Dec. 13, 1966 P. R. J. COURT 3,290,905

LIGHTER

Filed Sept. 25, 1964

Fig. 1

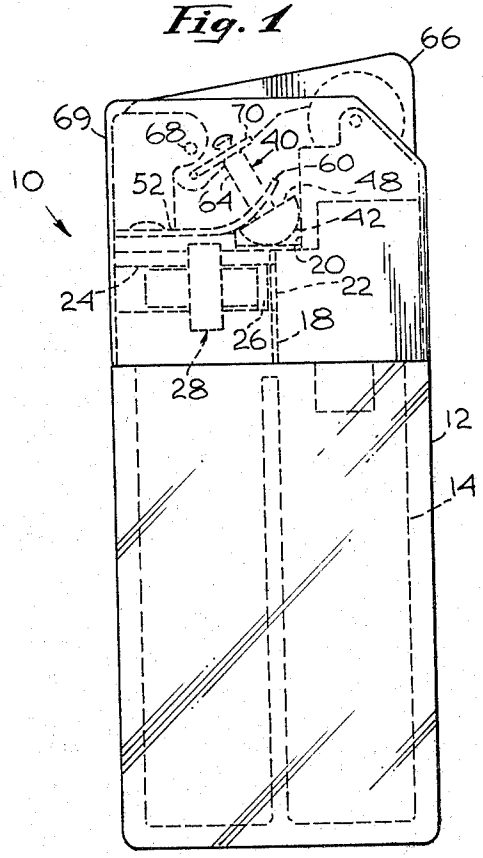
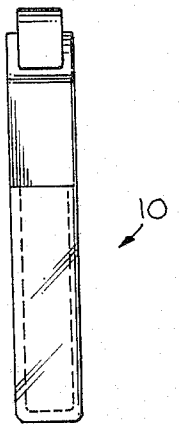


Fig. 2



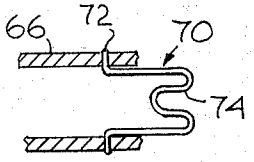


Fig. 4

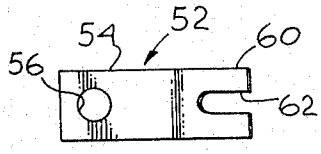


Fig. 5

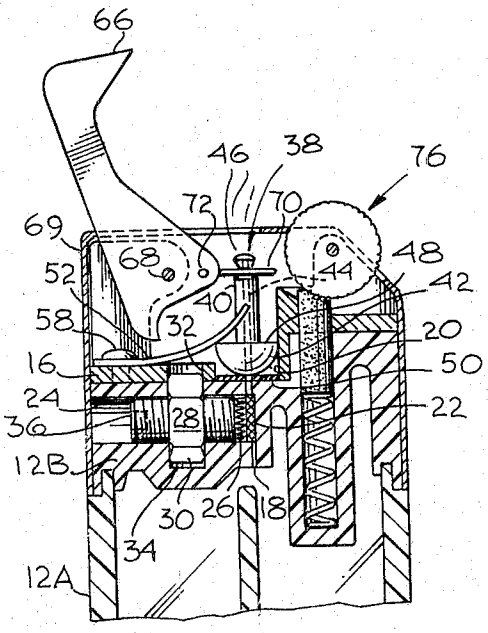


Fig. 3

INVENTOR
PATRICK R.J. COURT
BY Samuel Lindenberg
ATTORNEY

United States Patent Office 3,290,905 Patented Dec. 13, 1966

3,290,905

LIGHTER

Patrick R. J. Court, 360 Bonhill Road, Los Angeles, Calif.

Filed Sept. 25, 1964, Ser. No. 399,314
13 Claims. (Cl. 67—7.1)

The invention relates to disposable cigarette or cigar lighters of the type employing liquefied gas under pressure, such as butane, and more particularly to improvements therein.

