April 18, 1967 YOSHIO KANAMARU 3,314,252

CIGARETTE LIGHTER

Filed June 7, 1966 2 Sheets-Sheet 1

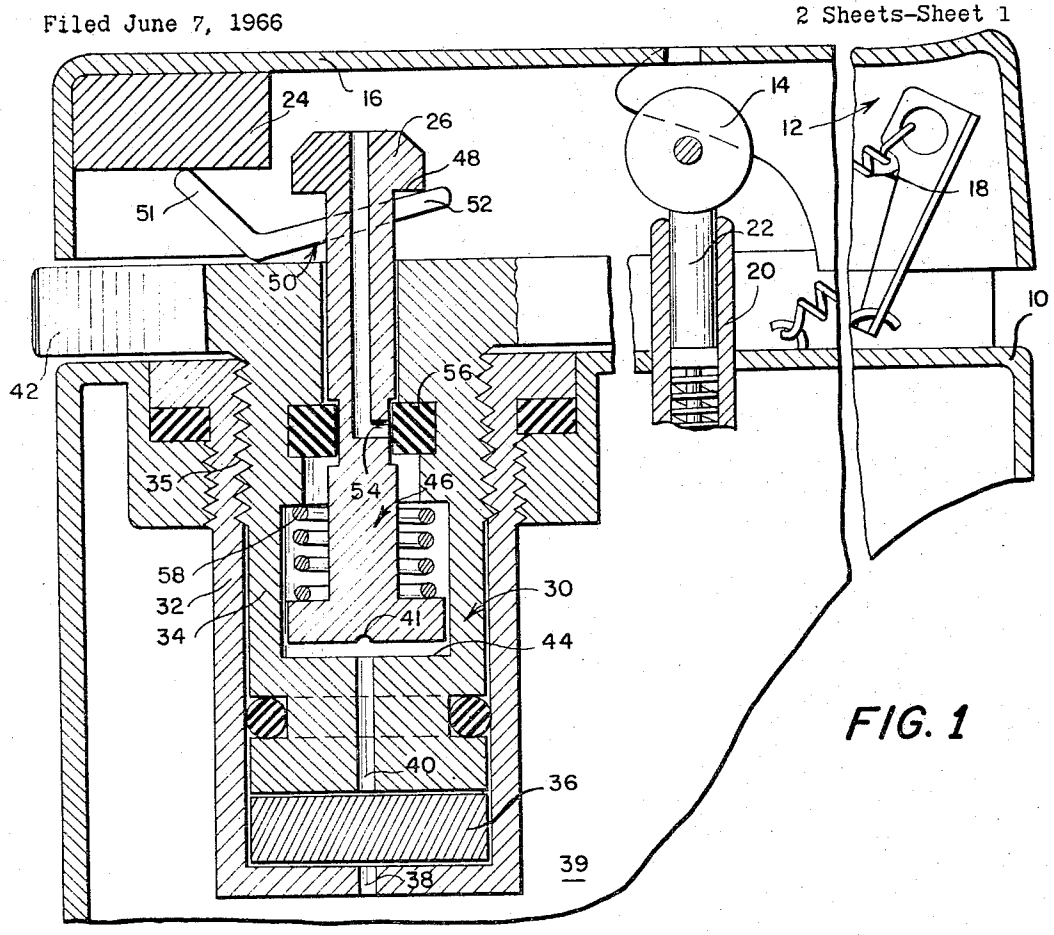


FIG. 1

