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GAS LIGHTER WITH ELECTRIC SPARK IGNITION

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Fig.1

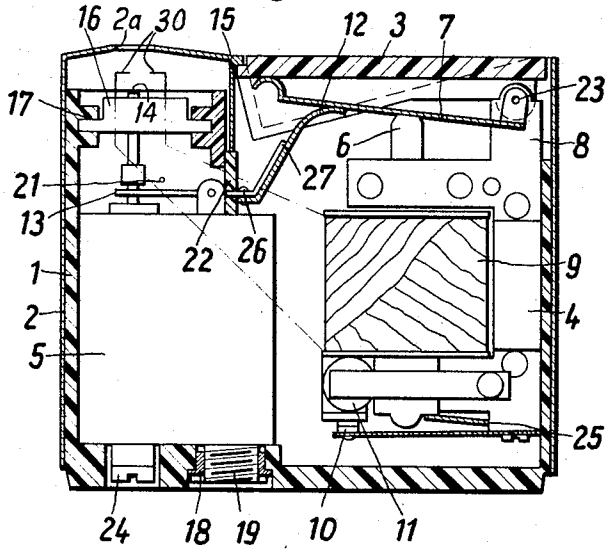

Fig.2

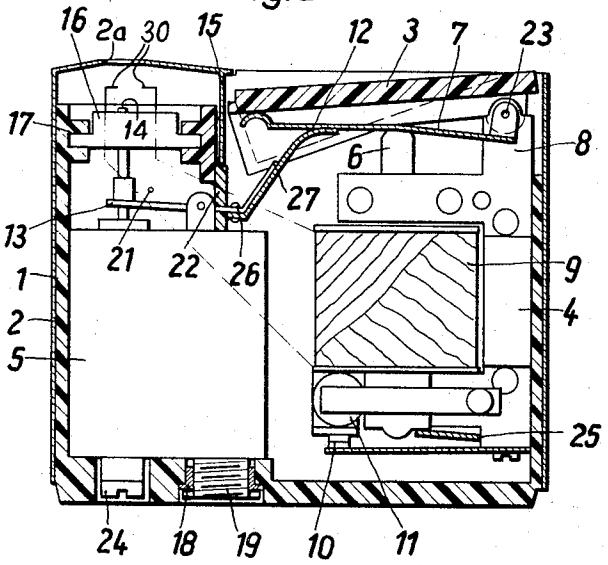

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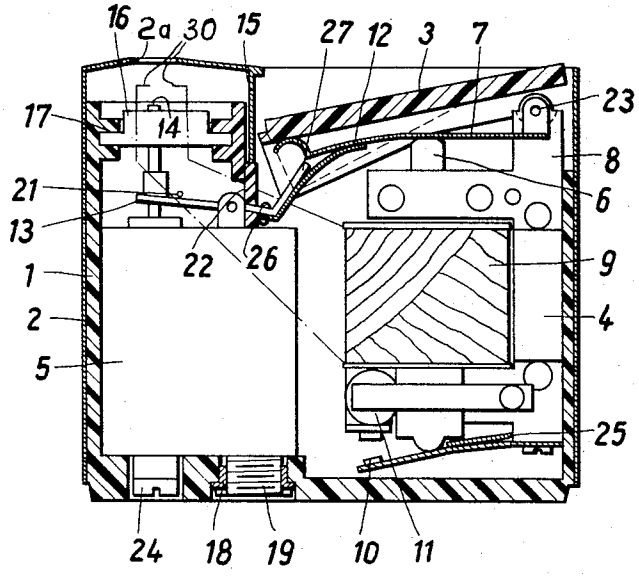
Fig. 3



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GAS LIGHTER WITH ELECTRIC SPARK IGNITION

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7 Claims. (Cl. 317—85)

ABSTRACT OF THE DISCLOSURE

A gas fueled lighter with electric spark ignition system in which movement of an armature for causing the discharge and movement of the valve lever for effecting opening of the fuel valve are controlled by a pair of coacting springs first moving the valve lever into the valve opening position and then the armature into the spark discharge causing position when the operating member of the lighter is operated.

