

[54] GAS LIGHTER 3,547,566 12/1970 Tamarin..... 431/88

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[57] ABSTRACT

A gas lighter for cigarettes and the like including a high voltage generating device connected to a spark gap formed with a pair of discharge electrodes, an electric ignition circuit having a conductive metal plate disposed between the high voltage generating device and the spark gap and an associated displaceable ground connected contact means adapted to be displaced into contact with the metal plate to short-circuit the electric ignition circuit when so positioned.

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[58] Field of Search 431/255, 264, 266, 88

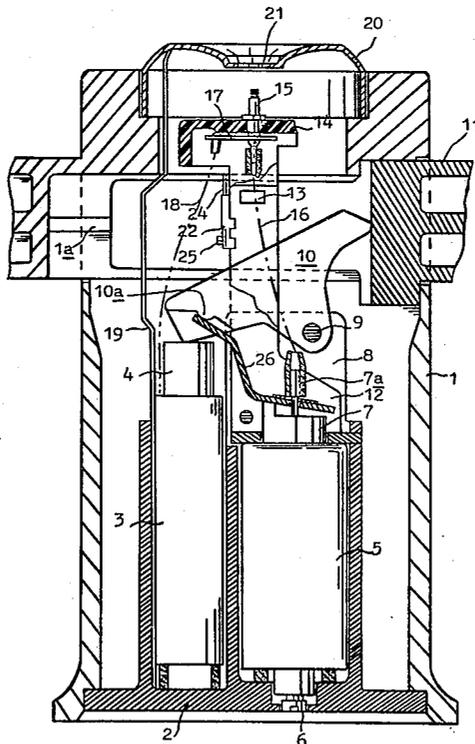
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10 Claims, 3 Drawing Figures