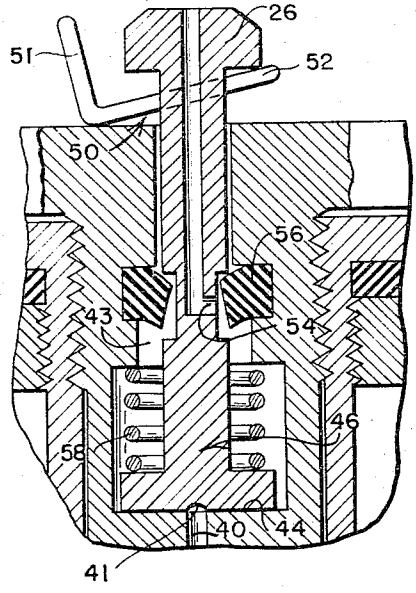


FIG. 2

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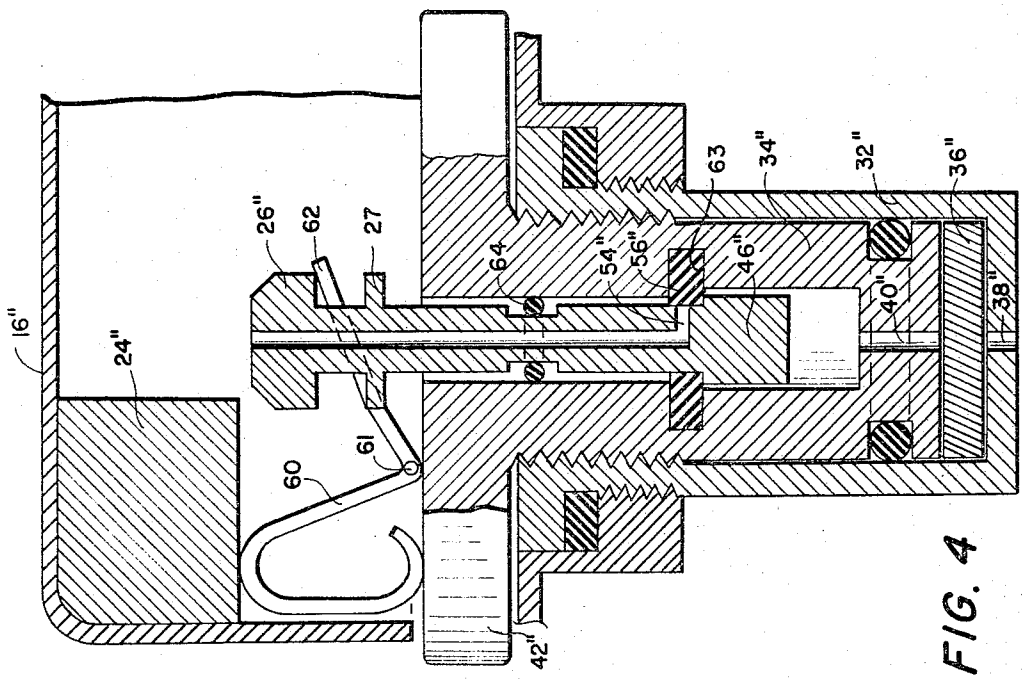