The present invention relates to a gas fueled lighter with an electric spark ignition in which, for the generation of the ignition voltage, an induction coil is linked with a permanent magnetic assembly having a snap armature operated from the outside by means of an operating member. The operating member simultaneously controls the gas supply to the burner.

The present application discloses subject matter not claimed herein but claimed in my copending application Serial No. 535,542 filed March 18, 1966.

In order to obtain the highest possible ignition energy the snap action of the armature must take place in the shortest possible time, that is, instantly. This requirement is fulfilled according to the invention by arranging a directional force storage between the operating member and the armature. Because of its small space requirements an arrangement of unilaterally clamped interacting leaf springs is preferred as force storage. It is, however, possible to use also compression springs or pneumatic force storages, such as in the form of a piston pump. Closing or locking or restraining devices can be used as well which give a snap effect or a pressure point for the operation.

In the interest of a high ignition security the opening of the burner valve on the tank must take place before the spark discharge. As the stroke of the valve does not coincide with that of the snap armature, which is larger, a compensation must be provided for this purpose. According to the invention, the arrangement of the springs is made so that one spring acts simultaneously upon the snap armature and a second spring connected with the burner valve lever.

The burner valve lever is preferably a rocking lever arranged on the upper side of the tank, the second spring engaging with about half of its length an angular extension of said lever. The spring is fixed to the extension by means of a rivet at its offset end.

Both springs are biased in the direction of the operating member. The spring for the snap armature is pivotally supported on an extension of the magnetic system. The spring for the armature is stronger than the spring for the valve lever.

In the drawing one embodiment of the invention is shown diagrammatically:

FIG. 1 is a section through the lighter in its neutral position,

FIG. 2 is a section through the lighter in a position in which the break-away armature of the magnetic system

was not yet moved, while the burner valve is already open, and

FIG. 3 is a section through the lighter in ignition position.

The lighter consists of a base frame **1** upon which a cover **2** is slidably fitted. An operating member **3** is accessible through an opening in the sleeve **2**. The frame supports a magnetic assembly **4** and a tank **5** with the pertinent mechanism. The magnetic assembly **4** comprises a snap-off armature **6** which is moved from a rest position in a permanent magnetic field by the operating member by means of a spring **7**. This spring is pivotally supported on an extension **8** of the magnetic assembly or in the frame by means of a pin **23**. The magnetic assembly also comprises an induction coil **9**, if desired also a current coil, which may be arranged under or above the induction coil, a contact breaker **10** and a capacitor **11** connected in parallel thereto.

The operating member acts by means of a spring **12** on a valve lever **13**, such as a rocking lever, provided with a stop **21** which may also be arranged on the upper side of the tank and thereby controls the release of fuel from the tank **5**. A burner **14** is separated by a partition wall **15** in the frame **1** from the operating member, so that air blasts generated when pressing down the operating member cannot extinguish the flame. A burner opening **2***a* in cover **2** is shielded below by an electrode carrier **16** which is fitted in grooves **17** of the frame **1**. The valve lever **13**, fastened on the upper surface of the tank may be provided with a latch device which is also pivotally supported on the tank and which is released by means of a push-rod when the lighter is placed on a surface. The latch device may be fastened on the tank as well. The push-rod may be arranged between the tank and the magnetic assembly and may project from the bottom of the lighter. The tank is screwed at its lower end to the frame **1**. A nut **18** is screwed to a nozzle **19** of a filling valve. The magnetic assembly **4** is also screwed to the frame **1**. An adjusting screw **24** at the bottom of the tank serves to adjust the size of the flame.

The springs **7** and **12** are biased toward the operating member **3**. This ensures that there is no empty stroke. It is also possible to use several leaf springs of leaf springs combined with rigid but movably carried parts. Spring **12** is secured for instance riveted at **26** to an angular extension of valve lever **13**. The respective end of the spring is bent-off for the purpose.

The operating member **3** is shown as a pivoting lever and carried in the frame or on the magnetic assembly. It has a substantially triangular shape in longitudinal section and a U-profile in transverse section. It may also protrude from the cover **2**.

In the embodiment shown a slotted rubber disc **22** is inserted in a partition wall **15**. The disc provides an elastic and sealed passage of the valve lever **13** through the partition wall **15**. Instead of the disc shown a moulded rubber part, such as a bushing, a bellows or the like may be used. Instead of the operating lever **3** a vertically movable push key may be used. The operating member may also be arranged on a narrow side of the cover.

