

[54] GAS LIGHTER

[75] Inventor: **Kenjiro Goto, Tokyo, Japan**

[73] Assignee: **Mansei Kogyo Kabushiki Kaishya,**
Kawaguchi-shi, Saitama, Japan

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Primary Examiner—Carroll B. Dority, Jr.
Attorney—James E. Armstrong et al.

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[51] Int. Cl. F23q 25/00

[58] **Field of Search**..... 431/130, 131, 142,
431/143, 150, 276

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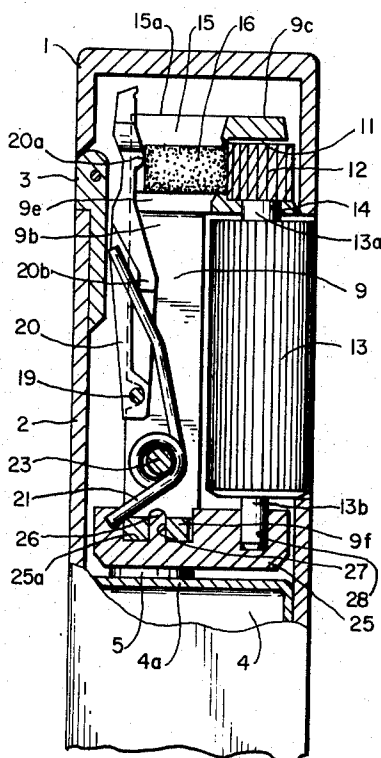
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[57] **ABSTRACT**

Head mechanism for a gas lighter including two devices secured by a single screw means and one of which includes a knurled wheel, a rotor rotatably mounted thereon and adapted to rotate the knurled wheel, a flint stone, a flint housing passage for guiding the flint stone into engagement with the knurled wheel and a flint urging means for driving the flint stone toward the knurled wheel, the flint urging means rotating within the flint housing passage around a predetermined axle. The other device includes a valve operating means adapted to control a conventional burner valve and a spring positioned on the screw means to apply a pressure upon the valve operating means. Also disclosed is a valve actuating means controlled by the valve operating means and including a pair of upper and lower members surrounding the burner valve and separated by a stopper associated with the upper member and a spring.

