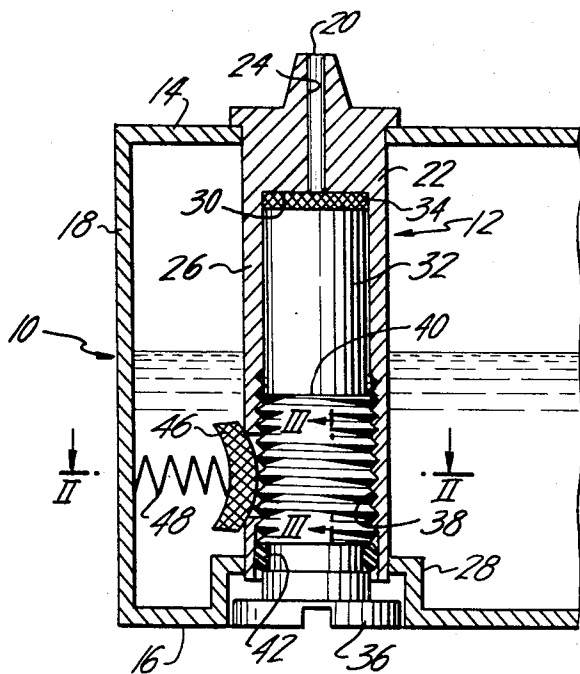


FIG. 1

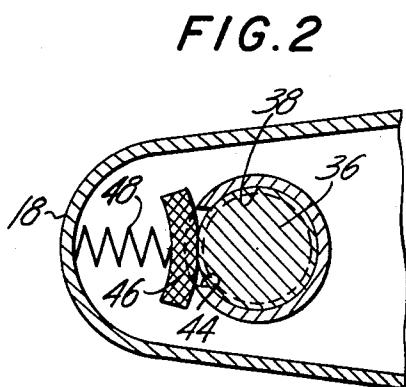


FIG. 2

FIG. 3

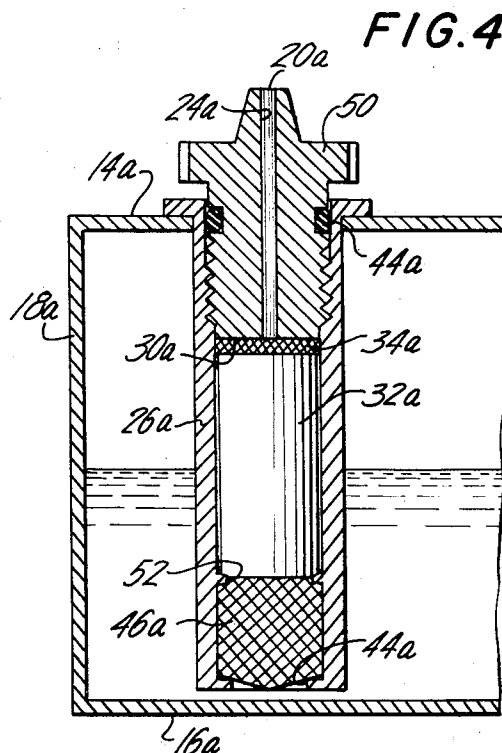
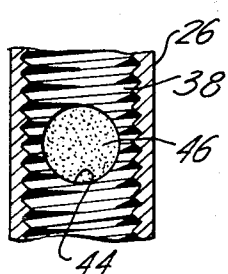


FIG. 4

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**BUTANE GAS LIGHTER**

This invention relates to lighters for cigarettes and the like, using butane or other liquefied gas lighter fuel. The burner unit in such lighters has been made in many ways, most of them very complicated. In such lighters there is usually an adjustment for controlling the rate of gas supply to the burner orifice. This adjustment should be smooth or gradual, and it should remain constant as adjusted. The objects of this invention reside in providing a smooth-working, stable adjustable burner unit for liquefied-gas fuel lighters, of simple and inexpensive yet excellent construction.

