

Oct. 31, 1967

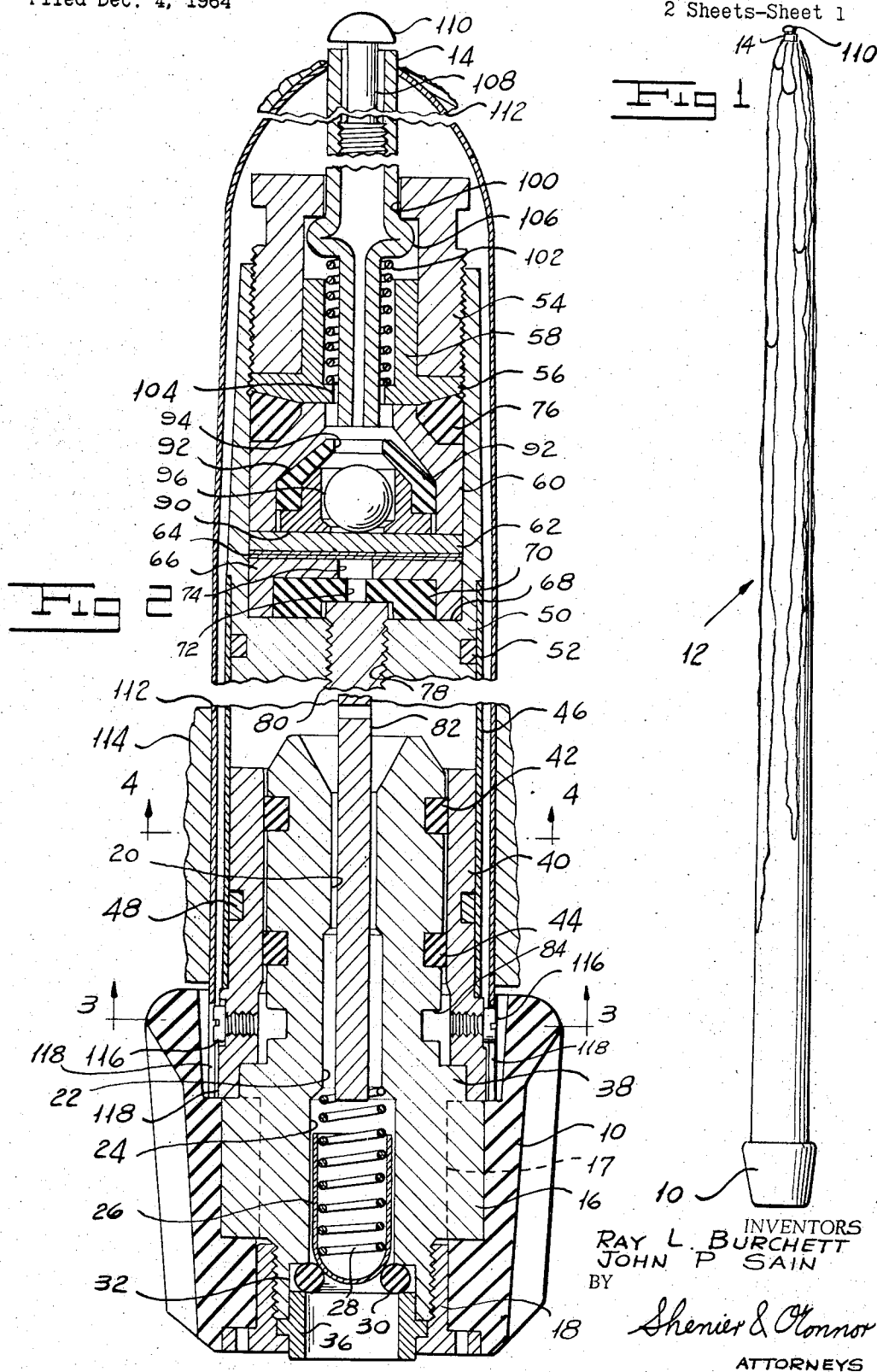
R. L. BURCHETT ET AL

3,349,577

SAFETY GAS-FUELED CANDLE

Filed Dec. 4, 1964

2 Sheets-Sheet 1



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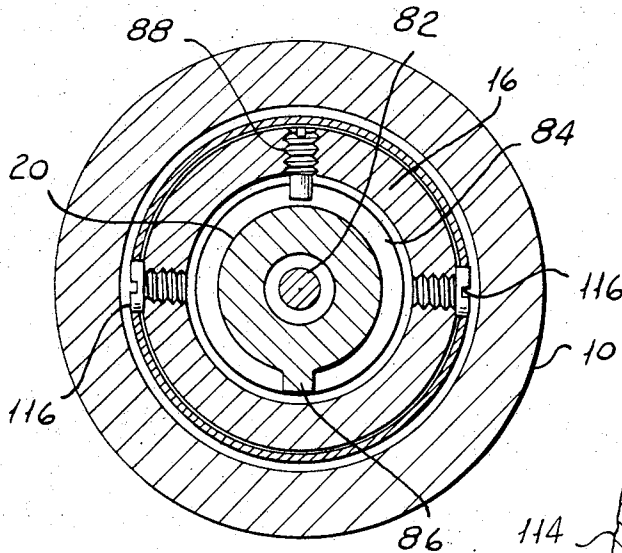


FIG 3

FIG 4

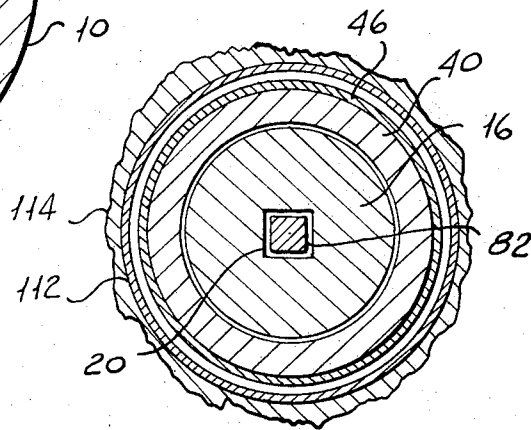
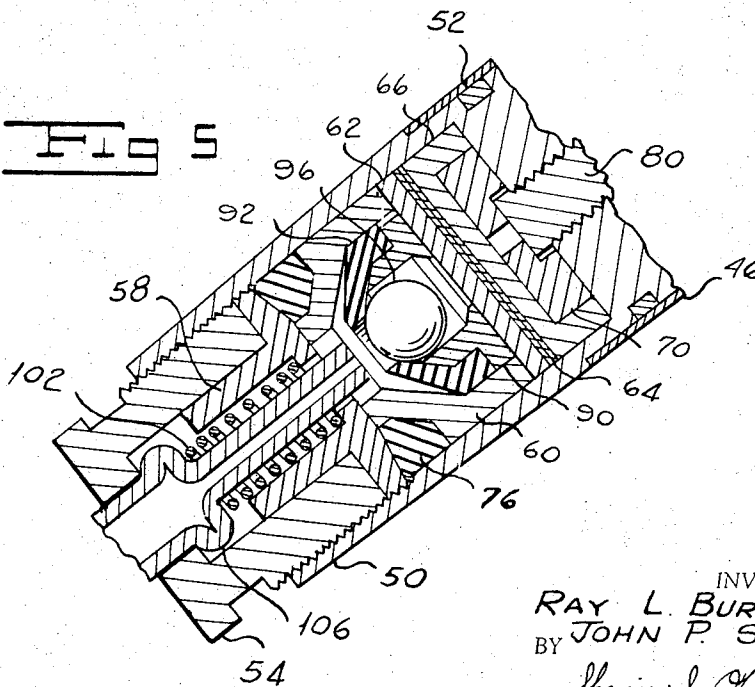


FIG 5



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SAFETY GAS-FUELED CANDLE

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ABSTRACT OF THE DISCLOSURE

A safety gas-fueled candle including a control valve, a maximum flame height pressure regulating valve and a gravity-responsive valve in series between an elongated reservoir holding a supply of fuel and a burner at the top of the candle together with means at the candle base for operating the control valve. The burner is mounted for movement to permit the gravity-responsive valve to be manually reset after operation thereof. A shell normally houses the pressure regulating valve to render it inaccessible. The shell provides a readily replaceable decorative cover.

Our invention relates to gas-fueled candles and more particularly to an improved safety gas-fueled candle which is automatically shut off in the event that the candle topples from its normally vertical position.