14 Claims, 7 Drawing Figures



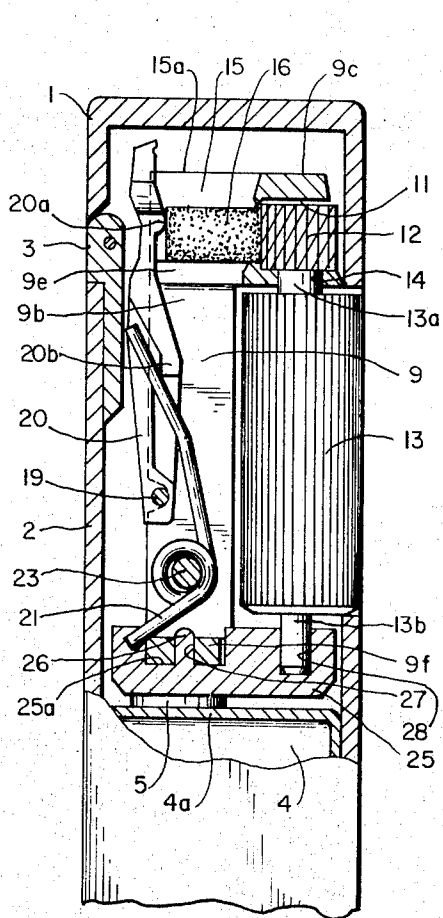


FIG. 1

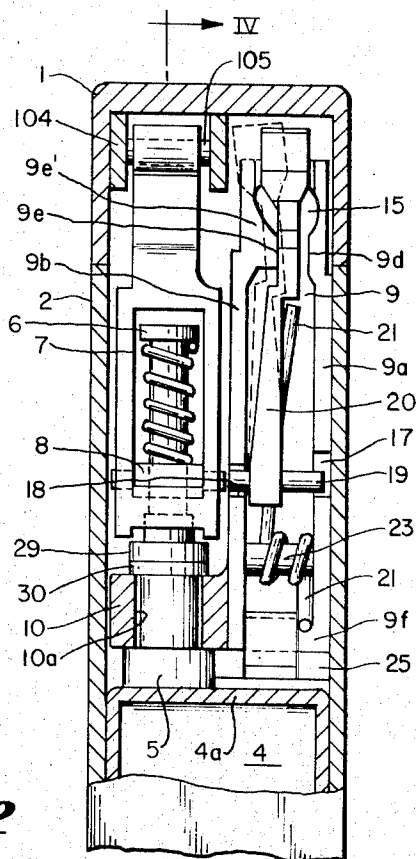


FIG. 2

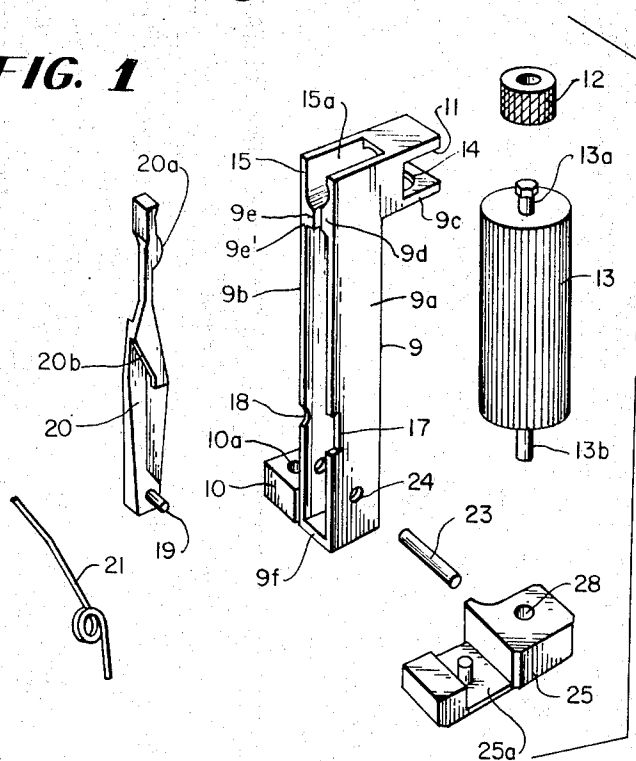


FIG. 3

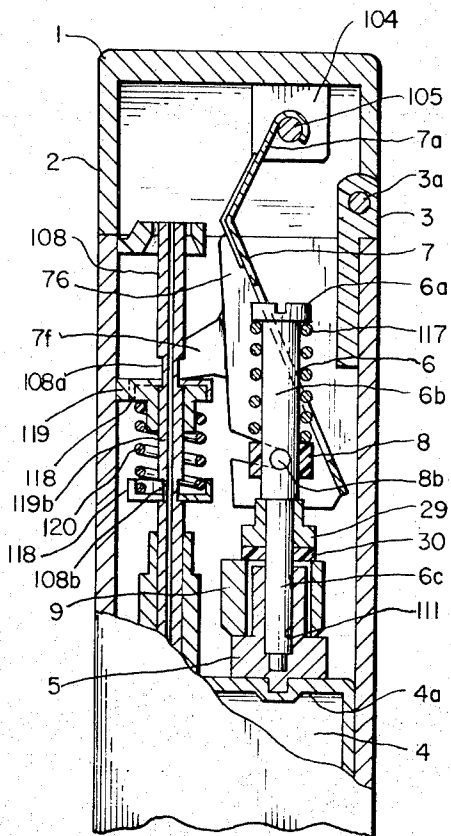


FIG. 4

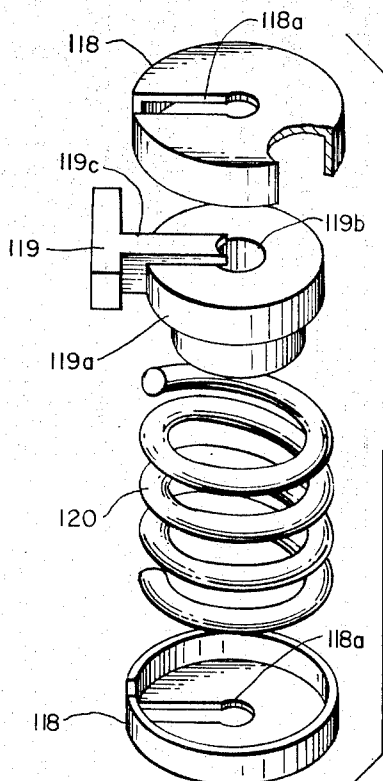


FIG. 7

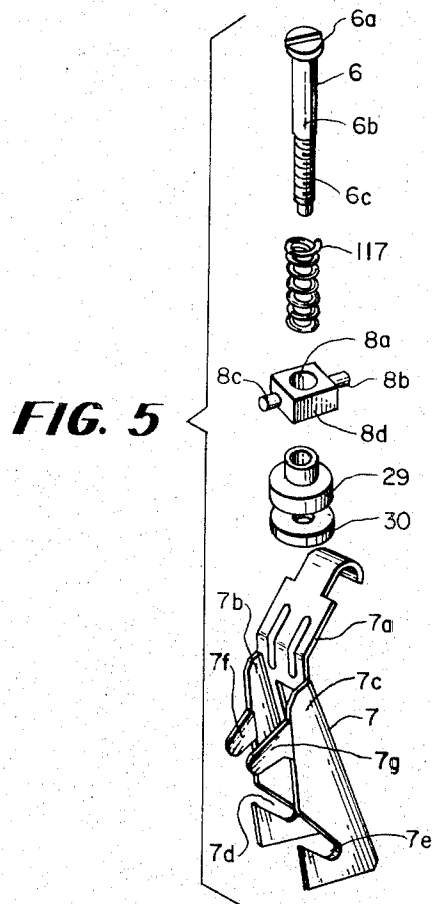


FIG. 5

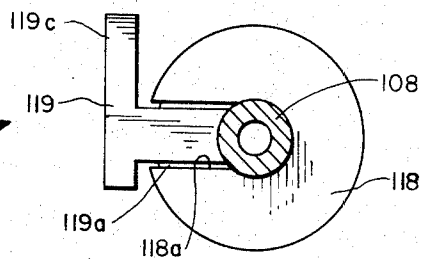


FIG. 6

GAS LIGHTER

SUMMARY OF THE INVENTION

The present invention relates to gas lighters for cigarettes, cigars and pipes, and more particularly, to an improved head mechanism of a gas lighter of the type described above.

Heretofore, various head mechanisms of gas lighters have been disclosed. They have, however, complicated structures and accordingly require annoying and complex way of operation in actual use. Further, these structures entail excessive and laborious steps in manufacturing thereof as well as difficulties in replacement of worn or damaged parts.

The improved head mechanism in accordance with the present invention comprises two devices which are effectively connected with each other and properly arranged by a single common screw means within a lighter casing and a third device associated with the burner valve. One of the two connected devices is an ignition device including a knurled wheel, a rotor adapted to rotate the knurled wheel, a flint stone, a flint housing passage designed to hold the flint stone and a flint urging means adapted to drive the flint stone into engagement with the knurled wheel, and the other is a valve operating device having end portions one end portion of which is detachably attached on a cap pivotably mounted on the lighter casing and another end portion of which is adapted to control a burner valve provided near the valve operating means to issue gas from a fuel tank disposed within the lighter casing. In this ignition device, on the one hand, the flint