March 29, 1966

A. F. FUKAL

3,242,700

CIGARETTE LIGHTER

Filed May 18, 1964

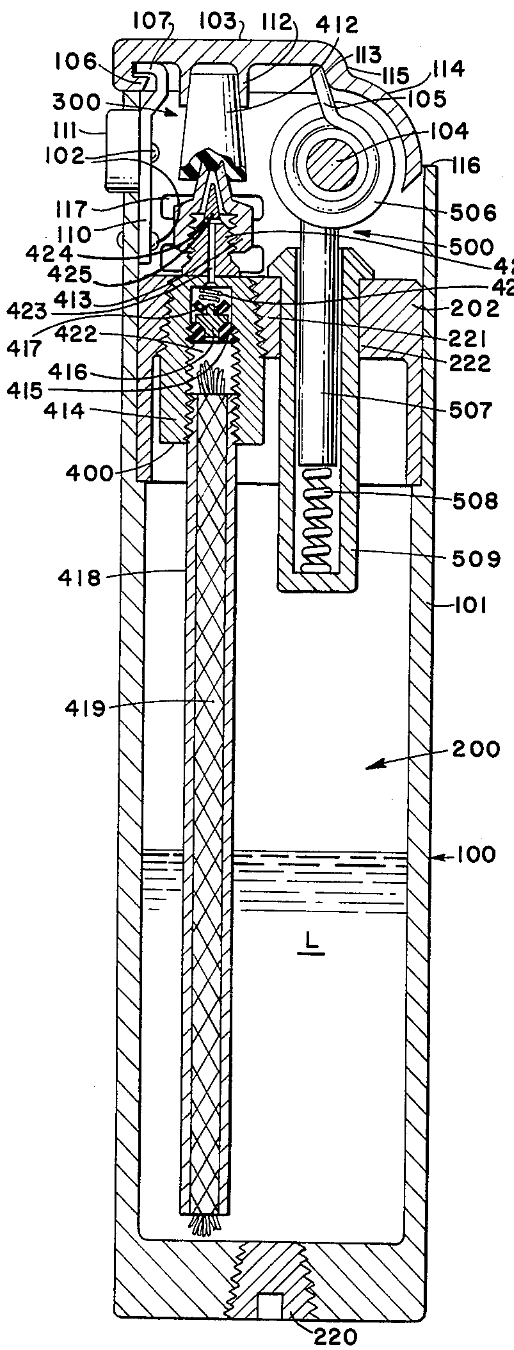

FIG. 2

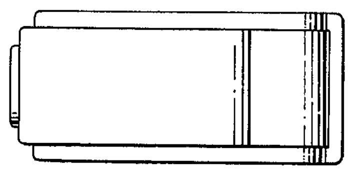

FIG. 1

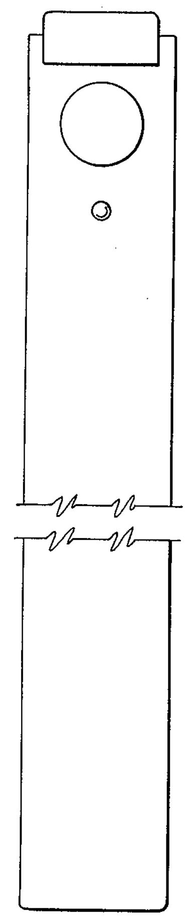

FIG. 3

3,242,700
Patented Mar. 29, 1966

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CIGARETTE LIGHTER

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Filed May 18, 1964, Ser. No. 368,041
5 Claims. (Cl. 67—7.1)

This invention relates generally to cigarette lighters that employ a sparking wheel and utilize an ignitable fuel.

More particularly, this invention relates to a cigarette lighter that is adapted to utilize a liquid gas, such as, for example, butane, propane, pentane and the like.

A primary object of this invention is to provide a highly efficient device of the character described that is light in weight and extremely economical in construction and in operation.

Another object is to provide a portable cigarette lighter that has a size, weight and configuration that makes it convenient for use by either men or women and makes it equally easy to carry in either pocket or handbag.

A further object is to provide a cigarette lighter having a unique valve with flutter-type action that makes this lighter particularly suited to certain aromatic fuels.

And a still further object is to provide a gas lighter that includes a completely automatic valve that requires no levers, wheels or opening mechanism of any kind, and which valve operates instantly upon the opening of the top cover of the lighter.

And yet another object of this invention is to provide a gas cigarette lighter in which a simple, single thumb motion will initiate the simultaneous actions of opening the top cover, rotating the spark wheel, removing a snuffer from the flame nozzle, and starting the gas flow through the flame nozzle.

And an additional object is to provide a cigarette lighter having a spark wheel rotatably mounted to the same pin about which the top cover rotates.

And another object is to provide a cigarette lighter having a spark wheel rotatably mounted to a pin that is removably attached to the housing and to the top cover so that the pin may be removed to service the spark wheel, its cooperating flint and the top cover.

And a further object is to provide a gas lighter employing a permanent internal wick of non-corrosive material that assists in vaporization of the liquid fuel.

