

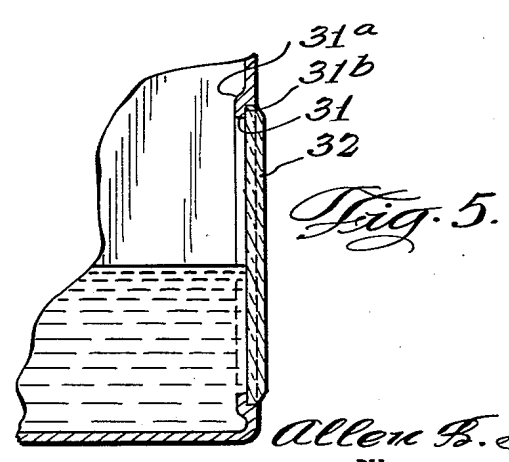
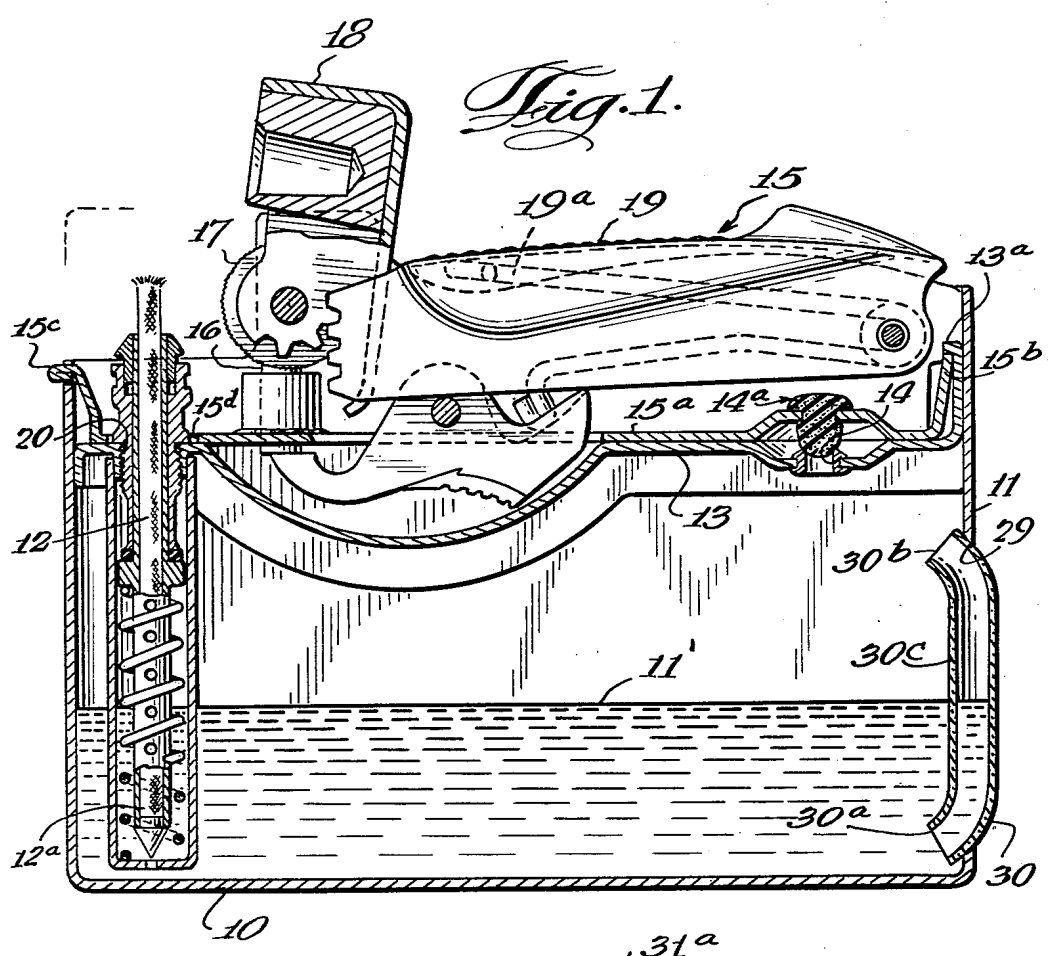
Oct. 25, 1960