housing passage has an open-ended window across which the flint urging means extends upwardly and rotates around a predetermined axle to advance the flint stone toward the knurled wheel. Therefore, continuously smooth pressure may be exerted upon the flint stone in accordance with the worn degrees of the flint stone. Further, the open-ended window is so dimensioned that the flint stone may be easily put into the flint housing passage through the open-ended window of the flint housing passage. On the other hand, the rotor adapted to rotate the knurled wheel is rotatably mounted on the device proper instead of the lighter casing, and the arrangement of the device into the lighter casing is easier than that of the prior devices. The latter valve operating device is held on the common screw means through the intermediary of a spring means surrounding the screw means. Additionally, the valve operating device engages the cap pivotably mounted on the lighter casing in order to maintain the same under the influence of the spring means so that the pivotal movement of the cap is smoothly realized and kept in both open and closed positions. Thus a single movement of the valve operating device is concerned with control of the cap and the burner valve whose operation should correspond with the movement of the cap, and the stable operation of the burner valve is carried out without using intermediary means such as a spring cylinder as used in a conventional gas lighter. Finally, the third device of the present invention is a valve actuating means fitted on the burner valve and operatively associated with the valve operating device to control the burner valve. The valve actuating means preferably comprises upper and lower members, one of which, preferably the upper one, engages the valve operating device. In be-

tween the upper and lower members are respectively disposed a stopper and a spring.