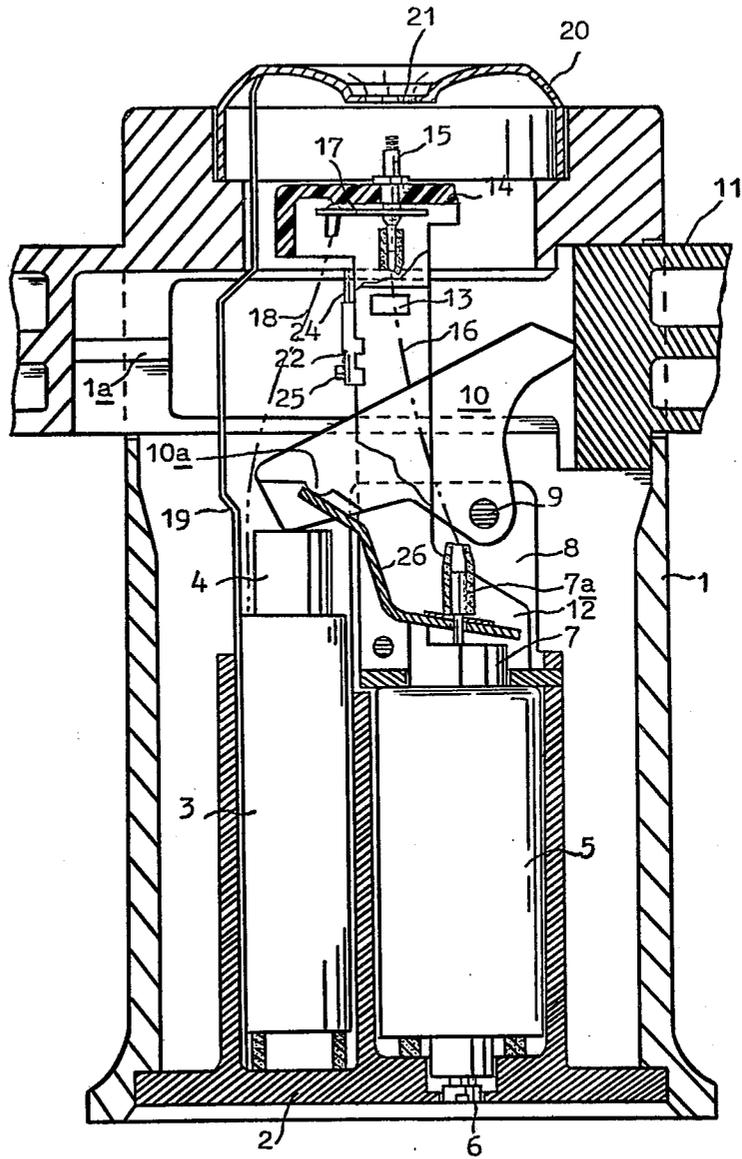


FIG. 1

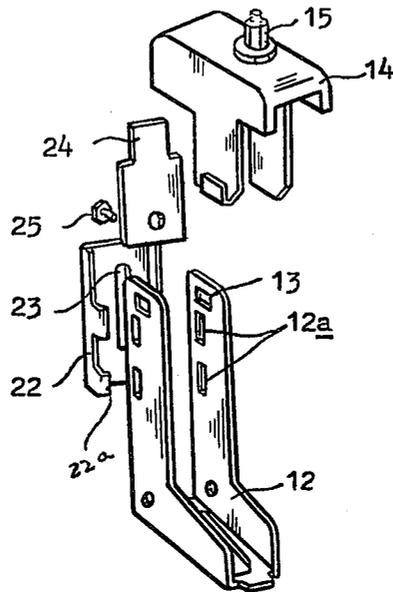


FIG. 2

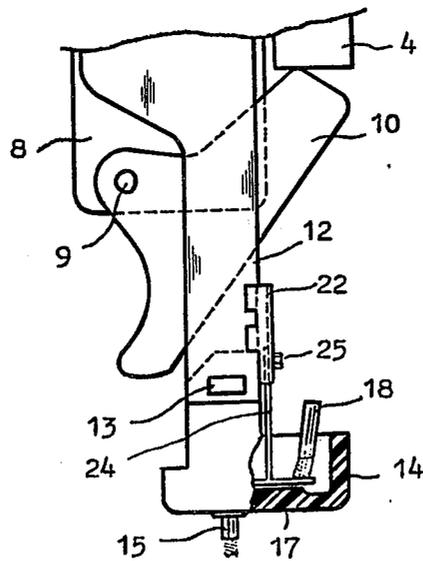


FIG. 3

GAS LIGHTER

The present invention relates to an improved construction for gas lighters, and more particularly a spark preventing safety device for gas lighters of the types which include a high voltage generating device as an ignition source.

Mechanical safety devices heretofore incorporated in gas lighters for cigarettes and the like, to prevent inadvertent spark discharge when the lighter is inverted to charge fuel gas into the fuel reservoir thereof by means of a conventional fuel cylinder, usually employed an intermediate element to halt or preclude movement of an operating means for the ignition device. Safety devices of this kind, however, must normally withstand the relatively large operating pressures or forces to halt or preclude movement of the operating means and as such are susceptible to breakage with a resultant limited operating life.

This invention is adapted to overcome the above noted defects in gas ignited safety devices by provision of a novel and more efficient safety device construction for gas lighters.

It is therefore an object of the present invention to provide an improved safety device construction for gas lighters that is both simple in construction and is possessed of a markedly extended operating life.

It is another object of the present invention to provide an improved safety device construction for gas lighters includable in the electric ignition circuit thereof to electrically prevent inadvertent spark discharge at the spark gap.

In accord with the principles of the present invention, the improved gas lighter construction includes a support means for a high voltage generating device electrically connected to a spark gap formed by a pair of spaced discharge electrodes. Associated therewith is an electric ignition circuit which includes a metal plate disposed intermediate the high voltage generating device and the spark gap and an associated movable contact element adapted to be displaced into contact with the metal plate and to thereby short circuit the electric ignition circuit and thus electrically prevent inadvertent spark discharge. In its narrower aspects, the metal plate is preferably disposed on the high voltage side of the electric ignition circuit and the movable contact element is disposed on the low voltage side thereof and is connected through the support means to the low voltage terminal of the high voltage generating device. The movable contact element that effects the switching operation is desirably displaced by gravity and without direct manual manipulation thereof.

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawings, wherein:

FIG. 1 is a vertical sectional view of a preferred embodiment of a gas lighter constructed in accord with the principles of the present invention;

FIG. 2 is an exploded perspective view of certain of the parts of FIG. 1; and

FIG. 3 is an enlarged explanatory view showing the positional disposition of the movable contact element in the present invention, when the lighter is in an inverted position.