In one form of lighter described below, the adjustment is made at the bottom of the lighter. This is sometimes preferred. In a second form of lighter described below, the adjustment is at the top, also a popular place to make the adjustment. The present invention is adaptable to both. The liquid fuel in the tank of the lighter enters the burner unit near the bottom, through a porous member, preferably a sponge made of a synthetic plastic. The fuel passes along the exterior of a rod in a close-fitting bore, to and through a compressible gas-permeable disc, to be delivered to the burner orifice. The compression of this disc is smoothly controllable, for gradually changing and stably maintaining the flame size.

The nature of the invention, including the foregoing and other objects, novel features and advantages will be better appreciated from the following detailed description of two illustrative embodiments of the invention shown in the accompanying drawings.

In the drawings:

FIG. 1 is an enlarged vertical cross-section of the fuel-containing tank and burner unit of a lighter embodying features of the invention, part of the tank being broken away;

FIGS. 2 and 3 are fragmentary cross-sections of the fuel tank and burner unit of FIG. 1 along the cross-sectional planes II—II and III—III; and

FIG. 4 is an enlarged vertical cross-section of another fuel-containing tank and the burner unit embodying further features of the invention, part of the tank being broken away.

FIG. 1 shows a novel tank 10 and burner unit 12 of a cigarette lighter. The refilling valve and the orifice-covering cap, the igniter and the manual operating mechanism of such lighters are conventional and are omitted from the drawing. Tank 10 includes top wall 14, bottom wall 16 and lateral wall 18 united to form a sealed container for containing liquefied fuel under pressure. The fuel is converted to its gaseous state in burner unit 12 and the gaseous fuel is supplied at an adjustable rate to external burner orifice 20.

Burner unit 12 includes a member 22 that has a burner orifice 20, a small-bore gaseous fuel passage 24 and a large-bore portion 26. The lower half of the large-bore portion 26 (as shown) is threaded internally. Burner unit 12 extends through top and bottom walls 14 and 16. The burner unit is brazed or otherwise joined and hermetically sealed to top wall 14, and it is similarly joined and sealed to a recessed portion 28 in bottom wall 16.

Transverse abutment 30 forms the top of large-bore portion 26. Cylindrical rod 32 is contained in large-bore portion 26. Rod 32 is long compared to its diameter, the length being nearly twice the diameter in the

form shown. Rod 32 is received in a cylindrical bore of tubular portion 26 with only enough clearance or looseness to form a gas passage.

A disc 34 of gas-permeable compressible material is confined between the top of rod 32 and abutment 30. Those two surfaces are ideally parallel to each other, perpendicular to the axis of rod 32.

A screw 36 has its slotted head exposed externally at cup 28 for manual operation. Screw-threaded portion 38 of tubular portion 26 receives the threaded portion of screw 36. The end 40 of screw 36 presses against the lower end of rod 32. The engaging surfaces of screw 36 and rod 32 are both perpendicular to the common axis of rod 32 and screw 36. An O-ring 42 is confined and slightly compressed between a cylindrical part of screw 36, and a cylindrical surface of tubular portion 26.

An opening 44 is formed in tubular portion 26 near the bottom of the tank. A synthetic sponge 46 covers this opening, being held in this position by a light compression spring 48. The fit of the screw 36 in threads 38 allows space for gas to pass from body 46 to rod 32. Otherwise, one or more grooves as gas passages can be formed in the screw-threaded portion 38, along tubular portion 26 between opening 44 and the section occupied by rod 32.

In operation, liquefied fuel in tank 10 enters tubular member 26 at opening 44, passing through porous body 46. The liquid or gas fuel passes along the clearance space between rod 32 and tubular portion 26 and reaches the outer edge of gas-permeable disc 34. This disc is compressed between the abutment end of rod 32 and transverse abutment 30. Gaseous fuel enters bore 24 and is supplied to burner orifice 20.