A. B. GELLMAN
PYROPHORIC LIGHTER

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3 Sheets-Sheet 1



INVENTOR.
Allen B. Gellman
BY
Schroeder, Hofgren, Brady & Nequa
ATTORNEYS

Oct. 25, 1960

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3 Sheets-Sheet 2

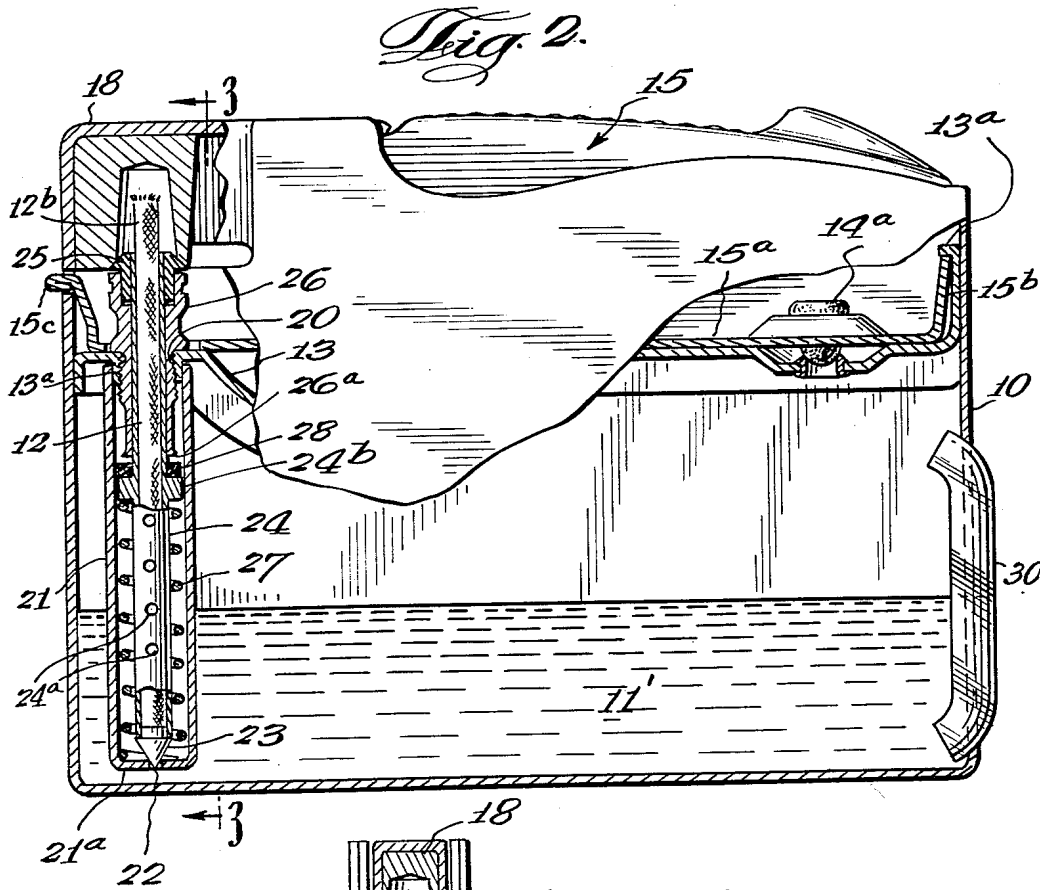


Fig. 3.

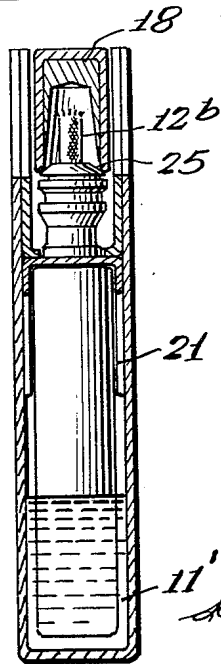


Fig. 4.