It is, therefore, an object to provide a gas lighter which is easy to construct.

It is another object to provide a gas lighter which is stable in operation and which serves for a long span of life.

It is a further object to provide a gas lighter which is operated by a simple motion.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages of the present invention will be understood from the following description of preferred embodiments when taken in conjunction with the drawings wherein:

FIG. 1 is a cross sectional view of a gas lighter showing an ignition device in accordance with the present invention,

FIG. 2 is a cross sectional side view of a gas lighter showing the ignition device seen in FIG. 1,

FIG. 3 is an exploded view of the ignition device in accordance with the present invention,

FIG. 4 is a cross sectional view of a gas lighter showing a valve operating device in accordance with the present invention,

FIG. 5 is an exploded view of the valve operating device in accordance with the present invention,

FIG. 6 is a top plan view on an enlarged scale showing a burner valve included in a gas lighter according to the present invention, and

FIG. 7 is an exploded view of the elements illustrated in FIG. 6.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring now to FIGS. 1 to 3, cap 1 is pivotably mounted on lighter casing 2 by means of hinge means 3. Fuel tank 4 is arranged in the lower section of lighter casing 2 and is adapted to contain gas. Fuel tank 4 has base plate 5 provided on top wall 4a thereof. This base plate has a female screw (not shown) which receives screw means 6. Screw means 6 holds, on the one hand, means 7 through the intermediary of spring-loaded collar member 8 arranged on screw means 6. Details of means 7 will be described later. On the other hand, screw means 6 secures block body 9 in lighter casing 2 by fixing leg 10 of block body 9 to the base plate through rings 29 and 30, which have a larger diameter than that of through-bore 10a made on leg 10 of block body 9. Block body 9 extends vertically to form a pair of sidewalls 9a and 9b and has at the upper portion thereof horizontally extending portion 9c formed with cutout 11 to accommodate knurled wheel 12 adapted to be rotated therein by rotor 13. An upper axle 13a engages knurled wheel 12 through opening 14 made in the lower side of cutout 11 of horizontally extending portion 9c. Flint housing passage 15 is defined by inward extensions 9d and 9e provided on the pair of spaced sidewalls 9a and 9b of block body 9 to guide flint stone 16 toward knurled wheel 12 rotatably arranged within cutout 11 of horizontally extending portion 9c. Flint housing passage 15 has open-ended window 15a which is so dimensioned that flint stone 16 may be put into flint housing passage 15 therethrough and that the wearing degree of flint stone 16 may be seen through open-ended window 15a. Inward extensions 9d and 9e also define therebetween a width sufficient to form a path for flint pusher 20 described later.

Formed on predetermined positions of the pair of sidewalls 9a and 9b are depressions 17 and 18 which are adapted to engage pins 19 of flint pusher 20. Depressions 17 and 18 have relatively different dimensions so that flint pusher 20 may be moved by the user's hand to an inoperative position, as shown in dotted lines in FIG. 2, in which flint pusher 20 is disengaged from the path defined by inward extensions 9d and 9e and rested on lateral end portion 9e of inward extension 9e of sidewall 9b in order to facilitate a desired replacement of flint stone 16. To restrict the movement of flint pusher 20 toward or in the inoperative position, a stopper or member adapted to limit the transverse movement of flint pusher 20 may be preferably provided on a suitable portion of block body 9. Of course, the transverse movement of flint pusher 20 toward or in the inoperative position may be limited by the dimension of relatively larger depression 17 of sidewall 9a of block body 9. Flint pusher 20 extends upwardly beyond the top of the block body when assembled within the pair of sidewalls 9a and 9b, and on the upper part thereof there is provided portion 20a which directly engages flint stone 16 within flint housing passage 15 so as to slidably bias flint stone 16 toward knurled wheel 12 in the operative position of flint pusher 20. In this way, flint pusher 20 swivels, within the pair of sidewalls 9a and 9b of block body 9, around pins 19 positioned within depressions 17 and 18 under the influence of spring means 21 arranged on shaft 23 inserted into opposing openings 24 on the sidewalls 9a and 9b. Spring means 21 on shaft 23 has two end portions, one of which is rested on a bottom end of 9f of the block body 9 and the other of which engages stepped portion 20b of flint pusher 20 so that flint pusher 20 exerts a continuous pressure on flint stone 16 in accordance with wearing of the latter.