Highly efficient lighters are presently being marketed employing a fuel, such as butane, that readily vaporizes at normal ambient temperatures. Such lighters are usually carried in a pocket or purse of a user. Butane at the normal body temperature of 98.6° F. has a vapor pressure of approximately 30 p.s.i. The characteristics of high volatility and relatively high vapor pressure at normal ambient temperatures presents certain advantages, one of which is that of obtaining an extremely efficient combustion. It follows that gum deposits and the like in the nozzle or flame area are virtually eliminated, providing a clean lighter that may be used over an extended period of time without much attention.

However, the characteristics of volatility and high vapor pressure also provide problems in lighter design. First is the problem of the fuel container itself. This must be made strong enough and yet, if the lighter is to be disposable, it should be inexpensive. The answer here is to make the fuel container out of plastic material. This raises another problem; that of insulating the fuel or shielding the container from the lighter flame so that it is not damaged thereby. Then, there is also the problem of filling the fuel container. Usually, this is done by using a special filling valve, as well as an outlet valve for enabling lighting.

A disposable lighter has no provision for refueling and, if it is to have a reasonable life expectancy, it is most important that fuel loss through vaporization be avoided when the lighter is not in use. Patently, this requires a positive seal of the fuel-containing tank during non-use periods. Additionally, the design must be such that the vaporized fuel is efficiently metered to the flame area during use and only in such volumes as is necessary to accommodate proper lighting.

With the above in mind, it is an object of the invention to provide a novel disposable lighter construction which uses butane as a fuel.

It is a further object of the invention to provide a lighter arrangement of the type described having a highly efficient and controllable flow regulating means associated therewith.

It is yet another specific object of the invention to provide a lighter arrangement of the type described having a unique, and inexpensive, valve structure and valve actuating arrangement.

These and other objects are achieved in accordance with this invention by constructing a disposable cigarette lighter with a plastic fuel container and metal frame. The fuel metering is performed by controlling the pressure applied to a fibrous member in the fuel escape passage to achieve a desired flow rate. The fibrous member is positioned in the fuel escape passage in a manner such that the pressure adjustment is made by a screw which is held transversely to the fuel escape passage. The valve comprises a nozzle having a hemispherical bottom which fits on a seat established by a flat polyethelene washer. A bias spring maintains the nozzle in a position to close the escape passage of the fuel. A link, which is actuated by the opening of the cover of the lighter pivots the nozzle to open the escape passage whereby escaping gas may be ignited. Upon closing the cover, the bias spring pivots the nozzle to close the escape passage.

The novel features that are considered characteristic of this invention are set forth with particularity in the appended claims. The invention itself both as to its organization and method of operation, as well as additional objects and advantages thereof, will best be understood from the following description when read in connection with the accompanying drawings, in which:

FIGURE 1 is a side elevational view of a typical lighter arrangement employing the herein disclosed invention;

FIGURE 2 is an end elevational view, taken from the right side of the structure shown in FIGURE 1;

FIGURE 3 is a vertical, sectional, fragmentary, side elevational view of the structure shown in FIGURE 1 and illustrating said structure in the "light" position;

FIGURE 4 is a detailed view, in plan, of a nozzle-cover connecting link employed in the invention; and

FIGURE 5 is a plan detailed view of a cantilever spring element employed in the herein disclosed invention.

Referring now to the figures of the drawings, in FIGURE 1 the numeral 10 indicates a cigarette lighter having a fuel tank 12. The tank is made of plastic material. The dotted lines 14 represent the inner walls and are shown to illustrate the thickness of the walls as well as the multicellular structure. The fuel tank, as may be seen in FIGURE 3, is made of two parts; a body portion 12A and a top or cap construction 12B. A metal frame, indicated generally at 16, covers the upper end of the tank 12 and engages same by suitable inserts (not shown).

A relatively small gas flow passage 18 is provided in the upper part of the plastic fuel container 12, as may be seen in FIGURES 1 and 3. The passage 18 extends upwardly to establish communication between the fuel container and a cavity 20 in the frame 16.