INVENTOR.

Allen B. Gellman

BY

Schneider, Hoffgren, Brady & Wagner
ATTORNEYS

Oct. 25, 1960

A. B. GELLMAN
PYROPHORIC LIGHTER

2,957,328

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3 Sheets-Sheet 3

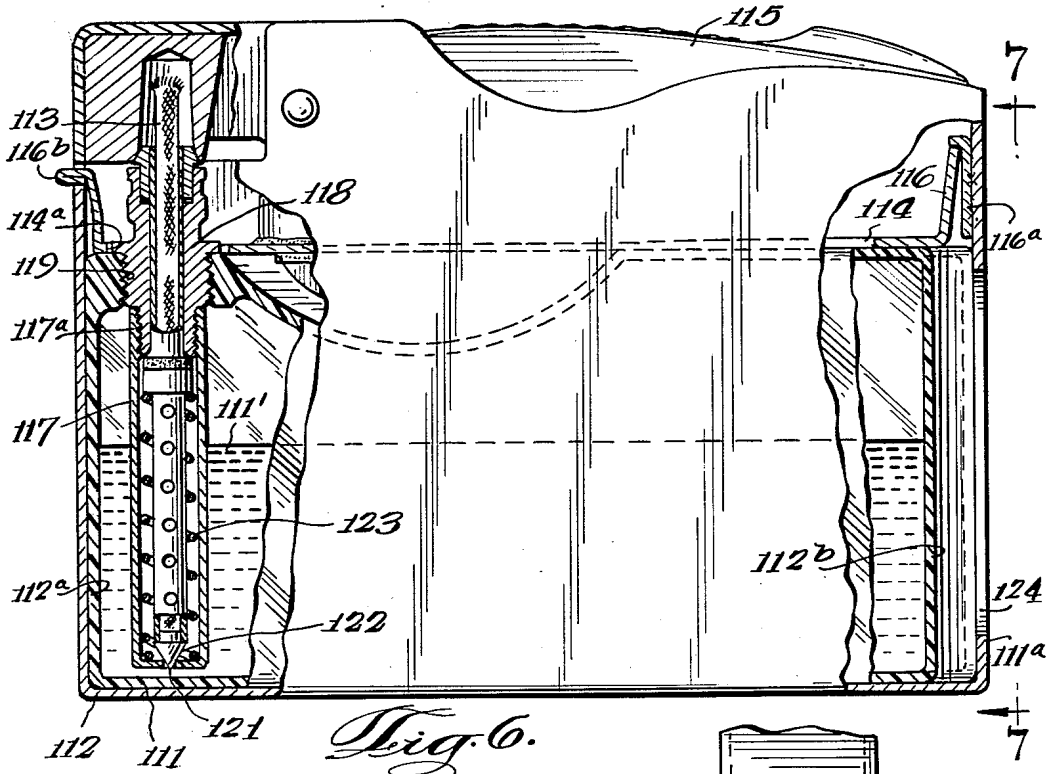


Fig. 6.

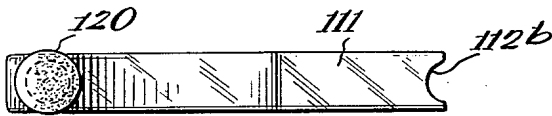


Fig. 9.

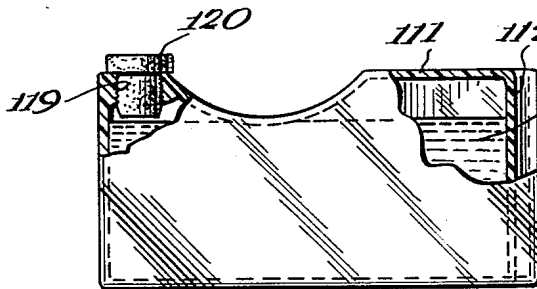


Fig. 8.