Support member 25 has concave portion 25a which is adapted to mate with bottom end 9f of block body 9 and further boss 26 adapted to engage bore 27 of bottom end 9f of block body 9. In addition, support member 25 is provided with opening 28 which receives rotatably lower shaft 13b of rotor 13 to support the same. Therefore, member 25 should be of low frictional resistance in order to yield a smooth rotation of rotor 13. For example, synthetic resin may be used for support member 25.

When replacement of flint stone 16 is required, flint pusher 20 is taken back around pins 19 against the action of the spring means 21 by applying a backward pressure at the top of flint pusher 20 extending upwardly beyond the block body 9, and then rested, as shown by dotted lines in FIG. 2, on lateral end portion 9e of inward extension 9e. A coiled spring is used in this embodiment as spring means 21 arranged on the shaft 23. This coiled spring applies forces to flint pusher 20 in two directions, one toward knurled wheel 12 and the other in the direction of the horizontal axis of shaft 23. Thus, flint pusher 20 is maintained on lateral end portion 9e by the action of coiled spring 21 to leave open-ended window 15a of the flint housing passage open even after the pressure applied on the top of flint pusher 20 is released. Flint stone 16 is then put into flint housing passage 15 from the upper open end thereof. Upon resetting flint pusher 20 in the original operative position a continuous force is again exerted by the action of coiled spring 21 on flint stone 16 in the direction toward knurled wheel 12. Thus, the required

replacement of flint stone 16 may be carried out easily and in a short period of time. At the same time, a stable and continuous pressure upon the flint stone is assured by swivel flint pusher 20.

Referring now to FIGS. 4 to 7, cap 1 is pivotably mounted on lighter casing by means of hinge means 3. (Note that FIG. 4 substantially corresponds to the cross-section taken at line IV—IV' of FIG. 2). Within cap 1 there is provided a pair of ear-like members 104 which secure shaft 105 (see also FIG. 2). Shaft 105 engages valve opening means 7 which has bent portion 7a thereon in order to be out of contact with lighter casing during the movements of valve opening means 7. Fuel tank 4 is disposed within lighter casing 2 to retain gas which is issued from burner nozzle 108 of a burner valve (not shown) communicating therewith. Fuel tank 4 as base plate 5 which is fixedly attached on top wall 4a and which is formed with female screw 111. Engaged with female screw 111 is screw means 6, including head portion 6a, shank portion 6b and a threaded portion 6c adapted to be screwed into female screw 111 of base plate 5. The diameter of shank portion 6b is larger than that of threaded portion 6c but smaller than that of head portion 6a. By screwing screw means 6 into female screw 111 of base plate 5, block body 9 having a knurled wheel, a rotor, a flint housing passage and a flint pusher, as shown in FIGS. 1 to 3, is secured on base plate 5 mounted on top wall 4a of fuel tank 4 within lighter casing 2 through the intermediary of fixing ring 29 and rubber ring 30. Further, screw means 6 holds valve opening means 7 via collar means 8 and coiled spring 117 interposed between collar means 8 and head portion 6a of screw means 6. Collar means 8 (preferably of a synthetic resin) has a through-bore (8a) for slidably engaging screw means 6, and pins 8b and 8c which rotatably receive a pair of slots 7d and 7e made on wings 7b and 7c of valve opening means 7 in order to maintain valve opening means 7 under the influence of the coiled spring 117. Thus, valve opening means 7 is movably held in lighter casing and sways in the wake of the movement of cap 1 when the latter is rotated toward the open and closed positions around hinge means 3 secured on lighter casing 2. Means 7, further, engages a pair of cup-like members 118, detachably mounted on burner nozzle 108 of the burner valve (not shown) through a pair of arms 7f and 7g thereof. The pair of cup-like members 118 have respectively cutout portion 118a through which cup-like members 118 are detachably mounted on the burner nozzle 108. Provided under upper cup-like member 118 is member 119 comprising circular portion 119a laid below upper cup-like member 118, aperture 119b through which the cup-like member 118 is disposed on burner nozzle 108 and T-shaped portion 119c adapted to engage cutout portion 118a of upper cup-like member 118 so as to prevent cup-like member 118 from rotating. This result is effected since T-shaped portion 119c comes into contact with the lighter casing 2 when transversely moved. Cup-like members 118 and the member 119 are held between peripheral grooves 108a and 108b formed on the burner nozzle 108 through coiled spring 120 interposed between member 119 and lower cup-like member 118. Member 119 is maintained between peripheral grooves 108a and 108b by means of upper and lower cup-like members 118 held respectively within peripheral grooves 108a and 108b on burner nozzle 108. Upper cup-like member 118 dis-