Because the top end of rod 32 is parallel to abutment 30, disc 34 is compressed evenly and provides a uniform flow of gas. Screw 38 can be rotated for adjusting the compression of disc 34 to restrict the gas flow for the desired flame size. The rotation of the screw adjusts the flame smoothly because the top of screw 36 is transverse to the screw axis and presses smoothly against the flat lower end 40 of rod 32. The great length of rod 32 helps in assuring smooth, gradual adjustment since any possible tendency of screw 36 to cause side-to-side tilting or shift of the top of rod 32 is minimized. There is only a slight clearance between the diameter of rod 32 and the bore in which it fits. The described burner unit provides for smooth-working flame adjustment.

A stabilized flame is important to satisfaction in using cigarette lighters. The pressure of the liquid in the tank is high and it may vary. The gas pressure in the burner unit is low. A uniform supply of gas is promoted in the described construction by choosing a porous member 46 of suitably fine hole size and by adopting a standardized small gap or clearance between the relatively long rod 32 and the tubular portion 26.

In FIG. 4, parts corresponding to the parts of the lighter in FIGS. 1-3 have like numerals bearing the suffix *a* and their description is not repeated except to explain the differences.

Burner 20*a* is formed in a manually operable screw-threaded portion 50 of the burner unit and operates transverse abutment surfaces 30*a* to bear against compressible gas permeable disc 34*a* on the transverse upper end of rod 32*a*. O-ring seal 42*a* is confined

between cylindrical surfaces of tubular portion 26a and screw-threaded part 50. Tubular portion 26a extends close to the bottom wall 16a of the tank and has an opening 44a of reduced diameter formed by an integral flange that confines porous gas-permeable synthetic sponge 46a. A circular rib 52 acts as stop for rod 32a, preventing downward shift of rod 32a when screw-threaded part 50 is rotated to squeeze part 34a. At arcuately spaced points, rib 52 or the lower end of rod 32a may have notches to act as gas passages from body 46a to the lateral space between rod 32a and tubular portion 26a that forms a fuel passage.

The abutment surface 30a of adjustment member 50 squeezes disc 34a adjustably. Surface 30a is transverse to the axis of member 50. Therefore surface 30a does not wobble during rotation of member 50, and smooth variation of the flame occurs during this rotation. Surface 30a is ideally flat; but it could have other shapes, convex or concave, for example, with similar performance. Surface 30a should be symmetrical about the axis of member 50 for smooth flame-adjustment.

The burner unit of FIG. 4 extends through the top of the tank to its external orifice 20a, and it extends down to the bottom of the tank where the liquid fuel is available even when the supply is low. The fuel penetrates porous body 46a. This structure has been found highly effective in providing a stabilized flame. The burner is adjustable smoothly. The construction is simplified and the manufacturing cost is a minimum.

Variations in the constructions described above will readily occur to those skilled in the art, and therefore the invention should be construed broadly in accordance with its full spirit and scope.

What is claimed is:

1. A liquefied gas lighter including a tank for containing liquefied gas and an adjustable burner unit, said tank having top, bottom and lateral walls, said burner unit including a tubular member having a lower portion extending gas-tight through said bottom wall and having a relatively large bore extending to an integral transverse abutment at the upper end of said lower portion, said tubular member having an upper portion extending gas-tight through said top wall and having a small-bore passage extending through said transverse abutment and to an external orifice, a rod fitting closely in the large bore of said lower portion with sufficient clearance to provide a gas passage along the rod, the length of the rod being much larger than its diameter, the rod having an upper transverse end opposite said transverse abutment, said transverse end and said transverse abutment being parallel to each other, a compressible gas-permeable member between said transverse abutment and said transverse end of the rod, said lower portion of the tubular member having an opening in the tank near the bottom wall, a porous gas-permeable member having fine holes occupying said opening and constituting a restrictive barrier between the liquefied fuel space in the tank and the gas passage in the lower portion of the tubular member, and an adjusting member screw-threaded into the large bore of said lower portion of the tubular member and bearing against the lower end of the rod for compressing said compressible gas-permeable member and thereby adjusting the flow of gas therethrough, and a seal below said opening and about said adjusting member.

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