The mode of operation of the invention is as follows:

When moving the operating member from its rest position (FIG. 1) into the ignition position (FIG. 3), the spring **7** is first bent to the position shown in FIG. 2. The spring **12** is taken along by spring **7** during the downward movement of the operating member **3**. The valve is thus safely opened before an ignition spark is generated across the spark gap defined by electrodes **30**.

In this position (FIG. 2) the force accumulated in the springs **7**, **12** is now so strong that it overcomes the magnetic force which holds the armature **6** in the position

of FIG. 1 or 2 causing the same to snap into the position of FIG. 3. The magnetic circuit through the armature is thus interrupted. The resulting change in the magnetic field generates an electric current in the induction coil 9 which is fed either directly or indirectly to the electrodes by means of a current coil and is discharged there. The contact breaker 10 is opened exactly when the highest voltage is present in the induction coil. A high electric energy thus is generated in the current coil preferably surrounding the induction coil. As is shown in FIG. 3, the spring 12 is bent off from the angular end 27 of the valve lever 13 when lever 13 engages the stop 21, as it is fastened to said lever only by rivet 26. The stroke difference between the snap armature and the valve is thus compensated for.

The return of the armature 6 to the rest position is effected by a spring 25, and the return of the valve lever 13 by a spring (not shown), preferably a compression spring, of the burner valve. When arranging a latch device for the valve lever, the push-rod to release the latch device may be surrounded by a compression spring disposed between a collar on the push-rod and an abutment arranged for instance on the tank. In this case, the compression spring serves to return the valve lever to its rest position.

The pivotal support of the spring 7 has the advantage in comparison with a firm clamping that the portion of the spring between its support and the armature need not be deformed.

The combination of the described operation and the release of the latch device of the burner valve with the described operation of the snap armature provides a minimum of power expenditure and operations. The combination of the described arrangement of the components in the frame with the operation of their moving elements provides the lowest possible space requirements.

What is claimed is:

1. A gas-fueled, electric lighter comprising an ignition assembly including an induction coil, a pair of electrodes defining therebetween a spark gap connected in circuit with said coil for generating a spark discharge across the electrodes in response to an excitation of the coil and a permanent magnetic system comprising an armature movable between a rest position and an operative position and being retained in said rest position by magnetic attraction, movement of the armature into said operative position causing excitation of the coil; a burner assembly including a fuel tank, a burner, a normally closed fuel valve and an actuating lever coacting with said valve for moving the same into its open position; a movably mounted operating member displacing the armature into the operative position to cause said spark discharge and moving the fuel valve into the open position to ignite

fuel escaping through the valve by said spark discharge; and a spring means interposed between the armature and the valve lever to actuate the same, said spring means being loaded by actuation of the operating member first to move the valve lever into its position for opening the fuel valve and then, in response to a spring loading in excess of a predetermined value, to snap the armature into its operative position, said spring means including a pair of leaf springs, one of said springs being stationarily supported at one end and the other spring being secured at one end to the valve lever, said springs engaging each other and said one spring being further engaged with the operating member, displacement of said operating member exerting pressure successively upon the valve lever and the armature by flexing said springs.

2. A lighter according to claim 1 wherein said one spring acts directly upon the armature and via said other spring upon the valve lever.

3. A lighter according to claim 2 wherein said valve lever is a rocking lever pivotally mounted on said fuel tank and having a bent-off extension, and wherein said other spring is secured at said one end to said extension and abuts with about half its length against said extension.

4. A lighter according to claim 3 and comprising a limit stop positioned to be engaged with said valve lever when the latter reaches its valve opening position to free said other spring for further flexing until said directional force exceeds said predetermined stored value without further movement of the valve lever whereby the valve is opened prior to the occurrence of the spark discharge.

5. A lighter according to claim 1 wherein the said springs are biased toward said operating member.

6. A lighter according to claim 1 wherein said magnetic system comprises an extension, the respective end of said one spring being pivotally supported by said extension.

7. A lighter according to claim 1 wherein said one spring is stronger than said other spring.

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