FIG. 4

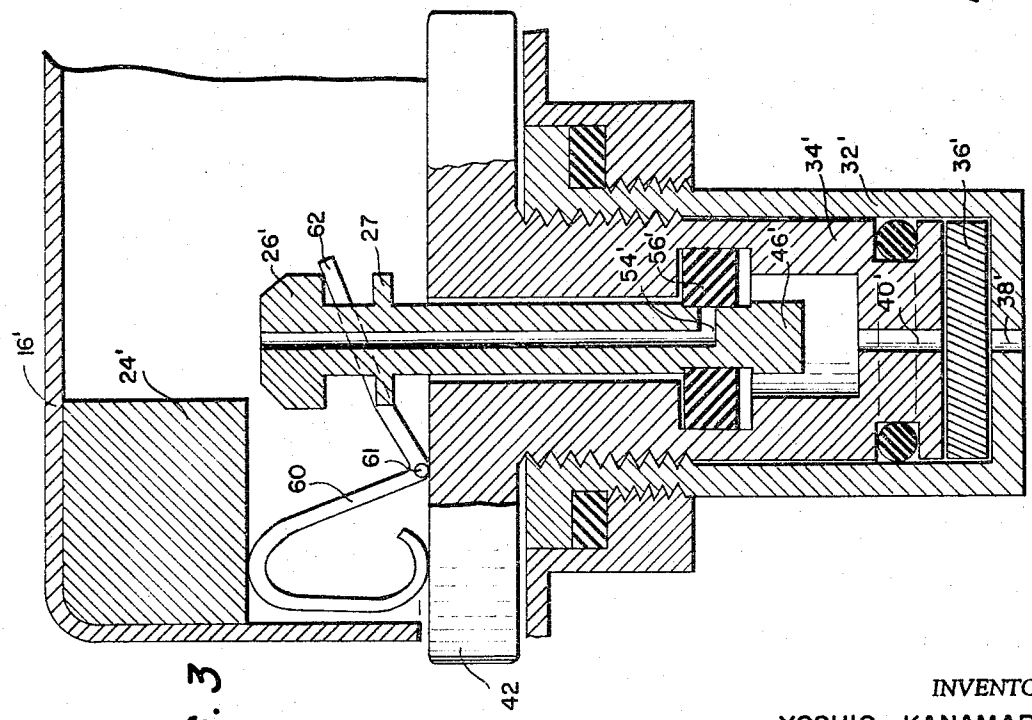


FIG. 3

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CIGARETTE LIGHTER

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3 Claims. (Cl. 67—7.1)

The present invention relates generally to a lighter of the type in which liquefied petroleum gas is used as a fuel. In particular, the present invention concerns a novel burner "off-on" valve assembly and system for actuating same.

Prior patented butane cigarette lighters frequently employ, in addition to valve mechanism for regulating height of flame, an "off-on" valve element preventing leakage of fuel when lighter is not in use, i.e. lighter fingerpiece in idle position. It is often characteristic of these lighters that the force of snuffer cap exerts sufficient pressure to push "off-on" valve into closed position which in turn has prompted many inventors to conclude that such "off-on" valves must operate between *inner closed position and outer open position.* This relationship, such as disclosed in U.S. Patent 2,620,643 for example, has many inherent disadvantages from an operational standpoint.

Frequently, such "off-on" valves are raised to upper open position by fingerpiece actuating mechanism which may take the form of a "lever" underlying lighter fingerpiece and extending underneath sparking wheel to top of burner "off-on" valve. In such construction, as disclosed in U.S. Patent 2,571,435, the portion of lever located below fingerpiece is lowered while opposite end of lever and burner "off-on" valve is raised to open position.

Still other constructions have been patented in which a cam mechanism formed as part of snuffer cap engages a lever designed to raise burner "off-on" valve to open position. In this type of construction, as the lighter fingerpiece is depressed, snuffer cap and cam mechanism rotate thus forcing one end of lever downward while other end and associated burner "off-on" valve are raised to open position. This type of construction is shown in Patent 2,671,328, for example.

Such "lever" and "cam" mechanisms are in themselves difficult and expensive to manufacture. Even more important is the additional time and expense required to install such mechanisms between lighter fingerpiece and casing.

Experimentation has shown that abrupt termination of flow can best be achieved by employing reciprocating valve mechanism having a side port normally coverd by surrounding gasket such that when valve member is moved downwardly, gasket is twisted downwardly to expose the port. However, this type of valve construction is not readily adaptable to conventional lighter "off-on" valves in which valve is raised to open position.

Further, frequent difficulty is experienced in igniting fuel from burner which must be raised to "open" position since the direction of sparks may be below the top of burner nozzle. Thus, in this conventional construction, it is necessary to precisely regulate how high the burner nozzle is raised if proper ignition is to be achieved. Since the present burner nozzle moves *downwardly* to open position, the direction of sparking will always be sufficient to ignite fuel. That is, any portion of fuel above nozzle is available to be ignited.

Accordingly, an object of the present invention is to ensure against leakage of fuel during those times when lighter is inoperative by providing an "off-on" valve characterized by simplicity of construction and low cost of manufacture.

Another object of the present invention is to provide an

"off-on" burner valve characterized by its operation between inner open position and outer closed position.