posed within upper groove 108a is held by member 119 whose circular portion 119a is in engagement with upper cup-like member 118 to prevent the same from disengaging from burner nozzle 108. Therefore, lower cup-like member 118 is held on the burner nozzle by coiled spring 120 interposed between member 119 and lower cup-like member 118. Members 118, 119 and 120 cooperatively act to effect, without failure, a smooth controlled engagement between valve opening means 7 and burner nozzle 108 reciprocally arranged on the burner valve (not shown). Moreover, they protect the construction of the burner valve (not shown) which is susceptible to damage by a sudden movement or shock from the outside of lighter casing 2.

In operation, upon turning cap 1 around hinge means 3 toward the open position thereof, valve opening means 7, is swayed in the right direction around pins 8b and 8c of collar means 8 and upwardly lifted with collar means 8 along screw means 6. In this turning movement of cap 1, coiled spring 117 acts to apply a downward force upon valve opening means 7 so that cap 1 is rotated automatically toward and maintained open under the influence of coiled spring 117, after shaft 105 of the cap 1 passes a predetermined deadpoint on the extension of a line connecting pin 8b of collar means 8 and axle 3a of the hinge means 3. At the same time, arms 7f and 7g of valve opening means 7 disengage from upper cup-like member 118 arranged on burner nozzle 108, so that burner nozzle 108 may be brought into the operative condition thereof. One means of achieving this result is to arrange burner nozzle 108 to be spring biased and inoperative in the depressed position. In this coiled spring 120 would preferably exhibit a greater resiliancy than the spring of burner nozzle 108. The operation of burner nozzle 108 may be further effected even though a substantial depression of upper member 118 produces only a minor variation in the position of burner nozzle 108. The way of controlling gas emission from the burner valve (not shown) necessarily depends upon the structure of the burner valve which is actuated by valve opening means 7 through the intermediary of the burner nozzle 108 mounted on the burner valve. Accordingly, the connection between valve opening means 7, and cup-like members 118 may be modified without departure from this idea. For example, if the opening operation of the burner valve required the lifting of the nozzle 108, arms 7f and 7g of valve opening means 7 could be positioned beneath lower member 118.

When cap 1 is returned back to the original inoperative position by the user's hand, valve opening means 7, is also moved back to the initial position under the action of coiled spring 117. Then, cap 1 is automatically returned back by the coiled spring 117 after the shaft 105 engaging the valve opening means 7 passes the aforementioned predetermined deadpoint. At the appropriate point of the return movement of valve opening means 7, arms 7f and 7g of valve opening means 7 come into contact with upper cup-like member 118 on burner nozzle 108 in order to depress the same downwardly so that gas emission from burner nozzle 108 may be smoothly ceased. As described above, coiled spring 120 acts to smoothly and resiliently transfer the action of arms 7f and 7g to burner nozzle 108. Therefore, the control of the burner valve may be effected in a stable condition without detriment to the parts of the lighter structure while the cap is

turned smoothly toward both open and closed positions thereof.

Modifications to the present invention readily apparent to one of ordinary skill in the art are also contemplated to be within the scope of the invention as claimed.

What is claimed is:

1. A gas lighter comprising

a lighter casing;

a cap pivotably mounted on said lighter casing;

a fuel tank disposed within said lighter casing to store gas;

a burner valve mounted on said fuel tank and communicating with said fuel tank;

means adapted to control said burner valve;

a block body disposed in relation with said fuel tank and extending vertically to form a sidewall means;

a flint housing passage in said block body;

a knurled wheel positioned with respect to said flint housing passage;

a rotor having opposing end portions one of which is operatively connected with said knurled wheel to rotate said knurled wheel;

a flint stone accommodated within said flint housing passage;

a flint pusher disposed on said block body and extending along said sidewall means to drive said flint stone into contact with said knurled wheel; and

a support member engaging said block body and adapted to engage the other end portion of said rotor to support said rotor within said lighter casing on said block body.