And an object is to provide a lighter having a housing case made primarily of impact extruded parts assembled by shrink fits so that no fasteners are used that might work loose in operation.

Another object of this invention is to provide a unique adjustable flame nozzle for a gas cigarette lighter.

These and other objects and advantages will be apparent from an examination of the following specification and drawing in which:

FIGURE 1 represents a top plan view of a preferred embodiment of this invention;

FIGURE 2 is a cross sectional side elevational view of the lighter of FIGURE 1;

FIGURE 3 is a front elevational view of the device of FIGURES 1 and 2.

Referring now more particularly to the characters of reference on the drawing, it will be observed that the complete lighter assembly of this invention consists

basically and functionally of an external case assembly identified as **100**, defining an internal enclosed fuel chamber section **200**, an internal but exposable fuel combustion section **300**, and a metering valve assembly **400**, and an ignition system **500**.

The case assembly **100** comprises a vertically extending housing **101** having an open upper end, that is normally closed after assembly by cap **103**. A pin **104** extends transversely across the housing **101** and serves as a pivot about which cap **103** rotates under pressure of coil spring **105** when opening. Cap **103** includes a U-shaped lip **106** that cooperates with U-shaped lip **107** of a leaf type latch spring **110** that is biased to an engaged position with cap **103**. Spring **110** is released and cap **103** permitted to open by means of a press button **111**. Rivets **102** hold spring **110** to the housing **101** and button **111**. Cap **103** also includes a hollow boss member **112** that supports a flexible material conically shaped snuffer **412** which may be classified as part of the valve assembly **400**. The internal configuration of cap **103** is such that a ridge **113** is formed which serves as an anchor for coil spring **105**. The external configuration of cap **103** is such that the end section is curved to be concentric with the spark wheel **506** of the ignition system **500**. The cap curvature identified at **114** and the outer ridge **115** also serve to permit the cap to telescope into housing **101** when opening until ridge **115** engages the upper open edge **116** of housing **101**, which acts as a stop and as a rest for retaining cap **103** in its open position. Openings **117** in housing **101** permit air necessary for mixing with the vaporized fuel to enter combustion chamber section **300**. The distance between spring **110** and boss **112** limits the distance of travel of spring **110** between its closed and open positions. This is desirable as it reduces wear and possible breakage and provides a precise motion for the lighter operation.

A plug **202** permanently seals the upper end of fuel chamber **200**, whereas a threaded plug **220** normally seals the lower end and also provides access for refilling the chamber with liquified gas in a well known manner. Plug **202** includes a threaded opening **221** to receive valve fitting **414** having external cooperating pipe threads, and includes a straight bore **222** in which flint tube **509** is installed by means of a shrink fit. Since plug **202** is also installed by a shrink fit and since valve fitting **414** engages plug **202** by pipe threads, a leak proof fuel chamber **200** is thus provided in housing **101**.

The valve assembly **400** includes the described valve fitting **414** which also includes a straight external thread on the reduced diameter upper portion **421**, and a straight thread in its internal bore **422**. A tube **418** threaded at its upper end engages threaded bore **422** and provides support for a fiber glass wick **419** that extends nearly to the bottom of fuel chamber **200**. A short distance above the top of tube **418** and wick **419** is located a seal plug **415** perferably of nonmetallic material that threads into bore **422**. A noncorrosive metal top **416** having a tapered lower surface engages a corresponding tapered surface on seal plug **415** so that the weight of the top tends to cause a seal to be formed between the top **416** and the seal plug **415**. To assist this sealing action a rubber washer **417** engages the upper end of top **416** and is placed in compression by the action of its oversized diameter against the upper unthreaded portion of bore **422**. A small diameter axial bore **423** extends upward into upper portion **421** from bore **422** until it intersects a smaller horizontally extending bore **424**. A protuberance **425** extends axially upward from portion **421** and is normally enclosed within flame nozzle fitting **413** that engages portion **421** and is spaced from protuberance **425** by a small and adjustable distance that determines the flame size in operation. A snuffer **412** closes over flame nozzle **413** when the cap **103** is closed.

Flint tube **509** installed in plug **202** contains a longitudinally extending flint **507** that is biased upward by spring **508** that seats in the closed bottom of tube **509**. Directly above flint **507** is located spark wheel **506** that fastens to and rotates with pin **104** as the cover cap **103** is opened by action of spring **105**.

In operation, the liquefied gas L in chamber **200** seeps up through the fiber glass wick **419** into the internal bore **422** of valve fitting **414** below the seal plug **415** where it collects as a vaporized gas. When the pressure is great enough it lifts top **416** off of its seat on seal **415** and permits gas to pass through the seal **415** and to the area of washer **417**. When the pressure in the area under washer **417** is sufficient, the washer lifts and permits gas fuel to pass there around and out through flame nozzle **413**, unless snuffer **412** closes the flame nozzle, in which latter case an equilibrium is reached and metal top **416** by its own weight will reseat on plug seal **415** until such time as the pressure builds up again. At this point an amount of gas under pressure is retained in the area above top **416** and including the area within the flame nozzle **413**. A weak coil spring **420** at the upper end of chamber **422** prevents top **416** and washer **417** from "bottoming" at the upper end of the chamber and stopping gas flow through the flame nozzle.

