Oct. 25, 1966 S. McLARTY 3,280,597

CIGARETTE LIGHTER

Filed May 18, 1964

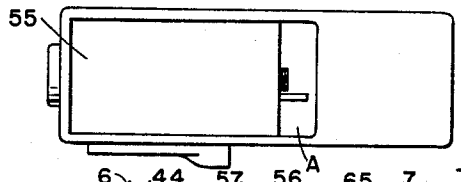


FIG. 1

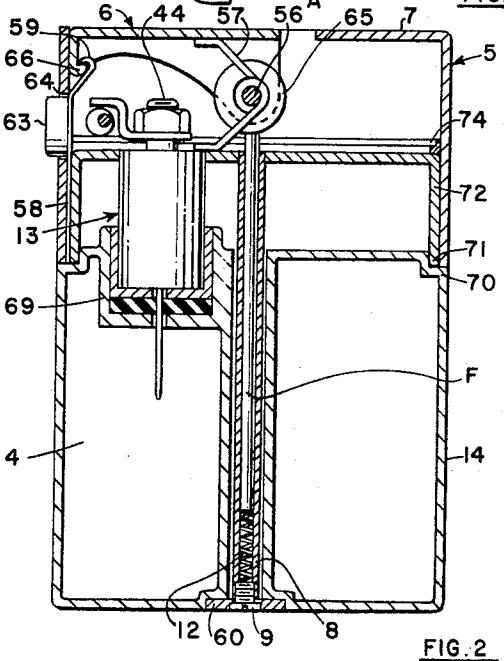


FIG. 2

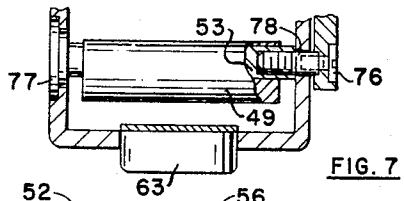


FIG. 7

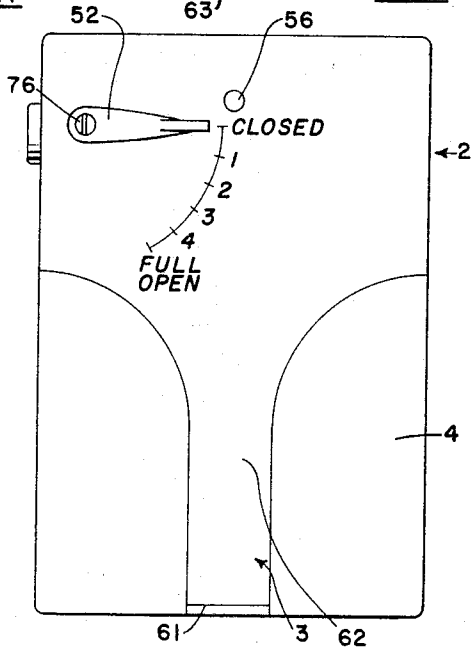


FIG. 3

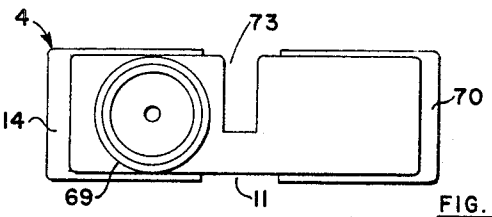


FIG. 4

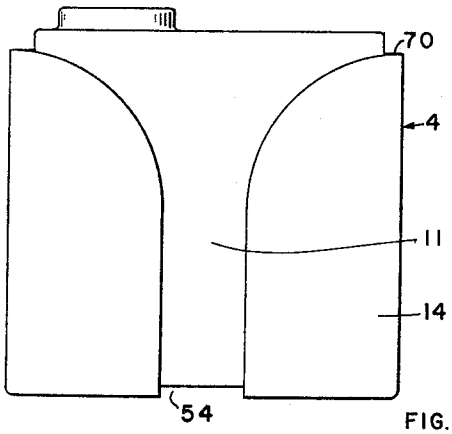


FIG. 5

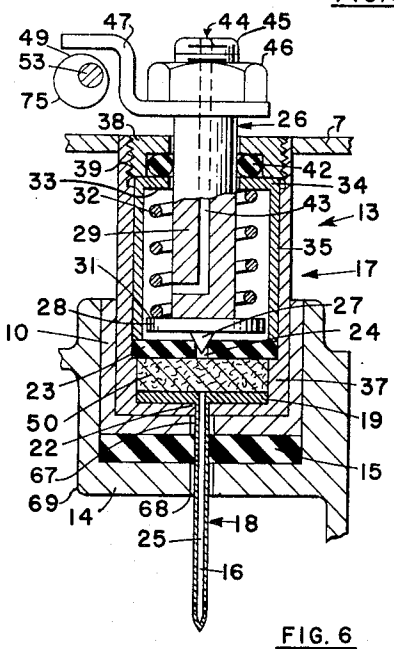


FIG. 6

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CIGARETTE LIGHTER

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This invention relates generally to cigarette lighters and more particularly to lighters utilizing liquified gas as a fuel.

A principal object of this invention is to provide a portable cigarette lighter for use with a readily available aromatic fuel, wherein the fuel is contained under pressure in a disposable translucent normally sealed cartridge that is ruptured upon insertion into the lighter casing so that vaporized fuel is available when required.

A secondary object is to provide a cigarette lighter using propane, butane, pentane or the like as a fuel, in which the casing is so constructed that special air vents to provide the proper mixing of fuel and air are not required.

A further object is to provide a gas lighter having a lever operated fuel valve that utilizes a cam-lift arrangement to raise the valve stem vertically for increased precision of operation.

An additional object is to provide a spring loaded, normally closed valve, including an integral flame nozzle, that acts as an element to permit adjustment or setting of the flame during use.

And another object is to provide a pocket lighter that is reliable in operation, economical to construct and virtually maintenance free.

Another object is to provide a lighter of the character described that includes a unique, easy-to-operate, leakproof valve which simultaneously serves as the flame nozzle for the ignitable vapor.

And yet another object is to provide a unique T-shaped casing for a cigarette lighter in which one leg of the T serves as a flint tube and in which both legs serve as guiding and support means for the disposable fuel cartridge.