2. A gas lighter according to claim 1, wherein said sidewall means includes a pair of sidewalls;

wherein said flint pusher is disposed between said pair of sidewalls said flint pusher including a transverse pin supported by said pair of sidewalls such that said flint pusher rotatably moves in accordance with wearing of said flint stone; and

A spring is adapted to engage with said flint pusher to apply a biasing force thereon.

3. A gas lighter according to claim 2, wherein said pair of sidewalls is formed with a pair of depressions, said depressions adapted to receive said transverse pin on said flint pusher; and said spring is adapted to maintain said flint pusher within said sidewalls through the engagement between said depressions and said transverse pin.

4. A gas lighter according to claim 3, wherein said pair of depressions are of different dimensions and wherein said flint pusher tilts in the direction transverse to the axis of rotatable movement thereof in the normal operating position.

5. A gas lighter according to claim 4, wherein said block body has an opening in the bottom thereof and

said support member has a portion adapted to engage with said opening formed in said block body.

6. A gas lighter according to claim 5, wherein said supporting member is provided with a depression dimensioned to engage said bottom of said block body and including a boss formed at the center of said depression to engage with said opening of said block body.

7. A gas lighter comprising

a lighter casing;

a cap hinged on said lighter casing;

a fuel tank disposed within said lighter casing to store gas;
 a burner valve mounted on said fuel tank and communicating with said fuel tank to issue the gas;
 a one piece valve opening means having a first extension which engages said cap and a second extension which operatively engages said burner valve to control the operation of said burner valve;
 a block body disposed above said fuel tank and extending vertically to form a sidewall means;
 a flint housing passage in said block body;
 a knurled wheel positioned relative to said flint housing passage;
 a flint stone positioned within said flint housing passage;
 a flint pusher disposed on said block body and extending along said sidewall means to drive said flint stone into contact with said knurled wheel;
 a fixing means adapted to hold said cap and said burner valve in a normally closed position through a spring arranged on said fixing means; and
 said spring surrounding a portion of said fixing means and adapted to apply a force on said valve opening means.

8. A gas lighter according to claim 7, wherein said burner valve has a burner nozzle adapted to issue gas; and
 said burner nozzle includes on the outer periphery thereof grooves of a predetermined depth;
 said lighter further including an upper and lower cup-like member each having a slot through which said cup-like member is disposed in one of said grooves of said burner nozzle and said upper cup-like member adapted to engage said second extension of said valve opening means; and
 a spring disposed on said burner nozzle in engagement with said members which is arranged for resiliently transmitting the movement of said valve opening means to said burner nozzle through said cup-like members to control the operation of said burner valve.

9. A gas lighter according to claim 8, wherein said valve opening means has wings integral on said

valve opening means; said wings having a pair of slots formed thereon;
 said fixing means has a head portion and shank portion provided under said head portion; and said fixing means are provided with a collar moveably arranged on said fixing means; said collar having a pair of pins laterally extending to engage with said slots on said wings to keep said valve opening means in its operative position; and wherein
 said spring is interposed between said head portion of said fixing means and said collar is arranged on said shank portion of said fixing means.

10. A gas lighter according to claim 9, including a holding means adapted to stop said cup-like members from disengagement with said burner nozzle and having an aperture through which it may be disposed on said burner nozzle; and
 said spring is arranged between said upper and lower cup-like members for stopping the engagement of said cup-like members.

11. A gas lighter according to claim 10, wherein said holding means is adapted to stop the disengagement of said cup-like members is provided with a lateral extension extending to engage with the inner side of said lighter casing so that the turning movement is limited.

12. A gas lighter according to claim 11, wherein said lateral extension extends in the direction opposite to said second extension of said valve opening means held by said fixing means in said lighter casing.

13. A gas lighter according to claim 12, wherein said fixing means has a fixing ring on the lower portion thereof and a screw-threaded portion and said block body is provided with a leg at the bottom end of said block body so that said leg of the block body may be fixedly secured on said fuel tank through said fixing ring by screwing said fixing means into a threaded portion formed on said fuel tank.

14. A gas lighter according to claim 13, wherein said collar is of synthetic resin.

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