The relatively high vapor pressure of the fuel within the tank requires careful flow regulation when the lighter is in use. To effectuate such regulation, a flow regulating element 22 is disposed within the passage 18. This flow regulating element compirses compactible fibrous material designed to provide a multiple of erratic paths which enable a flow of the vaporized fuel therethrough. In a preferred embodiment of the invention, a high-grade lint-free felt is employed.

A second passage 24 is provided in the top of the fuel container 12, which is perpendicular to and intersects the fuel flow passage 18. A seal and compression member 26 is positioned in the passage 24 in abutting engagement with the flow regulating element 22 and in peripheral engagement with the walls of the passage 24. The passage 24 further carries a pressure control device, indicated generally at 28, which, in the preferred embodiment, comprises a nut 30 disposed in opening 32 and in annular shoulder abutment with the cap 12B as at 34. The nut 30 threadably mounts an adjustment screw 36, the latter having one end thereof in abutting engagement with the seal and compression member 26.

Until pressure is brought to bear on the fibrous member 22 by means of the screw 36 and the seal and compression member 26, it is quite pervious to the flow of gas or fluid in both directions. Advantage is taken of this for filling the tank with butane.

Thereafter, by turning the screw 36 within the frame 16, pressure can be brought to bear upon the seal and compression member 26 causing it to increase in diameter and thus prevent gas leaking back out through passage 24. The seal and compression member also applies pressure to the flow regulating element 22, and thereby increases the compaction of the material therein. As the compaction of the material is varied, the effective cross-sectional

area of the erratic paths is varied. In this manner, a pressure drop across the regulating element 22 is established and may be controlled to provide a desired gas flow and/or flame size.

A nozzle arrangement indicated generally at 38 is provided for turning the fuel on and off when a light is desired. This comprises a nozzle 40, the lower aspect of which is hemispherically formed, as at 42. The nozzle 40 is a generally elongated member having an aperture 44 therein which extends therethrough and provides, at its upper terminus, a flame area 46. The hemispherical form of the lower aspect of the nozzle 40 terminates in a preferably upwardly facing shoulder 48. A nozzle seal 50, which is a washer, of a material such as polyethelene, is disposed within the cavity 20 and interposed between the flat top of the fuel tank and the hemispherical surface 42 of the nozzle 40. The seal 50 is provided with an opening which enables communication between the passage 18 and the aperture 44 of the nozzle.

Attention is now directed to FIGURE 5 which shows a detailed view of a cantilever biasing spring 52 employed to hold the nozzle arrangement in place. The biasing spring has an anchoring portion 54 with an opening 56 formed therein which accommodates riveting, as at 58, (FIGURE 3), of the spring 52 to the frame 16. The other end 60 of the spring 52 is bent in manufacture to angle slightly upwardly. Additionally, said end 60 is bifurcated as at 62 to moveably receive the stem portion 64 of the nozzle 40. High-grade spring steel may be employed in the manufacture of the spring element 52. It will thus be apparent that in the assembled condition, the flat undersurface of the end 60 of the spring 52 applies pressure to the upwardly facing shoulder 48 of the hemispherical surface 42 of the nozzle 40. In the non-use or closed position of the lighter, as shown in FIGURE 1, the end 60 of the spring 52 is still not quite in uniform surface engagement with the shoulder 48 to thereby maintain a rotating pressure on the nozzle shoulder, and, as will appear subsequently, to thereby keep the hinged cover 66 of the lighter firmly closed.

Returning now to FIGURE 3, it will be seen that the lighter arrangement includes an openable cover 66 pivotally carried, as at 68, by the frame 16. A metal case 69 is force-fitted over the frame 16 and the plastic top 12B of the fuel tank. FIGURE 4 is a detailed plan view of a cover-nozzle connecting link 70 employed in the disclosed invention. The connecting link 70 has its ends bent to be inserted and pivotally carried in holes 72 in the cover 66 which are located in eccentric relation relative to the axis of pivot 68. The link 70 is bifurcated as at 74 to physically receive the stem 64 of the nozzle 40 immediately adjacent its upper terminus.