A still further object is to provide a novel valve unit assembly for a gas lighter which comprises a spring-loaded, normally closed metal plunger that seats against a non-metallic valve disk in a housing cage that includes a depending hollow needle for piercing the fuel cartridge and supplying fuel to the flame nozzle.

And an additional object is to provide a transparent or translucent plastic hermetically sealed replaceable and disposable cartridge containing a liquified gas fuel under pressure. An important advantage to a leakproof sealed cartridge that is punctured only when seated in the lighter is that it eliminates any spillage that might occur when pouring fluid from a can, and it greatly increases the ease with which fuel loading may be accomplished.

And still another object is to provide a standardized replaceable fuel cartridge that can be used with different lighter heads.

And a different object is to provide a standardized size and shape fuel cartridge that is made of translucent or transparent plastic and is made of a plastic that may be formed in different colors to fit color requirements dictated by decor or dress of the owner.

And yet an additional object is to provide a fuel cartridge of translucent or transparent plastic material that is shaped in such a manner as to provide the dual purposes of maintaining sufficient strength to rigidly withstand pressurized liquid gas and of guiding the cartridge into cooperative seating relation with the lighter casing,

at which point the sealer is punctured by a needle to permit lighter operation.

An object is also to provide a gas lighter having a manually controlled gas discharge valve that is operated by a lever externally located on the casing and so actuated that it will automatically return to a valve closing position when released, and yet to provide a lever that does not project from the casing in a manner that might likely be accidentally moved while being carried.