There are known in the prior art candles which are fueled with liquefied gas such, for example, as butane. When the on-off valve of the candle is opened, gas under pressure is expelled from the candle burner and may be ignited. In candles of the prior art, in the event that the candle accidentally falls over the flame may ignite flammable articles or otherwise damage articles of furniture and the like.

Some gas-fueled candles of the prior art are provided with an on-off valve which in addition to permitting the escape of gas to the burner mouth affords some adjustment of flame height. In such arrangements the valve may accidentally be adjusted to a condition at which it permits the escape of an inordinate amount of gas so that a flame far beyond the desired maximum results. The danger to persons and articles in the environment of such a device will readily be apparent.

Gas-fueled candles of the prior art customarily are provided either with a translucent housing so that the level of the fuel remaining is apparent or they may be provided with a metal fuel tank which is painted in a color to simulate the appearance of a candle. While these candles function in the manner of the ordinary wax candle to provide light, they are generally unattractive and their appearance is not readily altered.

We have invented a safety gas-fueled candle which overcomes the defects of candles of the prior art pointed out hereinabove. Our gas-fueled candle automatically shuts off the supply of fuel in the event that the candle moves a predetermined distance from its normally vertical position. Our candle avoids the danger of fire which might result if the candle topples. We provide our candle with means for limiting the flame to a maximum flame height. Our candle closely simulates the appearance of a wax candle. We so arrange our candle that its appearance may readily be changed.

One object of our invention is to provide a safety gas-fueled candle which overcomes the defects of gas-fueled candles of the prior art.

Another object of our invention is to provide a safety

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gas-fueled candle which avoids the danger of fire resulting when the candle topples from its normally vertical position.

A further object of our invention is to provide a safety gas-fueled candle in which the supply of gas is automatically cut off when the candle falls from its normally vertical position.

Still another object of our invention is to provide a safety gas-fueled candle which may readily be relit after the supply of gas has been automatically cut off.

Yet another object of our invention is to provide a safety gas-fueled candle having means for determining the maximum flame height.

A still further object of our invention is to provide a safety gas-fueled candle, the appearance of which can readily be changed.

Other and further objects of our invention will appear from the following description.

In general our invention contemplates the provision of a safety gas-fueled candle in which a manually actuatable element adjacent the candle base operates a shutoff valve disposed in series with a maximum flame height adjusting valve and a normally open gravity responsive valve adjacent the top of the candle between the reservoir and the burner. A readily replaceable decorative shell houses the flame height adjusting element. In the event that the candle falls from its normally vertical position to actuate the gravity responsive valve, the burner may be actuated to reset that valve.

In the accompanying drawings which form part of the instant specification and which are to be read in conjunction therewith and in which like reference numerals are used to indicate like parts in the various views:

FIGURE 1 is an elevation illustrating the appearance of our safety gas-fueled valve.

FIGURE 2 is a sectional view of our safety gas-fueled valve.

FIGURE 3 is a sectional view of our safety gas-fueled valve taken along the line 3-3 of FIGURE 2 and drawn on an enlarged scale.

FIGURE 4 is a sectional view of our safety gas-fueled valve taken along the line 4-4 of FIGURE 2 and drawn on an enlarged scale.

FIGURE 5 is a fragmentary sectional view of our safety gas-fueled candle illustrating the mode of operation of the gravity-responsive valve thereof.

Referring now to the drawings, our safety gas-fueled valve includes a base 10, similar in appearance to the conventional candle holder, which supports the candle body indicated generally by the reference character 12. The burner 14 extends from the top of the body 12 so as to simulate the wick of an ordinary wax candle. The hollow base 10 receives a rotor 16 which is held in position within the base by an end cap 18 threaded onto the lower end of the rotor. Conveniently we form the rotor 16 and the base 10 with flats 17 so as to facilitate rotation of each with the other. Moreover we make the base 10 of a resilient material such as rubber or the like which facilitates the assembly operations to be described hereinbelow. We provide the rotor 16 with an axially extending bore having a portion 20 of a non-circular cross-sectional shape such, for example, as a square shape. Below portion 20 the bore has a circular cross-sectional portion 22 and an enlarged bore portion 24. The enlarged bore portion 24 receives a valve 26 normally urged by a spring 28 into engagement with a seat formed by an O-ring 30 held in a recess 32 below bore portion 24 by a retainer 36 carried by the end cap 18. Valve 26 is adapted to be moved upwardly against

the action of spring 28 to permit liquefied gas to be introduced into the candle to replenish the supply. This may be achieved by use of an adapter such as is shown in the copending application of Ray L. Burchett, Ser. No. 299,137, filed July 19, 1963, for a Refill Valve for Gas Lighter, now Patent No. 3,217,762.