When the button **111** is pressed and the cover **103** springs open rotating spark wheel **506** against flint **507**, sparks are directed to the now open flame nozzle **413** and the gas above top **416** ignites as it leaves the nozzle. This action reduces the pressure above the top **416**, which raises off its seat on seal plug **415** and permits more pressurized gas to pass around washer **417** and up and out bores **423** and **424** and around protuberance **425** to be consumed at the top of flame nozzle **413**. This action repeats itself and continues as a fluttering or a palpitating action which goes on until the snuffer **412** recloses nozzle **413**. The above construction may thus be described as a pressure opened, gravity closed, flutter type metering valve.

Filling of chamber **200** with a pressurized liquid gas may be accomplished by conventional means using commercially available butane filling units. Plug **220** may be replaced by a plug to accommodate any known filling unit.

From the foregoing description it will be readily seen that there has been produced a device which substantially fulfills the objects of this invention as set forth herein. The invention is not limited to the exemplary constructions herein shown and described, but may be made in many ways within the scope of the appended claims.

What is claimed is:

1. An automatically operating flutter valve assembly for a cigarette lighter, comprising: a valve fitting having a flame nozzle engaging one end and having its other end exposed to vaporized fuel under pressure, said fitting defining a large bore and a small bore, a plug seal installed in said large bore and having a seat thereon, a top normally seated on said seal, a flexible washer attached to said top, means associated with said top to permit said top to be raised when the differential pressure above and below exceeds a predetermined minimum, and to permit said top to drop by gravity and by action of the flexible washer, and reseat itself on said seal as the differential pressure decreases to provide a fluttering action as pres-

surized gas passes by said top and through said bores and is consumed at said flame nozzle.

2. A cigarette lighter assembly comprising in combination a case assembly having a fuel section for containing liquified gas, a combustion section, an ignition system, and a completely automatic acting fuel valve; said case assembly including an adjustable flame nozzle associated with said fuel valve and including a cover with a snuffer, automatic means for opening said cover and exposing said flame nozzle and simultaneously activating said ignition system for igniting fuel passing through said fuel valve and out said fuel nozzle, manual means for closing said cover and applying said snuffer against said flame nozzle for extinguishing the flame, said fuel valve including an internal chamber, a seal plug in said chamber and a free-floating weighted top seated above said seal plug whereby gas may pass through said valve by lifting said free-floating top completely off said seal plug when said snuffer is removed from said flame nozzle, a flexible washer attached to said top and engaging the chamber walls, said top adapted to reseat itself by gravity and the flexure of said washer when said snuffer is closed.

3. A fuel valve for a cigarette lighter comprising a housing defining a fuel chamber and defining a bore through the housing, a nonmetal material seal plug engaging the inner walls of the fuel chamber and reducing the open inner dimensions of the fuel chamber, a rigid weighted top positioned on said seal and closing by gravity the open dimension through the seal plug, a nonmetal flexible washer on said top, an adjustable flame nozzle at one end of said valve whereby fuel pressure will lift said top and permit fuel to pass around said top and out said bore in a quantity determined by the position of said top, and the adjustment of the flame nozzle, and means to prevent said top and washer from completely closing said bore when fluid is passing through said flame nozzle.

4. In a cigarette lighter, a lighter mechanism, comprising: a case assembly including vertical walls having a fuel section, a combustion section, an ignition system, said ignition system including a spark wheel, a cover in said case assembly having a curved section concentric with said spark wheel and having an internal and external ridge, a common pivot pin for said cover and spark wheel, a coil spring around said pivot pin for biasing said cover to its open position, a free end of said coil spring being anchored to said internal ridge, said concentric section telescoping into one said vertical wall of said case assembly until said external ridge strikes said external wall; said case assembly including a sealed bottom and a plug near the top sealing off a liquefied gas fuel chamber in said fuel section, an automatic valve assembly installed in said plug, a tube attached to and extending from said valve assembly substantially the full length of said fuel chamber, a seal plug in said valve assembly, a free-floating gravity sealing top above and cooperating with said seal plug, a fiber glass wick extending from the vicinity of said seal plug for substantially the full length of said tube and in direct fluid transfer relation between said fuel section and said valve, and snubber means in said cover to close the external end of said valve assembly in cooperation with said automatic valve assembly.

5. In a gas cigarette lighter, including a case assembly having a bottom, side walls, and a cover, and closure means to seal off a portion of said case assembly to provide a liquefied gas fuel section, a valve means in said closure means to provide gas vapor for combustion, a nozzle attached to the external end of said valve means, a snubber in said cover to close the external end of said nozzle and attached valve means, a fuel chamber in said valve means, a seal plug in said fuel chamber, a plastic material wick extending from the fuel section to the valve means, a free-floating gravity seating top above and cooperating with said seal plug to close when said snubber engages said nozzle and meter the flow of gas vapor through said valve means.

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