And a further object is to provide a unique lever operated gas needle valve that permits graduated settings to be placed on the exterior of the lighter casing so the user may adjust the flame setting, before lighting, to his particular liking.

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 the gas cigarette lighter of this invention.

FIGURE 2 is a cross-sectional elevational view of the device of FIGURE 1.

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

FIGURE 4 is a top plan view of the fuel cartridge used in the lighter of this invention.

FIGURE 5 is a side elevational view of the disposable fuel cartridge of FIGURE 4.

FIGURE 6 is an enlarged fragmentary detail view showing the valve cage sub-assembly of FIGURE 2.

FIGURE 7 is an enlarged fragmentary detail view showing the cam lever operating structure of FIGURES 2 and 3.

Referring now more particularly to the characters of reference on the drawing, it will be observed that the complete assembly of the cigarette lighter of this invention, identified as **2**, is comprised of a casing unit **3**, and a disposable cartridge **4** combined into an operating assembly.

The casing unit **3** is itself comprised of a casing group **5**, and a movable cover group **6**. The casing group **5** including a T-shaped frame **7**, an integral flint tube **8** containing a flint F held in place by flint tube screw **9** and spring **12**, and a valve cage sub-assembly **13**.

The disposable cartridge **4** is self-contained and consists of a translucent or transparent molded plastic housing **14** having a precise shape so as to cooperatively assemble with the casing unit **3** to form the complete lighter assembly **2**. Cartridge **4** also includes a gas seal **15** that is affixed to housing **14** to prevent escape of vapor or liquid until such time as the seal **15** is punctured by the needle **16** of the valve group **13**. Seal **15** is held in a cup shaped recess in housing **14** and is sealed in place by a smaller cup-shaped piece **10** that is cemented or heat sealed into housing **14**. Aligned openings **67** and **68** in plastic parts adjacent the seal **15**, but not in the seal itself, permit the fluid tight seal to be punctured by the guided hypodermic type needle **16**.

The valve group **13** includes a cage structure **17** press-fitted into the T-shaped frame **7**, and including a needle structure **18** comprising a disk **19** attached to the depending needle **16** that projects through an opening **22** in the cage structure **17**. Non-metallic valve seat disk **23** is spaced from disk **19** so that its opening **24** aligns with opening **25** in the needle structure **18**. Plunger **26** includes a valve tip **27**, conically shaped in one embodiment, that aligns with and seats in the slight conical upper area of opening **24** of disk **23**. Plunger **26** also includes a peripheral flange **28** extending beyond tip **27** and beyond plunger shank **29** to provide a base or seat **31** for valve spring **32**. The other seat **33** for spring **32** is provided by lip **34** of insert **35** that snugly fits in the inner

diameter of cage cup 37 which is itself press fitted into casing frame 7. Insert 35 is held in place by ring 38 that threadedly engages internal threads 39 of cage structure 17 and by O-ring 42 that simultaneously seats against and seals insert 35, ring 38, and plunger shank 29 against leakage of vaporized fuel that passes through channel 43 and out through flame nozzle 44. Plunger shank 29 is threaded at 45 to receive lock nut 46 which tightens against cam follower 47 to position the cam follower at its proper height relative to the valve tip 27 and cam 49. Gas lever 52 is located external and at one side of the casing frame 7 and is supported on shaft 53 which it rotates. Cam 49 is secured to shaft 53 internally of casing frame 7 so that upon movement of lever 52 the shaft 53 and cam 49 will rotate to raise cam follower 47 and valve plunger 26 and hence raise valve tip 27 off its valve seat at opening 24 in valve disk 23. Channel 43 extends vertically through one portion of shank 29, and laterally through another portion so that vaporized fuel that passes around the periphery of flange 28 will enter the lateral opening and pass upward and out through channel 43 and flame nozzle 44. It is important to note that no separate structure is required to provide the flame nozzle and no adjustment of the flame nozzle is required.