To complete the lighter, a conventional spring-loaded flint and peripherally serrated spark wheel mechanism indicated generally at 76 are carried by the frame 16. The mechanism 76 is located immediately adjacent to the flame area 46 whereby the user, by manual rotation of the spark wheel mechanism 76, may create an apporpriate spark to ignite the escaping fuel.

FIGURE 1 illustrates the position of the various parts of the lighter when the cover is closed. At this time, the cantilever spring 52 biases the nozzle 40 toward the hinge 68 whereby the nozzle is rotated to bring a solid portion of the lower hemispherical aspects 42 of the nozzle over the upper end of the flow passage 18. Pressure of the spring 52 on the shoulder of the nozzle positively seals the solid portion of the nozzle to the polyethylene washer 50 and also seals the washer to the top of the tank 12B. This seals the passage 18 thus effectively preventing dissipation of fuel from the tank 12. When it is desired to use the lighter, the cover 66 is pivoted to the open position shown in FIGURE 3. Pivotal movement of the cover 66 induces eccentric and pivotal movement of the connecting link 70, which moves the nozzle 40 in a clockwise direction, pivoting the hemispherical aspect of said nozzle to a position establishing communication between the nozzle aperture 44 and flow passage 18 through the opening in the nozzle seal 50. The vapor pressure of the fuel within the tank 12 then causes gaseous fuel flow through the passage 18 to the flame area 46 of the nozzle 40. The amount of fuel required for a desired flame size is correctly metered by virtue of the controlled pressure drop across the flow regulator element 22. In the operating position shown in FIGURE 3, the cantilever spring 52 has been further stressed and engages the edge of the shoulder 48. Thus, when the user closes the cover 66, the stressed spring 52 snaps the nozzle 40 counterclockwise to the closed position shown in FIGURE 1 and maintains sufficient pressure thereon to effectively seal the flow passage 18. It should also be noted that the location of the pivot point 72 of the nozzle actuating link is above the pivot point 68 of the cover when the cover is open, thus maintaining the cover open, and is below the pivot point of the cover when the cover is closed, thus maintaining the cover closed. The pressure of the spring 52 on the nozzle provides positive pressure by means of the link 70 to maintain the cover open or closed as dictated by the position of the cover.

There has accordingly been shown and described herein a novel disposable lighter having a simple and inexpensive construction. The metal frame acts as a heat sink and flame guard to prevent the heat of the flame from affecting the fuel container. The fuel metering and valve arrangement are simple and inexpensive and provide the dual functions of enabling the fuel tank to be filled and with subsequent adjustment, enable the fuel to be metered. That is, before the case is installed, the butane is injected in liquid form through the nozzle and through the uncompacted fibrous material into the fuel tank. The screw is then adjusted to compress the fibrous material until the fuel flow occurs through the nozzle at a desired, measured flow rate, which determines the flame size. Then the case is force-fitted in place, which covers the opening for access to the screw. No further adjustment of the screw is necessary thereafter.

What is claimed is:

1. In a lighter arrangement, a fuel tank arranged to contain a volatile fuel, said lighter arrangement having a first passage extending in one direction through one side of said tank to afford the escape therefrom of vaporized fuel, said first passage having disposed therein a flow regulating element comprising compactible fibrous material providing a plurality of erratic paths therethrough to accommodate said flow of said vaporized fuel, and a second passage extending substantially at right angles to said first passage and intersecting said first passage, said second passage including means to controllably vary the compaction of said material and thereby control the rate of flow of the vaporized fuel through said passage means.

2. A lighter arrangement according to claim 1 wherein said means to vary the compaction of said material comprises a variable pressure device in abutting engagement with said fibrous material.

3. A lighter arrangement according to claim 2 wherein said variable pressure device comprises a seal member disposed in said second passage abutting said compacted fibrous material, a screw, and means for threadably supporting said screw in said second passage in pressure adjusting engagement with said seal member.

4. A lighter arrangement according to claim 3 wherein said seal member is in peripheral seal engagement with the walls of said second passage.