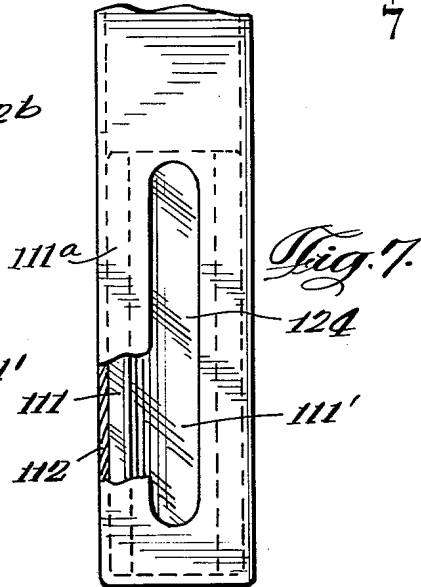


Fig. 7.

INVENTOR.
Allen B. Gellman
BY
Schaefer, Haffgen, Brady & Kegan
Attorneys

1

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PYROPHORIC LIGHTER

Allen B. Gellman, Glencoe, Ill. (% Elgin American, Inc., 853 Dundee Ave., Elgin, Ill.)

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5 Claims. (Cl. 67—7.1)

This invention relates to a pyrophoric lighter. A common form of pyrophoric lighter is one having a container for holding fluid fuel and a wick element extending through the wall of the container to have an inner end submerged in the fuel within the container and an outer end disposed for igniting of the fuel delivered through the wick. A common defect in such lighters is that the outer end of the wick is exposed to atmosphere even though it may be covered, as by a snuffer cap, so that over a period of time the fuel is evaporated from the container.

Another disadvantage in the pyrophoric lighters now found in the art is that no completely satisfactory means is available for indicating the level of the fuel in the lighter where the fuel container housing is substantially opaque.

A principal feature of this invention is to provide a new and improved pyrophoric lighter obviating the disadvantages discussed above.

Another feature is the provision of a pyrophoric lighter having means for controlling the communication between the wick and the fuel supply within the lighter to prevent transfer of fuel therebetween when the lighter is not in use.

A further feature of the invention is the provision of a valve controlled enclosure surrounding the portion of the wick within the fuel container, for providing alternate communication and non-communication of the wick and fuel supply, as desired.

Still another feature is that valve means are associated with the enclosure to be operated by means exteriorly of the enclosure. Yet a further feature is that the means exterior of the enclosure comprise the means for snuffing a flame on the exterior portion of the wick. Yet another feature is that the valve means is biased to an open position when the snuffer is removed from association with the exposed wick end, with the biasing means being overcome by the snuffer cap when the snuffer is disposed in the flame snuffing position relative to the exposed wick end.

A further feature of the invention is the provision of a pyrophoric lighter having such means for controlling the communication between the wick and fuel supply, wherein the fuel container is separable from the lighter. Still another feature is that the fuel container is disposable. Yet another feature is the provision in such a lighter of new and improved means for removably retaining the separable container in association with the lighter.

Still a further feature of the invention is the provision of a pyrophoric lighter having a container provided with an elongated opening extending between the lowest and highest levels of the fluid fuel supply therein and a light transmitting means sealingly secured to the container across the opening for viewing the interior of the container to gauge the level of fuel therein. Still another feature is that the window means may comprise a tubular member arranged to receive a portion of the fuel there-within.

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Yet a further feature of the invention is the provision of a pyrophoric lighter having means for controlling the communication between the wick and fuel supply where-
 5 in the fuel supply is retained in a transparent container removably received in an opaque outer shell which is provided with means automatically correlated with the communication controlling means to allow gauging of the level of fluid associated with said controlling means.

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

Fig. 1 is an enlarged, fragmentary sectional view taken
 longitudinally through the lighter;

Fig. 2 is a fragmentary sectional view of the lighter,
 15 generally similar so that of Fig. 1 but with the mechanism thereof in another position;

Fig. 3 is a vertical sectional view taken substantially
 along the line 3—3 of Fig. 2;

Fig. 4 is a fragmentary end elevation of the lighter
 20 showing the liquid level indicator thereof;

Fig. 5 is a fragmentary sectional view showing a modi-
 fied form of liquid level indicator.