The cover group 6 includes a movable cover 55 that is hinged near one end to shaft 56 that is fastened to T-frame 7. Coil spring 57 also surrounds shaft 56 and urges cover 55 in a direction to open. The cover 55 is normally restrained from opening by leaf spring 58 that is secured to T-frame 7 at its lower end. The upper end of leaf spring 58 includes an L-shaped lip 59 that engages a corresponding L-shaped lip 66 on cover 55 to normally hold the cover in its closed position. A button 63 is secured to leaf spring 58 at an intermediate point and projects through an opening 64 in the front wall of T-frame 7. Button 63 is conveniently located to be depressed by the thumb of a person holding the assembly 2 in hand. Shaft 56 of cover group 6 also includes a spark wheel 65 located directly above and in frictional contact with flint F. The spark wheel 65 rotates with cover 55 when the latter opens and sparks generated by wheel 65 moving over flint F are directed toward flame nozzle 44. The cover 55 is made shorter than the available space in the top of T-frame 7 by the amount A that is required to furnish air for admixing with the fuel vapor to produce initial combustion at flame nozzle 44. As the cover 55 begins to raise under the action of spring 57, air is drawn in through opening A to permit continued combustion until the cover has reached a stable position, at which point burning continues due to the other available air source, i.e. the area exposed when the top cover is open. Similarly when the top cover 55 is moved to its closed position it forces remaining expended combustion products out through the opening A and readies the lighter for its next operation.

Cartridge 4 is assembled into the casing unit 3 by hand pressure until the hollow needle 16 has punctured seal 15 and the internal pressure in the cartridge forces liquid or partially vaporized gas up through the needle 16, and into the area between disks 19 and 23, which is filled with a filter material such as fiberglass 50. If lever 52 is moved to an open position, the now vaporized gas will pass through valve seat 24 and around flange 28 and into exit channel 43 and out flame nozzle 44. When the cover 55 opens and spark wheel 65 rotates, the gas jet coming out of nozzle 44 will ignite and produce a flame, whose height is determined by the setting of lever 52.

The lower end of casing unit 3 is closed by a U-shaped clamp plate 60 that is held in place by the countersunk engagement of screw 9 and the plate. The small lips 61 of plate 60 engage cooperating recesses in the vertical legs 62 of the T-shaped casing frame 7, and cartridge 4 is recessed at 54 to receive plate 60, so that a perfectly flat and flush mounted closure is accomplished and cartridge 4 is rigidly secured into the casing unit 3.

The cartridge itself is molded polycarbonate material having the configuration indicated at 14 in FIGURES 2, 4 and 5. When inserting the cartridge 4 into the casing 3, the user may grip the lower flat bottom end of the housing 14 and insert the cartridge into the casing in such a way that the recesses 11 in the molded cartridge align with the depending legs 62 of the T-frame 7, and when so guided the needle 16 will align with and pass through the openings 67 and 68 in the plastic member 10 and the cartridge housing 14 respectively. The well portion 69 of the cartridge is adapted to receive the lower extended end of the cage cup housing 37 and when the cartridge is fully inserted, the bottom of cage 37 seats against the top of member 10 in nesting relation. At the same time the outer ridges 70 seat against the lower edges 71 of the inverted cup structure 72 and the indenture 73 surrounds the flint tube 8 in close relationship. Cup structure 72 is press-fitted into the interior of casing T-frame 7 until it abuts against a ridge 74 at its upper end.

