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## GAS CONTROLLED POCKET LIGHTER

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4 Claims. (Cl. 67—7.1)

1

The present invention relates to pocket lighters, more particularly to lighters of the wickless type wherein an inflammable gas released from a container or tank is ignited by a spark, or in some other manner (e. g. catalytically), and is kept burning until the escape of gas from the container is shut off.

The handling of pocket lighters of the aforesaid type is not without complications, since distinct operations are necessary to control the escape of the gas and to ignite same.

It is, therefore, an object of this invention to provide means enabling safe and convenient operation of a lighter of the aforesaid character by one hand only of the operator.

It is another object of the invention to provide means ensuring safe and effective control of a gas-supplied lighter as to the feed of a predetermined portion of the gas and the ignition thereof in timed relation while employing for this control one finger only of the hand of the operator.

A further object of the invention is to provide means affording quick and easy removal of a used gas tank from the lighter housing and the replacement by a refill tank.

With the above and other objects in view, the invention will be hereinafter more fully described and the combination and arrangement of parts will be shown in the accompanying drawing and pointed out in the claims which form part of the specification.

In the drawing:

Fig. 1 is a side elevation of a lighter embodying features according to the invention;

Fig. 2 is a top plan view of the lighter of Fig. 1;

Fig. 3 is a fragmentary section (drawn to a larger scale) on the line 3—3 of Fig. 1; and

Fig. 4 is a section taken along line 4—4 of Fig. 3.

Referring now more particularly to the drawing, there is generally indicated at 10 a lighter having a casing or housing 11 similar to that of a conventional pocket type cigarette lighter. Rising centrally from the top of the housing 11 are a pair of spaced lugs 12a, 12b traversed by a pin 13 on which there are rotatably supported a flint wheel 14, a pawl disk 15 and a cam member 16. Cam member 16 comprises a pair of disk-shaped side portions 16a, 16b and a bridge portion 16c connecting these side portions together; flint wheel 14 is provided on one of its faces with ratchet teeth 14a engageable by a tongue 15a struck out of the material of and projecting sideways from the resilient pawl disk 15. This disk 15 has a straight upper edge upon which bears the bridge portion 16c of cam member 16, as

2

best seen in Fig. 4, this arrangement causing entrainment of the disk 15 and thereby, eventually, of the flint wheel 14 upon rotation of the cam member 16 about to be described.

A plunger 17 slides in substantially vertical direction in a sleeve-shaped boss 18 projecting from the top of housing 11 on one side of the lugs 12a, 12b. Plunger 17 is urged upwardly by a coil spring 19 surrounding same, which spring bears upon a manually operable member or thumb piece 20 rigidly connected with the plunger. Thumb piece 20 has a pair of arms 20a, 20b extending toward the cam member 16, the disk portions 16a, 16b of the latter being provided with radial slots 21 engaged by pins 22a, 22b, respectively, carried by said arms 20a, 20b.

Flint wheel 14 cooperates with a flint piece or element 23 which is held in a central holder 24 of the housing 11 and is urged by a suitable spring (not shown) into contact with the knurled periphery of the flint wheel. It is well understood that the flint is spring supported in boss 24 as it is known.

The part of the housing 11 opposite that holding the plunger 17 forms a space to receive a gas container or tank 25 which may be introduced into the housing from the bottom thereof, as indicated in dot-dash lines in Fig. 1. The tank or chamber 25, containing butane or some other compressed suitable gas, is provided at its top with a control valve 26 which projects through an aperture 27 provided in the top wall of the housing 11. Valve 26 has a stem 28 terminating in a head 29, the stem being provided with a pinhole 30 through which the gas from the tank 25 escapes when the head 29 is raised to dotted position of Fig. 1 against the force of a spring (not shown). Valves of this description may be conventional and do not require a detailed description of their mechanism.

The bifurcate end of a fork-shaped lever 31 straddles the stem 28 of valve 26 just below its head 29. The opposite end of lever or fork 31 forms two arms 31a, 31b which are provided with outwardly extending pivot pins 32a, 32b at an intermediate location of said arms and with inwardly extending pins 33a, 33b at the ends of said arms. Pins 32a, 32b engage horizontal slots 34a, 34b, respectively, provided in the lugs 12a, 12b, and are normally lodged and retained in suitable slots or notches 35 communicating with the ends of slots 34a, 34b.

The disk-shaped portions 16a, 16b of cam member 16, while being generally circular, are provided with peripheral recesses 36 in engage-

3

ment with said pins 33a, 33b during inoperative position of the lighter. This position is illustrated in solid lines in Figs. 3 and 4 from which it is apparent that under these circumstances the fork 31 extends substantially in horizontal direction so that the valve 26 remains closed. Any escape of gas from the tank 25 is thereby prevented and spontaneous ignition cannot occur.

To operate the lighter, thumb piece 20 is depressed into the position shown in dot and dash lines in Fig. 4. This action imparts a downward movement to the pins 22a, 22b which results in a clockwise rotation of cam member 16 (as viewed in Fig. 4) until the slots 21 and the recesses 35 reach their actuated position shown in dot and dash lines.