A further object of the present invention is to ensure that direction of sparks will always ignite fuel as a result of moving burner nozzle downwardly to open position.

Still a further object of the present invention is to enable an "off-on" valve to be moved to inner open position by fingerpiece action without the necessity of employing complicated and expensive "lever" and "cam" mechanism.

Another object of the present invention is to permit the use of "off-on" valve mechanism with side port and sur rounding, downwardly movable gasket structure by operating between inner open position and outer closed position.

Other objects of the present invention will become apparent from the ensuing specification and attached drawings, wherein:

FIG. 1 is a sectional view illustrating conventional lighter construction including burner valve, fingerpiece and snuffer cap in conjunction with novel "off-on" *valve* in closed position and actuating mechanism.

FIG. 2 is a sectional view of the "off-on" valve of FIG. 1 in open position;

FIG. 3 is a sectional view of second embodiment "off-on" valve eliminating the necessity of using a separate spring in burner housing, in conjunction with the second embodiment spring lever valve actuating mechanism; and

FIG. 4 is a sectional view illustrating a third embodiment "off-on" valve in conjunction with a second embodiment spring actuating lever of FIG. 3.

As seen in FIG. 1, the upper casing structure of lighter is generally designated by reference numeral **10** and supports in conventional manner fingerpiece assembly **12**, sparking wheel assembly **14** and snuffer cap assembly **16**. Spring mechanism **18** is employed in a manner well known in the art to normally bias fingerpiece **12** in upper idle position. Extending upwardly from the top of casing **10** is flint tube **20** containing flint element **22**. Further discussion of these basic lighter components is not considered necessary, such technology now being within the public domain, as well as the subject of numerous patents such as 3,184,931 for example.

Within snuffer cap **16** is located metal block **24**, in place of the conventional resilient members of most snuffer caps which usually attempt to cover the burner nozzle in fluid-tight relationship.

As seen in FIG. 1, the burner valve assembly is generally designated by reference numeral **30** and includes, in conventional manner, an outer stationary member **32** and an inner movable regulating member **34** between which is located porous material **36**. Within the bottom of outer casing **32** is located port **38** while bore **40** extends upwardly within inner valve member **34**. In this manner, as flame adjusting wheel **42** is rotated, inner valve member **34** moves relative to outer stationary member **32** through threaded section **35**, thus varying pressure on porous member **36** and flow rate of fuel passing from lighter reservoir **39** through burner valve **30**.

Positioned immediately above surface **44** of inner movable valve member **34** is "off-on" valve member **46** terminating upwardly in nozzle **26** having shoulder **48** around which is located actuating member **50**. As will now be apparent, when fingerpiece **12** is in its normal raised position and snuffer cap **16** in its normal lowered position, metal block **24** pushes downwardly against upper end **51** of actuating member **50** while the other end **52** of actuating member **50** raises nozzle **26** upwardly. When nozzle **26** of "off-on" valve element **46** is raised upwardly, port **54** is securely enclosed or blocked by resilient gasket **56**. However, as fingerpiece **12** is depressed and snuffer cap **16** raised in conventional manner, contact of metal block **24** upon end **51** of actuating member **50** is released thus

permitting "off-on" valve member **46** to move downwardly into open position under pressure of spring **58**. As "off-on" member **46** moves downwardly, resilient gasket **56** bends or twists downwardly (FIG. 2) exposing port **54**. Thus, when "off-on" valve **46** is in lower open position fuel is permitted to leave bore **40** and pass upwardly through passageway **41** into compartment **43** and then enter port **54** and pass to the top of nozzle **26** to point of ignition. Of course, it is obvious that spring assembly **18** of fingerpiece **12** must be sufficiently strong to overcome effects of spring **58**.

As will now be apparent, "off-on" valve **46** is designed to operate between inner open position and upper closed position, as contrasted to the conventional technique of operating such valves between inner closed position and outer open position. Of even more importance is the ability to actuate "off-on" valve **46** without employing complicated "lever" and "cam" mechanism usually forming an integral part of fingerpiece and snuffer cap. Also, no burner valve actuating mechanism need be installed between fingerpiece and lighter casing. Finally, the advantages of employing horizontal port **54** and surrounding, downwardly twisting gasket **56** have been demonstrated. This valve arrangement is unusually well suited for abruptly halting fluid flow.