5. In a lighter of the type having a body portion with a pivotably supported cover thereon which is pivoted open when it is desired to use said lighter, said lighter body portion including a fuel container having a top portion, a fuel escape passage extending through the top portion of said container and affording communication with the interior thereof, walls forming a cavity in the

top portion of said container at the outside termination of said passage, a movable nozzle having an elongated portion and a pivotal portion disposed in said cavity, said nozzle having an aperture extending therethrough, said nozzle being pivotable within said cavity between a first position to establish communication between said nozzle aperture and said passage, and a second position to prevent communication between said nozzle aperture and said passage whereby in said first position one end of said nozzle provides a vapor exit port to provide a lighter flame area, spring means engaging said nozzle pivotal portion for urging said nozzle to a second position, and link means between said nozzle and said pivotal cover for moving said nozzle from a second to a first position with movement of said cover for using said lighter.

6. In a lighter according to claim 5 wherein said nozzle comprises a substantially hemispherical portion and a pipe portion extending from the flat side of said hemispherical portion, said hemispherical portion being seated in said cavity, a shoulder on said hemispherical portion, and said spring means biasingly engaging said shoulder.

7. In a lighter arrangement according to claim 6 wherein said spring means comprises a cantilever spring element and means fastening one end of said spring element for positioning the opposite end in pressure engagement with said shoulder of said nozzle hemispherical portion.

8. In a lighter according to claim 6 wherein said link means comprises a member having one end pivotally attached to the cover and movable therewith and the other end movably attached to the pipe portion of said nozzle.

9. In a lighter arrangement of the type having a body portion with a pivotably supported cover thereon which is pivoted open when it is desired to use said lighter, said body portion including a fuel container having a top portion, a fuel escape passage extending in one direction through the top portion of said container and affording communication with the interior thereof, said fuel escape passage having disposed therein a flow regulating element comprising compactible fibrous material providing a plurality of erratic paths therethrough to accommodate said flow of said vaporized fuel, a fuel regulating passage extending substantially at right angles to said fuel flow passage and intersecting said fuel flow passage in the region of said fuel regulating element, means in said fuel flow passage for controlling the compaction of said fibrous material for establishing the flow of fuel at a predetermined value, walls forming a cavity in the

top portion of said container at the outside termination of said passage, a movable nozzle having an elongated portion and a pivotal portion disposed in said cavity, said nozzle having an aperture extending therethrough, said nozzle being pivotable within said cavity between a first position to establish communication between said nozzle aperture and said passage, and a second position to prevent communication between said nozzle aperture and said passage whereby when in said first position one end of said nozzle provides a vapor exit port to provide a lighter flame area, spring means engaging said nozzle pivotal portion for urging said nozzle to a second position, and link means between said nozzle and said pivotal cover for moving said nozzle from a second to a first position with movement of said cover for using said lighter.

10. In a lighter arrangement as recited in claim 9 wherein said means for controlling the compaction of said fibrous material includes a screw, means threadably supporting said screw in said fuel flow passage, and an expansible sealing washer in said fuel flow passage positioned between one end of said screw and said fibrous material.

11. In a lighter according to claim 9 wherein said nozzle comprises a substantially hemispherical portion and a pipe portion extending from the flat side of said hemispherical portion, said hemispherical portion being seated in said cavity, a shoulder on said hemispherical portion, and said spring means biasingly engaging said shoulder.

12. In a lighter according to claim 9 wherein said spring means comprises a cantilever spring element and means fastening one end of said spring element for positioning the opposite end in pressure engagement with said shoulder of said nozzle hemispherical portion.

13. In a lighter according to claim 9 wherein said link means comprises a member having one end pivotally attached to the cover and movable therewith and the other end movably attached to the pipe portion of said nozzle.

References Cited by the Examiner

UNITED STATES PATENTS

2,720,098	10/1955	Wagner	67—7.1
3,148,522	9/1964	Court	67—7.1

FOREIGN PATENTS

727,195	3/1955	Great Britain.

FREDERICK L. MATTESON, JR., *Primary Examiner.*

R. A. DUA, *Assistant Examiner.*