Fig. 6 is an enlarged, side elevation of another form
 of lighter, with portions thereof broken away;

Fig. 7 is an end view thereof, with portions thereof
 25 broken away;

Fig. 8 is a reduced, side elevation of a disposable fuel
 container for use with the lighter of Fig. 6; and

Fig. 9 is a top plan view thereof.

In the exemplary embodiment of the invention as dis-
 closed in Figs. 1 to 5 of the drawings, a pyrophoric lighter
 generally designated 10 is shown to comprise a container
 11 arranged to hold a body of fluid fuel 11' for saturat-
 30 ing a wick 12. Forming the upper sealing closure mem-
 ber of container 11 is a deck 13 through which wick 12
 extends and through which is provided a filling opening
 14 for replenishing the supply of fuel 11 within con-
 tainer 10 when desired. Suitable closure means 14a
 are provided for sealingly closing opening 14. Mounted
 40 on deck 13 is an operating or igniting mechanism 15
 including a flint 16, an abradant wheel 17 in spark-pro-
 ducing relationship with flint 16, a snuffer cap 18, and
 a spring-biased thumb piece 19 for operation of wheel
 17 and snuffer cap 18. The specific construction of
 45 igniting mechanisms is well-known in the art, an example
 of such being that disclosed in my copending application
 Ser. #444,492, filed July 20, 1954, now Patent No.
 2,791,110.

Operating mechanism 15 is provided with a lower sup-
 port or cradle 15a having a spring tongue 15b adapted
 50 to snap under an inwardly projecting catch 13a of the
 deck for holding the operating mechanism in place. A
 manually operable tab 15c is provided on the cradle
 generally opposite tongue 15b for use in removing mech-
 55 anism 15 when desired.

As indicated above, wick 12 extends from the interior
 of container 11 to the exterior thereof, passing through
 an opening 20 in deck 13 and a registered opening 15d
 60 in cradle 15a. An end 12a of the wick extends to a low
 point within the container so that, in normal use, at least
 some portion of the wick may have communication with
 fuel 11'. However, as indicated above, means, such as
 shown in Figs. 2 and 3, are provided for preventing this
 65 communication when the lighter is not in use. For this
 purpose, a tubular enclosure 21 having an internal diam-
 eter substantially greater than the diameter of wick 12 is
 disposed in concentric surrounding relationship to the
 wick. Enclosure 21 is secured to deck 13 by means of
 70 a flange 13a depending from deck 13 around opening 20.
 An inner end 21a of tube 21 is closed except for a small
 port 22 which provides the passage for fuel 11' from the
 interior of container 11 to the interior of the enclosure 21.

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For controlling port 22 a valve 23 is provided having an elongated tubular stem 24 in intimate surrounding relationship to wick 12. One or more apertures 24a are provided in stem 24 within enclosure 21 to permit passage of fuel from the space between valve stem 24 and enclosure 21 to wick 12. Stem 24 terminates short of the outer end 12b of wick 12 whereby the exposed end 12b may be ignited by mechanism 15. On the outer end of stem 24 is fixedly secured an annular collar 25 arranged to be engaged by snuffer cap 18, when the cap is in the flame extinguishing position of Fig. 2, and yieldingly urged by the snuffer toward deck 13. As the collar is fixed to stem 24, the stem is resultingly moved longitudinally inwardly so that valve 23 is seated in port 22. To guide valve stem 23 and collar 25 in this longitudinal movement and maintain alignment of valve 23 with port 22, an annular bushing 26 is secured to deck 13 and through opening 20.

When the lighter is operated and snuffer cap 18 is removed from engagement with collar 25, it is desired that valve 23 be opened to permit a flow of fuel into enclosure 21 to replenish the fuel in wick 12. To this end, spring means such as helical spring 27 is provided to urge the valve stem 24 longitudinally outwardly. For this purpose, an annular boss 24b is provided on valve stem 24, whereby spring 27 may extend under suitable compression between the boss and enclosure end 21a. The outward movement of the valve stem is limited by the abutment of an annular washer 28, on the valve stem and outwardly juxtaposed to boss 24b, with the inner end 26a of bushing 26.