Referring now to the drawings, there is provided a gas lighter for cigarettes or the like which includes a perimetric casing 1 having an open bottom end effec-

tively closed by a bottom support element 2 of electrically conductive material. The bottom support element 2 integrally includes a plurality of vertical partition walls between which are disposed a high voltage generating device, generally designated 3, and a fuel reservoir 5. The high voltage generating device 3 may be of any conventional construction such as an impact responsive piezoelectric cell, electro-magnetic ignition device or even a battery type unit. The fuel reservoir 5 is conventionally provided with a fuel refill valve 6 at the lower end thereof and a fuel delivery valve assembly 7 at the upper end thereof. Pivotaly mounted on a shaft 9 terminally supported by extensions 8 of the partition wall of the bottom support 2 is a cam lever 10 having one end disposed in operative contact with a manually displaceable thumb piece 11 and its other end disposed in resilient spring biased contact with an operating means 4 of the high voltage generating device 3. The biasing spring (not shown) may be disposed within the high voltage generating device 3. The thumb piece 11 is displaceable transversely of the casing 1 and is guided in its reciprocatory action by a groove in the wall thereof straddling a rail 1a disposed on the inside wall of the casing 1. A generally L-shaped frame assembly 12 has its lower portion mounted on a portion of the partition wall of the bottom support 2 and is preferably fixedly positioned on top of the fuel reservoir 5. The frame 12 in association with the bottom support 2 provides the mounting and support means for all of the inner components of the lighter. Included therein is a holder 14 of electrically insulating material fixedly secured on the frame 12 in such a manner that the lower bosses on the dependent arms thereof engage the upper slits 13 of the frame 12. A gas delivery nozzle 15 is mounted on the holder 14 and is disposed in fluid communication with the valve nozzle 7a of the fuel delivery valve 7 by means of a gas guiding tube 16. Disposed beneath the upper surface of the folder 14 and in electrical contact with the gas delivery nozzle 15 is a metal plate 17 which is electrically connected through a lead wire 18 to the high voltage terminal (not shown) of the high voltage generating device 3, so that the gas delivery nozzle 15 additionally serves as a discharge electrode for spark initiated fuel ignition. The low voltage side or terminal of the high voltage generating device 3 is connected through an electrically conductive plate 19 to a metallic cap 20 disposed on the upper part of the casing 1. The cap 20 has at the center thereof an annular flame opening 21 the peripheral edge of which serves as the second and low voltage discharge electrode element so as to form a spark gap between itself and the gas delivery nozzle 15.

The frame 12 (see FIG. 2) has a guide plate 22 secured thereto through the engagement of the projecting ears 22a with the apertures or slits 12a. The guide plate 22 includes a longitudinal guide slot 23 for limiting the path of displacement of a pin 25 terminally connected to a movable contact means 24, which is thus reciprocally supported on the guide plate 22. The movable contact means or element 24 is electrically connected through the frame 12 and the bottom support 2 to the low voltage side of the high voltage generating device 3 and is thus at the same potential as the cap 20. The guide slot 23 is of such length as to permit displacement of the movable contact means 24 into electrical contact with the metal plate 17 disposed on the underside of the holder 14. The movable contact

means 24 is thus disposed on the low voltage side of the electric ignition circuit and its switching operation is so mounted as to be displaced under influence by its own gravity into contact with the under surface of the metal plate 17. Preferably, and as shown in FIG. 2, the pin 25 connected to the movable contact means 24 consists of a threaded bolt of sufficient length as to permit disposition of the head thereof on one side of the guiding slot 23 and its other terminal end disposed within a threaded bore of the movable contact means 24. A valve control lever 26 is rockably mounted on a valve housing of the fuel delivery valve 7 to control opening and closing operation of the valve 7. One end of the valve control lever 26 engages the undersurface of the valve nozzle 7a of the valve 7 and the other end thereof is in connection with a protuberance 10a provided on a hollow portion of the cam lever 10.