An annular shoulder 38 on the outside of rotor 16 receives the lower end of a reservoir support 40. O-rings 42 and 44 carried by the rotor provide a gastight seal between the rotor and the support 40. We secure an elongated tube 46 to the support 40 by means of solder 48. As will be apparent from the description given hereinbelow, the tube 46 forms the tank or reservoir of our gas-fueled candle. We mount a valve housing 50 on the upper end of the tube 46 by solder 52. Interior threads on the upper end of the housing 50 receive an actuable element 54 adapted to be turned in a manner to be described to adjust the maximum flame height to which the candle can be set. Element 54 bears on a flange 56 at the lower end of a burner guide 58. The guide 58 bears on a housing 60, the lower end of which is supported by a pressure plate 62. Pressure plate 62 rests on filter discs 64 carried by the on-off valve seat holder 66 which rests on the base 68 of a recess in the housing 60. The holder 66 receives on-off valve seat 70 formed of a suitable resilient material such, for example, as rubber. We form the seat 70 with an opening 72 through which gas may flow into an opening 74 in holder 66. From the opening 74 the fuel passes through the filter discs 64 and around the edges of the pressure plate 62 into the housing 60. An O-ring 76 disposed between flange 56 and housing 60 prevents the flow of fuel upwardly between housing 60 and the wall of housing 50.

A threaded bore 78 in the base of housing 50 receives the threaded upper end 80 of a rod 82. Rod 82 is adapted to be turned to move the upper end thereof into engagement with the seat 70 to shut off the flow of fuel from within the tube 46 to the opening 72. Normally when the upper end of the rod 82 has been moved away from the seat 70, fuel flows between the threads of bore 78 and the threads on the portion 80 of the rod 82. To achieve this result we may, for example, cut 0.99 thread on 0.93 stock in making the threaded upper end 80 of the rod 82.

Rod 82 has generally the same cross-sectional shape as does the bore portion 20. In the course of assembling our gas-fueled candle, the valve assembly together with the tube 46 and support 40 is assembled on the rotor by passing the lower end of the rod 82 into the bore 20. It will be seen that we countersink the upper end of the bore 20 to facilitate this operation.

We form the rotor 16 with a peripheral annular groove 84 having a stop 86 at one location therearound. After the valve assembly has been slipped on the rotor assembly with the lower end of rod 82 extending into the bore portion 20, we thread a setscrew 88 through the support 40. Screw 88 extends into the groove 84 and permits the rotor 16 to be turned relative to the support 40 through a distance determined by the interengagement of the screw 88 with the stop 86. In response to this relative rotation, the upper end 80 of the rod 82 moves toward or away from the seat 70.

As has been explained hereinabove, when the upper end 80 moves away from seat 70, fuel flows through the threaded bore 78, through opening 72, through opening 74, through the filter material 64 and around the edge of plate 62 and between the plate and the lower end of housing 60 to the space within the housing. We dispose a ball retainer 90 within the housing 60. Retainer 90 carries a resilient member 92, the upper end of which forms a seat 94 for a ball 96 disposed within the retainer 90. Fuel flowing into the housing 60 flows to the space within the retainer 90 and upwardly past ball 96 through the opening of seat 94. So long as the candle

is substantially vertical, the force of gravity acting on the ball 96 is sufficient to hold it away from seat 94. However, when the candle moves out of its generally vertical position, ball 96 moves into engagement with seat 94 to shut off the supply of gas. Owing to the pressure of the gas, the ball remains in engagement with the seat until it is positively restored to its position out of engagement with the seat in a manner to be described.

We provide our valve with a burner 14 extending through an opening 100 at the top of the adjustable element 54. A spring 102 bears between a flange surrounding an opening 104 in the base of guide 58 and a flange 106 formed in burner 14 normally to urge the flange into engagement with the top of the element 54.