While the means for urging snuffer cap 18 to the flame extinguishing position may be of any suitable type well known in the art, it is herein disclosed as a spring 19a. In the functioning of the instant invention, it is only necessary that the effect of spring 27 be weaker than the effect of spring 17a so that spring 27 may be overcome by the action of spring 19a.

In use, thumb piece 19 is manually depressed, thereby raising snuffer cap 18 and operating wheel 17 against flint 16 to produce a spark for igniting outer end 12b of the wick. The movement of cap 18 away from collar 25 allows spring 27 to move the valve stem 24 longitudinally outwardly and unseat valve 23. This permits a quantity of fuel 11' to pass into enclosure 21, through apertures 24a, and, by capillarity, through wick 12 to outer end 12b. When thumb piece 19 is released, cap 18 is urged by spring 19a to the flame extinguishing position of Fig. 2 where it engages collar 25 and moves valve stem 24 longitudinally to close valve 23 across port 22, thereby discontinuing communication between the interior of container 11 and the interior of enclosure 21.

While the engagement of cap 18 with collar 25 effects an enclosure of wick end 12b, this enclosure is not positively sealed, and over a substantial period of time evaporation of the fuel in wick 12 may occur. However, due to the separation of the wick from the main body of fuel by means of the valved enclosure 21, only the relatively small quantity of fuel within enclosure 21 and in wick 12 may thus evaporate. The main reservoir of fuel within container 11 is maintained available for replenishing the fuel in wick 12, which is accomplished by the simple manipulation of thumb piece 19 to open valve 23 and permit passage of fuel to the wick.

As shown in Figs. 1, 2 and 4, means for gauging the level of fluid 11' within an opaque container 11 may be provided comprising elongated opening 29 in an end wall 11a of the container. The opening preferably extends from the lowest desirable level of fuel in the container to the highest desirable level thereof. A light transmitting or translucent window member 30 is sealingly secured to the container to extend across the opening, and in the preferred form of Figs. 1, 2 and 4, is shown to comprise a tube having ends 30a and 30b opening into the interior of container 11, and a straight mid-portion 30c substan-

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tially centered in opening 29 to extend semi-cylindrically exteriorly of the container. If desired, the portion of tube 30 interiorly of container 11 may be made reflecting or opaque to provide an improved background for viewing the level of fuel 11' within the tube.

A modified form of liquid level indicator is shown in Fig. 5 wherein an elongated opening 31 is defined by a depressed flange 31a forming a continuous shoulder 31b for sealing abutment with a generally planar window member 32. Member 32 is arranged to project slightly outwardly from the container wall. Opening 31 may be aligned with enclosure 21 allowing observation of the fluid level relative to the enclosure as well as relative to the entire container. This extends the range of usefulness of the window down to the point where the supply is so low as to require tilting of the container.

Referring now to Figure 6 through 9, another form of pyrophoric lighter generally designated 110 is seen to comprise a container 111 received in a shell 112 and provided with a wick 113 similar to wick 12 extending from the interior of container 111 to the exterior thereof. The upper end of the shell is releasably secured to cradle 114 on which is mounted an operating mechanism 115 similar to mechanism 15 of lighter 10.

Container 111 is separable from the lighter and is of a disposable construction. The term "disposable" as used herein comprehends a structure which is economically suited for discarding subsequent to its use. Thus, container 111 is of a type which may be provided with suitable fluid fuel 111' therein, installed in the lighter 110, and after the fuel is used up thrown away and replaced with another similar container filled with fuel. This type of container is to be distinguished from a container which forms an integral part of the lighter and requires refilling when the fluid supply is depleted.