The fuel valve group 13 thus is seen to serve several purposes, it punctures the liquid gas fuel cartridge to supply fuel to its flame nozzle 44 and it controls the supply of gas from a fully closed position to a fully open position by intermediate increments. The several positions of the valve are indicated by the position of the lever 52 and position marks on the outer surface of the T-frame 7. These markings may cooperate with or be replaced by detents in the surface to align with a projection on the back surface of the lever (not shown). The lobe 75 of cam 49 engages the underside of cam follower 47 to permit action of plunger 26 in opposition to or in phase with the action of spring 32. When nut 38 is initially adjusted to properly position valve seat disk 23, the spring 32 urges plunger 26 downward so that tip 27 engages the conical seat in opening 24 with the desired amount of pressure to resist the maximum expected pressure of the fuel in cartridge 4. The relation of shaft 53 and cam 49 to the cam follower when it is fastened by nut 46 and when lever 52 is in its closed position is such that there is a slight clearance therebetween. This will permit the lever 52 to move a slight distance, such as to indication mark "1" before any lifting of the valve plunger 26 takes place. By this technique a built-in tolerance occurs so that expensive zero tolerance fitting of the valve cage subassembly 13 into the casing 3 is not required.

The lever 52 is attached to cam shaft 53 by a single screw 76 that threads into the interior of shaft 53 at one end, as seen in FIG. 7. The other end of shaft 53 includes an enlarged cap 77 that rotates in the casing frame 7. Shaft 53 includes a reduced diameter 78 near lever 52, and this construction permits the shaft 53 to be inserted from one side of the casing, have the cam 49 installed by a set screw (not shown) and then have lever 52 attached by screw 76. Shaft 53 and cam 49 will then rotate relative to the side walls of frame 7 in response to movement of lever 52. By this construction the user will be able to select the desired flame height he wishes before opening the cover of the lighter by moving lever 52 to one of the positions indicated on the casing exterior. Once the setting is achieved, the lever 52 will remain there and the desired flame height will be achieved while the lighter is in operation. However when the lever is moved toward the closed position and only very slightly beyond the first indicated flame size position "1," the lever 52 and valve plunger 26 will both be automatically returned to their fully closed positions by the action of spring 32.

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. A cigarette lighter assembly comprising in combination: a casing unit and a removable translucent plastic cartridge containing gas fuel; said casing unit including a

valve group and ignition means; said valve group including a hollow needle at one end puncturing said cartridge, a plunger in said valve group, a flame nozzle integral with one end of said plunger, a valve tip at the other end of said plunger, a valve seat in said valve group cooperating with said valve tip, control means to direct gas flow from said cartridge past said valve seat and tip and out through said flame nozzle, said control means including a spring normally biasing said plunger in a closed position, a cam follower attached to said plunger to raise said plunger, a cam associated with said follower and an externally located manually movable lever for rotating said cam and raising said follower when desired to cause said gas to flow.

2. A cigarette lighter assembly, comprising in combination: a casing unit and a removable, transparent, fuel cartridge containing liquefied gas; said casing unit including a casing group and a movable cover group; said casing group including a generally T-shaped frame, completely open at the bottom and partially open on the sides and top, side legs extending downward from the top of said T-shaped frame, said fuel cartridge including a side recessed area conforming to said frame and a bottom recessed area substantially in alignment with the bottom of said frame when installed, a bottom plate filling said recess and attached to said frame, said movable cover group installed in said frame in said partially open top in a manner to define a smaller partial opening in said top, a valve group including a flame nozzle in said frame, means in said valve group for connecting the interior of said fuel cartridge with said flame nozzle, and control means to channel gas from said cartridge out through said nozzle; and ignition means mounted in said frame to ignite said gas at said flame nozzle when said gas combines with air entering said casing through said partially open top.

3. A valve group combination for a gas cartridge lighter having a frame and a removable fuel cartridge, comprising a valve cage structure installed in said frame, a hollow needle in said structure and extending downward into said cartridge, a valve seat and a valve plunger in said cage structure, a spring in said cage structure normally biasing said valve plunger into closed engagement with said valve seat, a cam follower adjustably fastened to said plunger, a cam adjacent said follower, a shaft extending from said cam to the exterior of said frame, and a selectively adjustable lever attached to said shaft and through said shaft to said cam in operative relation.

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EDWARD J. MICHAEL, *Primary Examiner.*