Rotation of the cam member 16 also imparts motion to the pawl disk 15, but entrainment of the flint wheel 14 is delayed until the tongue 15a engages one of the relatively widely spaced ratchet teeth 14a of the flint wheel. During this interval the cam disks 16a, 16b have pushed the pins 33a, 33b in downward direction, thereby forcing the fork 31 into inclined position shown in dot and dash lines which raises the head 29 and enables the escape of gas through the pinhole 30. As the wheel 14 starts to turn, its knurled periphery coacts with the tip of flint 23 to produce a spark which ignites the escaping gas.

Thus a lighter construction is achieved which is operated by a manually operable means 20 which, in turn, is operatively connected by first intermediary means 29a, 29b; 16a, 16b and 31a, 31b to valve means 26 and also by second intermediary means 16a, 16b; 15, 15a; 14, 14a to the ignition means 23. Pin 13 forms a support common to disks 16a, 16b and disk 15—15a as well as to flint wheel 14.

It should be noted that during this sparking movement the circular or cylindrical portions of disk 16a, 16b bear upon the pins 33a, 33b which ride on said portions so that no further displacement of the fork 31 occurs, this arrangement enabling the wheel 14 to be rotated with the desired velocity since no resistance from the valve 26, other than frictional resistance, needs to be overcome.

The escape of gas from the chamber 25 will not be cut off until the thumb piece 20 has been released, at which time the flame appearing above the orifice 30 will be extinguished by the return of the above mentioned parts to their normal or inoperative positions, resulting in the closure of valve 26.

To remove an empty tank from the housing 11, the thumb piece 20 is kept at rest but the valve head 29 is raised by coupling means consisting of slots 34a, 34b, and pins 32a, 32b of the fork 31 which are normally seated in notches 35 which communicate with slots 34a, 34b. The fork is slid back along slots 34a, 34b until the pins 32a, 32b abut the other end of these slots thereby disengaging the fork from the head of valve 26 and permitting withdrawal of the tank 25. A refill container may then be inserted by reversing the above operation; since it will only be necessary to lift the valve head 29 of such refill container for a short moment, the amount of escaping gas will be negligible and may be further reduced by covering the orifice 30 with the finger.

It will thus be seen that there has been provided manually operable means displaceable by the user in a continuous motion to thereby ef-

4

fectuate through respective intermediary means the opening movement of the valve 26 and the rotation of flint wheel 14 for the ignition of the gas in timed relation, the sequence of said movement in this preferred embodiment being such that two (quick-acting and delayed-acting) steps are performed during distinct portions of the operating stroke of the operable means in order to give the gas ample time to pass through the orifice 30 before sparking occurs.

It can thus be seen that there has been provided according to the invention a cigarette or cigar lighter provided with a tank adapted to contain a compressed inflammable gas, normally closed valve means seated on said tank for controlling the escape of said gas therefrom, ignition means positioned next to said valve means, manually operable means common to and operatively connected to said valve means and to said ignition means, respectively, said operable means being constructed to perform a displacement movement between inoperative and operative positions, first intermediary means for operating said valve means upon manipulation of said operable means, and second intermediary means for actuating said ignition means in conjunction with said manipulation of said operable means, each one of said intermediary means including at least one element movably supported on a common axis, said first intermediary means including another element of said first intermediary means, whereby in the course of the displacement of said operable means, said valve means is first opened for gas escape and the escaping gas from said valve means is subsequently ignited by said ignition means.

It should be noted that the invention is not limited to the igniting of gas by the striking of a spark through the use of a flint wheel. Other means of accomplishing this result, and other forms of energy may be used. Thus, it will be apparent that a spark may be produced electrically, and that the gas may also be ignited with the aid of a suitable catalyst, such as platinum sponge, or by radiant (atomic and like) energy. These and other modifications and adaptations will be readily apparent to persons skilled in the art and are intended to be included in the scope of the invention as defined in the objects and in the appended claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

1. In a portable lighter; a casing, a fuel chamber in said casing for containing compressed inflammable gas, valve means on said casing for controlling escape of gas from said chamber, ignition means positioned next to said valve means, manually operable means common to said valve means and to said ignition means and operatively connected thereto, said operable means being constructed to perform a displacement movement between inoperative and operative positions, said operable means including first intermediary means for operating said valve means upon manipulation of said operable means and also including second intermediary means for operating said ignition means in conjunction with said manipulation of said operable means, whereby during displacement of said operable means said valve means is first opened for gas escape and the escaping gas from said valve means is subsequently ignited by said ignition means, each one of said intermediary means including at least one element supported on a common axis to be

5

moved thereabout by said operable means, said first intermediary means including an elongated element for operating said valve means, and coupling means normally maintaining engagement of said one element with said elongated element of said first intermediary means, said one element being disengageable from said elongated element of said intermediary means and from said valve means by longitudinal sliding movement to thereby provide access to said valve means and impede operation of the latter by said operable means.

2. In a lighter according to claim 1, wherein said valve means comprises a valve stem and a head on said stem, said first intermediary means including a fork straddling said stem and engageable with said head.

3. In a lighter according to claim 2, including a support, and pivot means swingably mounting said fork on said support.

4. In a lighter according to claim 1 wherein

6

said elongated element is provided with a fork for engaging said valve means and with pivot means, and a support for said pivot means on said casing and provided with elongated slot means to displace said elongated element therealong.

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