Container 111 is received within an upwardly opening hollow 112a of shell 112 and is retained therein by means of the cradle 114 which is held releasably in place across the top of shell 112 by a tongue 116 cooperating with a catch 116a on the shell. A manually operable tab 116b (similar to tab 15c of lighter 10) may be provided for effecting removal of the cradle when desired to permit replacement of the container in the shell. To permit the insertion of the container past catch 116a, a groove 112b may be formed in one end of the container, extending longitudinally between the top and bottom of the container.

Container 111 is disposed in hollow 112a with wick 113 extending upwardly therefrom. Cradle 114 is provided with an opening 114a through which the wick extends when the cradle is disposed across the top of the shell. The association of operating mechanism 115 and wick 113 is similar to the association of mechanism 15 and wick 12 of lighter 10. However, while enclosure 21 of lighter 10 is not disassociated from container 11 when replenishing the fuel 11' therein, an enclosure 117 is provided in lighter 110 which is removably associated with the disposable container 111 thereby allowing the enclosure 117 to be retained when the spent container is discarded. To this end, the upper end 117a of enclosure 117 is threadedly secured to a reduced diameter portion of a bushing 118 which while being somewhat larger in diameter is otherwise generally similar to bushing 26 of lighter 10.

The top container 111 is provided with an opening 119 which may be closed, prior to its use in the lighter, by means of a removable plug 120. In the illustrative embodiment, opening 119 is elongated longitudinally and threaded for improved retaining coaction with plug 120 and with bushing 118, it being understood that other structures providing suitable sealing retention of these elements in opening 119 may be substituted within the scope of the invention.

Enclosure 117 functions similarly as enclosure 21 of lighter 10, being provided with a port 121, valve 122

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and spring 123 similar to port 22, valve 23 and spring 27 respectively of lighter 10. Thus, except for the replaceable fuel supply container, the functioning of lighter 110 is substantially similar to that of lighter 10.

Container 111 is preferably formed of a transparent material, such as a plastic, and shell 112 may be provided with a transparent window 124 in one end 111a of the container in alignment with enclosure 117 to allow viewing of the interior of container 111 similar to the permitted viewing of the interior of container 11.

While I have shown and described certain embodiments of my invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. A pyrophoric lighter, comprising: a container adapted to hold fluid fuel and having an outlet; a wick extending through the outlet to have an outer portion exteriorly of the container and an inner portion to have communication with fuel interiorly of the container; an enclosure surrounding said inner portion having a port for conducting fuel in said container to said wick inner portion within the enclosure; valve means controlling the port, including a tubular valve stem surrounding the inner wick portion and projecting through said outlet to have an annular outer end disposed exteriorly of the container; means within the enclosure yieldably biasing the valve stem to urge the valve to a port opened position; and means exteriorly of the container for engaging said stem outer end and releasably holding the valve in a port closed position.

2. A pyrophoric lighter comprising: a disposable container for holding fluid fuel; means carried by the container for transferring fuel from within said container to a point exteriorly thereof; a cradle having means thereon for operating the lighter; and means for maintaining the container and fuel transferring means in operative association with the means for operating the lighter, comprising a shell removably receiving the container and having an open top and a catch adjacent said top, and a spring tongue on the cradle, said catch and tongue serving to lock releasably the cradle across said top of the shell.

3. The pyrophoric lighter of claim 2 wherein the container is provided with a groove to permit movement of the container past the catch.

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4. A pyrophoric lighter comprising: a cradle member having an opening therethrough; an operating mechanism carried on the cradle; a shell removably secured to the cradle opposite said operating mechanism and having a hollow communicating with the opening; a disposable, fluid fuel container in said hollow; means associated with the shell for holding the container removably therein; wick means removably secured to the container and extending through the cradle opening into operative relationship with the operating mechanism; and means associated with the wick means for preventing communication between the fuel in the container and the wick whenever the operating mechanism is not being operated, said wick means and last named means being removable through said cradle opening when desired.

5. The lighter of claim 1 wherein the container is provided with a wall opposite the outlet and the enclosure extends from the outlet to have a transverse inner end closely juxtaposed to said wall, said port being disposed in said transverse inner end and the space between said enclosure inner end and said wall being free of mechanism to permit free flow of fuel in the container to the port.

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