In FIG. 3 is illustrated a second embodiment of "off-on" valve **46'** in which the necessity of employing spring **58** (FIG. 1) is eliminated. In the second embodiment of FIG. 3, a spring lever **60** pivoted about pin **61** is employed which has sufficient resilent capacity to exert downward pressure upon nozzle **26'** through shoulder **27** as metal block **24'** and snuffer cap **16'** are raised. Thus, when lighter fingerpiece is depressed and snuffer cap **16'** raised, the resilient force of spring lever **60** pushes "off-on" valve **46'** downwardly into open position in similar manner to the first embodiment. When snuffer cap **16'** is in closed position, as seen in FIG. 3, spring **60** is pushed downwardly by block **24'** causing the right end **62** thereof to move upwardly against nozzle **26'** forcing "off-on" valve **46'** upwardly into closed position, i.e. port **54'** blocked by resilient gasket **56'**.

Thus, in addition to the advantages of the "off-on" valve construction of FIG. 1, it is now possible with spring lever **60** to move "off-on" valve **46'** between inner open position and outer closed position without the necessity of employing a separate spring element tending normally to push "off-on" valve downwardly into open position.

As illustrated in FIG. 4, spring lever actuating mechanism **60** is now employed in conjunction with third embodiment "off-on" valve **46''**, characterized by resilient gasket **56''** inserted within recess **64** of inner movable valve element **34''**. Thus, as the resilient force of spring lever **60** pushes "off-on" valve **46''** downwardly when snuffer cap **16''** moves upwardly, resilient gasket **56''** remains stationary in position, as contrasted to the bending or twisting action of gasket **56** in FIG. 1. By using the flat sealing member **56''** of FIG. 4, it is now necessary to employ O-ring seal **64** at the mid-portion of "off-on" valve member **46''** to prevent upper leakage of fuel.

Manifestly, variation in arrangement and configuration of lighter components may be envisioned without departing from spirit and scope of invention as defined by subjoined claims.

I claim:

1. A gas fueled lighter, comprising:

(A) a casing having a reservoir constructed to hold fuel under pressure;

(B) a burner valve assembly attached to said casing, said assembly being in communication with said reservoir;

(C) a fingerpiece, snuffer cap and spark producing mechanism mounted on said casing, said cap including a block portion;

(D) an off-on valve mechanism located within said burner valve assembly, said mechanism including a reciprocating valve stem containing a passageway terminating at the top thereof in a first port and at one side thereof in a second port, resilient sealing means mounted within said valve assembly in covering relationship with respect to said second side port when said off-on valve mechanism is in upper closed position and in downwardly twisted uncovering relationship with respect to said second side port when said off-on valve mechanism is in lower open position;

(E) an actuating assembly for moving said off-on valve mechanism to outer closed position, said actuating assembly including an angular element having a first end normally engaged and pushed downwardly by said block portion of said snuffer cap when said fingerpiece is in raised idle positon and a second end engagng said valve stem of said off-on valve such that when said first end is pushed downwardly said second end and engaged valve stem of said off-on valve mechanism are moved upwardly to closed position; and

(F) means for biasing said off-on valve mechanism in lower open position when said first end of said element is not engaged by said block portion of said snuffer cap.

2. A gas fueled lighter as in claim **1**, wherein said means for biasing said off-on valve mechansm downwardly into open position is a spring member located within and supported by said burner valve assembly and exerting downward pressure against said off-on valve mechanism.

3. A gas fueled lighter as in claim **1**, wherein said means for biasing said off-on valve mechanism in lower open position constitutes a resiliently curved spring forming said first end of said angular element of said actuating assembly, said element further being pivotably mounted upon said lighter.

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EDWARD J. MICHAEL, *Primary Examiner.*