In operation of the described unit, inward displacement of the thumb piece 11 rotates the cam lever 10 counter-clockwise to depress the operating means 4 of the high voltage generating device 3 to induce application of high voltage through the lead wire 18 to the metal plate 17 and to the gas delivery nozzle means 15 serving as the high voltage electrode. Such high voltage application effects a spark discharge across the spark gap formed between the gas delivery nozzle means 15 and the annular edge of the flame opening 21. At the same time, the valve control lever 26 is rocked counter-clockwise to lift the valve nozzle 7a and open the valve 7 to release gaseous fuel and its delivery through the gas guiding tube 16 to the gas delivery nozzle means 15. The fuel gas issuing from the delivery nozzle 15 will thus be ignited by the high voltage sparks discharged at the spark gap. In the case of extinguishing the flame, a release of the pushing force applied to the thumb piece 11 will effect a return of the operating means 4 to its initial position by means of a biasing spring (not shown) provided within the high voltage generating device 3 and a concomitant return of the cam lever 10 and the thumb piece 11 to their initial positions. The fuel delivery valve nozzle 72 will also be returned, together with the valve control lever 26, to their initial positions by a spring (not shown) provided within the fuel delivery valve 7, whereby the valve 7 is closed to stop the emission of fuel gas therefrom.

When the lighter is brought into an inverted position, as for example, when it becomes necessary to refill the fuel reservoir 5 with a new charge of fuel by means of a conventional fuel cylinder, the movable contact means 24 will vertically slide down as guided by the pin 25 within the guiding slot 23 of the guide plate 22 and will come into contact with the metal plate 17. Upon such contact, the movable contact means 24 operate to connect the plate 17 and high voltage electrode nozzle 15 to the low voltage side of the high voltage generating device 3 thus effectively paralleling and shorting out the spark gap. Therefore, even if the thumb piece 11 is inadvertently pushed by the user, for example, during the course of fuel refilling actuation and while the lighter is inverted, spark discharge in the vicinity of the gas delivery nozzle 15 is precluded because of the above

described short circuiting of the electric ignition circuit through the movable contact means 24, the frame 12 and the bottom support 2 within the casing 1.

As described above, the safety devices constructed and operable in accord with the principles of the present invention do not require positive manual manipulation of a lighter element by the user to mechanically halt movement of an operating means by an intermediary means but rather is a self-contained and gravity induced system that is automatically operable upon inversion of the lighter.

What is claimed is:

1. In a gas lighter having a casing, a support means disposed within the casing, a fuel reservoir provided with a fuel refill valve, a high voltage generating device mounted on the support means, and a pair of discharge electrodes electrically connected to the high and low voltage sides, respectively of the high voltage generating device and forming a spark gap therebetween, means to preclude undesired spark discharge across said spark gap when said lighter is in inverted position, comprising a conducting metal plate disposed between the spark gap and the high voltage generating device and electrically connected to the high voltage side thereof, and a contact means mounted on the support means and displaceable into electrical contact with said metal plate to parallel said spark gap and short-circuit the electric ignition circuit.

2. A gas lighter as claimed in claim 1, characterized in that the contact means is electrically incorporated in the low voltage side of the electric ignition circuit.

3. A gas lighter as claimed in claim 1, characterized in that the contact means is electrically connected through the support means to a low voltage terminal of the high voltage generating device.

4. A gas lighter as claimed in claim 1, characterized in that the contact means is selectively displaceable under the influence of gravity into engagement with the metal plate.

5. A gas lighter as claimed in claim 1, characterized in that the metal plate is electrically included in the high voltage side of the electric ignition circuit.

6. A gas lighter as claimed in claim 1, characterized in that the support means includes a guide slot for limiting the path of travel of said contact means.

7. A gas lighter as claimed in claim 6, characterized in that the contact means includes a pin disposed within the guide slot of the support means.

8. A gas lighter as claimed in claim 6, characterized in that the support means includes a guide plate having said guide slot therein.

9. A gas lighter as claimed in claim 1, characterized in that the support means has a holder element of electrically insulating material secured therein and supporting one of the discharge electrodes.

10. A gas lighter as claimed in claim 9, characterized in that the metal plate is arranged within the holder and fixedly mounted on a lower part of the high voltage discharge electrode.

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