Gas traveling past the seat 94 enters the bore of the burner 14 and travels outwardly therethrough. If desired, we may thread the shank 108 of a flame contour having a head 110 into the tip 14 to shape the flame as desired.

In the event that the lighted candle topples so that ball 96 moves into engagement with seat 94 to shut off the supply of gas, the ball will remain in that position under the pressure of the gas even when the candle is reerected. If now it is desired to relight the candle, this may expeditiously be accomplished merely by depressing burner 14 against the action of spring 102 to move the lower end of the burner against the action of spring 102 past the seat 94 to move the ball away from the seat to permit the gas to flow around the ball. Since the pressure of the gas is no longer holding the ball against the seat, the valve will remain in this position until the candle topples.

We provide our candle with a readily removable shell 112 carrying a coating of material such, for example, as candle wax. We may removably mount shell 112 on the candle by any convenient means. For example, we may thread headed screws 116 into the support 40 at a position below the upper end of base 10. The lower end of the tube 112 can be provided with slots 118 adapted to fit over the heads of screws 116 as the tube 112 is frictionally slid over the lower end of the support 40. We could of course use other suitable mounting means such, for example, as detents formed in the tube 112 and adapted to snap into slots or recesses in the support.

It is to be understood that we contemplate that a number of shells 112 carrying a variety of decorative coatings 114 will be used with our candle. It will readily be understood that the shells may be changed to suit various color schemes and they may as well be changed with the seasons. Thus rather than being obliged to purchase a large number of candles, the consumer need purchase only one candle and a large variety of different decorative covers can be used with the same candle. We also contemplate forming the decorative covering 114 from candle wax so that when the candle is lit with the burner tip 14 concealed, the candle closely simulates the appearance of a wax candle. As is known, candle wax is not especially durable. With our readily removable tube 112, the decorative cover can be disposed of and replaced without substantial expense while at the same time maintaining the appearance of a genuine candle.

In assembling our safety gas-fueled candle, we first assemble the regulating valve, the on-off valve and the gravity-responsive valve to form an upper subassembly including tube 46 and support 40, as well as rod 82. We form the lower subassembly including the base 10, the refill valve and the rotor 16. To complete the assembly of our candle, we slip the support 40 over the rotor 16 and at the same time insert the rod 82 into the bore portion 20. When these operations have been achieved, we thread the setscrew 88 through the support to position it so that its inner end is in the groove 84. Under these conditions the parts are held together and the rotor 16 can be turned relative to the support 40 through nearly a complete revo-

lution as determined by the stop 86. Next, we assemble the shell 112 carrying the desired decorative coating over the candle.

In use of our safety gas-fueled candle, the element 54 is set to give the desired maximum flame height before the outer decorative shell is placed on the candle. When this has been done, the candle is ready for use. Normally rotor 16 occupies such a position that the upper end 80 of the rod 82 prevents any flow of gas from inside the reservoir to the opening 72. To light the candle, base 10 is actuated to turn the rotor 16 to move the end 80 away from the seat 70. When this is done, gas flows upwardly through the threaded bore 78, through opening 72, through opening 74, through the filter material 64 and around the edge of plate 62 into housing 60. If the candle is upright, gas flows past the ball 96 and past the seat into the passage of the burner 14. Gas issuing from the burner 14 may then be ignited. Rotor 16 can be turned to a greater or lesser extent to regulate the flame to the desired height within the maximum provided by the adjustment of member 54.

If for any reason the candle is upset so that it falls toward the horizontal, the force of gravity acting on the ball 96 is lessened until the ball moves into engagement with the seat 94. Once the ball arrives at that position, the pressure of the gas behind the ball will hold it in that position even after the candle is re-erected. If that occurs, ball 96 can be reset by moving burner 14 downwardly to move the ball away from the seat. If the candle is erect, the ball will remain away from the seat. The refill valve 26 permits the supply of fuel to be replenished in the manner described in the copending Burchett application.

To change the color or configuration of the candle, the user merely removes the shell 112 carrying a particular decorative covering 114 and substitutes any other desired covering therefor.

It will be seen that we have accomplished the objects of our invention. We have provided a safety gas-fueled candle which automatically shuts off in the event the candle moves from its normally vertical position. Our candle can readily and expeditiously be relit in the event it automatically shuts off. We provide our candle with means for setting the flame height to a certain maximum flame height. Our improved candle may readily be assembled. The particular style of the candle may be changed in a simple and convenient manner.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of our claims. It is further obvious that various changes may be made in details within the scope of our claims without departing from the spirit of our invention. It is, therefore, to be understood that our invention is not to be limited to the specific details shown and described.

Having thus described our invention, what we claim is:

1. A gas-fueled device normally occupying a generally vertical position including in combination, an elongated tube holding a supply of liquefied normally gaseous fuel, a candle-shaped sleeve, means removably mounting said sleeve on said tube, a burner having an opening through which fuel from said reservoir may pass, an actuatable control valve, a normally open gravity-responsive valve adapted to close in response to displacement of said device from said normally vertical position, an adjustable pressure regulating valve, said regulating valve being operable independently of said control valve to set the maximum height to which the flame at said burner can be set in response to operation of said control valve, said sleeve housing said regulating valve normally to render it inaccessible, means mounting said control valve and said regulating valve and said gravity-responsive valve in series between said reservoir and the atmosphere, and means accessible from outside said sleeve for operating said control valve.

2. A gas-fueled device normally occupying a generally vertical position including in combination, a reservoir holding a supply of liquefied normally gaseous fuel, a burner having an opening through which fuel from said reservoir may pass, an actuatable control valve, a normally open gravity-responsive valve adapted to close in response to displacement of said device from said normally vertical position, an adjustable pressure regulating valve for setting the maximum height to which the flame at said burner can be set in response to operation of said control valve, means mounting said control valve and said regulating valve and said gravity-responsive valve in series between said reservoir and the atmosphere, normally inaccessible means for setting said pressure regulating valve and normally accessible means for setting said control valve independently of said pressure regulating valve.

3. A gas-fueled device normally occupying a generally vertical position including in combination a reservoir holding a supply of normally gaseous liquefied fuel, a burner having an opening through which fuel from said reservoir may pass, means forming a valve seat between said reservoir and said burner, an element adapted to engage said seat, means retaining said element adjacent said seat for movement under the influence of gravity from a position out of engagement with said seat when said device occupies said generally vertical position to a position in engagement with said seat in response to displacement of said device from said position, said retaining means permitting a buildup of pressure of said fuel behind said element to retain said element in engagement with said seat against the influence of gravity when said device is restored to said position after having become displaced therefrom and means mounting said burner for movement from a normal position to a position to engage said element to move it away from said seat after movement of said element into engagement with the seat.

4. In a gas-fueled device normally occupying a generally vertical position, a reservoir for holding a supply of normally gaseous liquefied fuel, a burner carried by said tank, said burner having an opening through which fuel from said tank may flow, means forming a passage between said reservoir and said burner, a normally open gravity-responsive valve disposed in said passage between said reservoir and said burner, a valve seat in said passage adapted to cooperate with said valve in response to displacement of said device from said generally vertical position to close said valve, said passage permitting a buildup of pressure of said fuel behind said valve to retain said valve in engagement with said seat against the influence of gravity when said device is restored to said position after having become displaced therefrom, means mounting said burner on said tank for movement between a first position away from said seat and a second position to engage said valve to move said valve away from said seat to reset the valve, and means biasing said burner to the first position.

5. A gas-fueled device as in claim 4 in which said reservoir is elongated, a base on said reservoir, a rotor carried by said base for movement therewith, a control valve disposed between said reservoir and said burner adjacent the top of the reservoir, means disposed adjacent the bottom of said reservoir for mounting said reservoir on said rotor for limited rotary movement and means responsive to rotary movement of said rotor for operating said control valve.

6. A gas-fueled device as in claim 4 in which said reservoir is elongated, a base, a rotor carried by said base for movement therewith, a control valve disposed between said reservoir and said burner adjacent the top of the reservoir, said rotor having an annular groove therein, said groove having a stop therealong, a set-screw carried by said reservoir and extending into said groove to permit limited rotary movement of said reser-

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voir with reference to said rotor, said rotor having an opening with a noncircular cross-sectional shape and a rod for operating said control valve, said rod having a portion disposed within said rotor opening, said rod portion having a cross-sectional shape corresponding to the shape of said opening.

7. A gas-fueled device as in claim 4 in which said reservoir is elongated, a shell simulating the appearance of a candle and means for detachably assembling said shell over said reservoir.

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