

SPECIFICATION

Gas operated cigarette lighters

The present invention relates to a gas-operated cigarette lighter, more especially of the type comprising a body and a cap which, together with the body, defines an internal space when it is in the closed position, and a valve mounted on the body in the said space, movable from a closed position where the release of gas is prevented into an open position where it allows the gas to escape.

Such automatic or semi-automatic gas-operated cigarette lighters are already known, wherein the gas is released when the cap is opened. The disadvantage of the known cigarette lighters of this type resides in the fact that the gas continues to escape until the cap has been closed again. As a result, particularly if it is dropped, the cigarette lighter may remain alight. Moreover, since the gas escapes during the whole of the time when the cap is open, these cigarette lighters consume a relatively large amount of gas. This point is particularly critical for electrical or electronic cigarette lighters which are generally equipped with a small-volume gas container owing to the size of their mechanism.

The present invention aims to remedy these disadvantages by providing a gas-operated cigarette lighter with an improved level of safety in use and which, moreover, enables a saving in gas to be made.

According to the present invention a gas-operated cigarette lighter of the type comprising a body and a cap which, together with the body, defines an internal space when it is in a closed position, and a valve mounted on the body in the said space, movable from a closed position where the release of gas is prevented into an open position where it allows the gas to escape, is characterised by the fact that it comprises a valve lever mounted on the said body to allow the valve to be opened, this valve lever being movable from a retracted position in which it is completely contained in the said space into an operating position in which it may be actuated by the user, and means provided for moving the valve lever from its retracted position into its operating position when the cap is displaced from its closed position into its open position.

Thus, the gas cannot escape from the valve unless the user has his finger pressed on the valve lever. In particular, if it is dropped, the cigarette lighter goes out. Furthermore, since the valve lever is inside the cap when it is in its retracted position, it cannot be actuated inadvertently when the cigarette lighter is closed.

The gas-operated lighter according to the invention may be a lighter with a wheel, the position of the valve lever being such that it can be actuated by the same finger of the user as that used to effect rotation of the wheel.

Alternatively, the lighter according to the invention may be an electric lighter, having a

switch arranged in the ignition circuit which can be closed by the valve lever in the position in which this valve lever effects the opening of the valve.

In a first embodiment, the cap can be lifted from the body by sliding, elastic means being provided to urge the valve lever towards its operating position, and a cam in the form of a wedge, integral with the cap, co-acting with the surface of the valve lever to return it into its retracted position when the cap is replaced on the body.

According to another embodiment the cap is mounted pivotable on the body, means being provided for translating its pivoting movement into a movement of the valve lever between its retracted position and its operating position.

In this latter case, the means for translating the pivoting movement of the cap into a movement of the valve lever may comprise a curved rod integral with the cap and passing through a hole provided in the valve lever.

Alternatively, the said means may comprise a lever arm integral with the cap, and a stop mounted on the body, a first rod being hinged at one of its ends to the lever arm and at its other end to a second rod which is hinged in turn on the valve lever, a compression spring being arranged between the stop and the hinge for the first rod on the lever arm.

According to another version, the said means comprises a cam which is integral with the cap and co-acts with a surface on the valve lever to bring it into its operating position, and a spring to keep this surface pressed against the cam.

Other characteristics and advantages of the invention will become apparent from the following description of some of these embodiments, given by way of non-limitative example.

In the attached schematic Drawings:

Figure 1 is a partial sectional view of a first embodiment of a gas-operated lighter with a wheel according to the invention, with its cap in the closed position,

Figure 2 corresponds to Figure 1 and shows the lighter with its cap in the open position,

Figure 3 is a view from above of the valve lever of the lighter shown in Figures 1 and 2,

Figure 4 is a partial, sectional view of a second embodiment of a gas-operated lighter with a wheel according to the invention, with its cap in the closed position,

Figure 5 corresponds to Figure 4 and shows the lighter with its cap in the open position,

Figure 6 is a partial, sectional view of a gas-operated lighter with a wheel according to the invention, with its cap in the closed position,

Figure 7 corresponds to Figure 6 and shows the lighter with its cap in the open position,

Figure 8 is a partial, sectional view of another embodiment of a gas-operated lighter with a wheel according to the invention, with its cap in the closed position,

Figure 9 corresponds to Figure 8 and shows the

lighter with its cap in the open position, and

Figures 10 to 18 show embodiments of an electrical lighter according to the invention, and correspond to Figures 1 to 9 respectively.

Referring now to Figures 1 to 3, these show a lighter comprising a body (1) and a cap (2). This lighter comprises in a known way a gas valve (3) which is axially movable, that is to say, movable substantially perpendicularly to the upper face of the body (1). When the valve (3) is in the position in which it is furthest inside the body (1) it prevents the release of gas, while if it is drawn towards the outside of the body (1), gas can escape. Elastic means (not shown) such as, for example, a spring, act on the valve (3) to hold it in its position down in the body (1). Again in a known way, the lighter according to the invention has a wheel (4) mounted on the body (1) which, when it is actuated by the user's finger, produces a spark which ignites the gas escaping from the valve (3).

According to the invention, the lighter has a valve lever (5) mounted on the body (1) so that it may slide between a retracted position shown in Figure 1 and an operating position shown in broken lines in Figure 2.

At its front part this valve lever (5) has an actuating section (6) which is ridged to allow easy pressure by the user's finger. Moreover, an elongated hole (7) is provided in the valve lever (5) to receive the wheel mechanism (8) and allows the lever to slide on either side of this mechanism. Another elongated hole (9) enables it to receive the foot (10) of the valve and has at its front part a widened area (11) which allows the head of the valve to pass through. Another hole (12) is provided in the valve lever (5) behind the hole (9). The function of this hole (12) which has a substantially rectangular section will be explained later. Finally, the valve lever has in its rear part a bore (13) which allows the passage of one leg (14) of a helical spring (15), the other leg (16) being attached to the body (1) of the lighter in a recess (17). The spring (15) is such that when its end (14) is engaged in the bore (13), it urges the valve lever (5) towards its operating position, that is to say, towards the right in Figures 1 and 2.

Moreover, inside the cap (2) a projection (18) is fixed, the end (19) of which is formed as a wedge-shaped cam surface (20) which can co-act with the rear surface (21) of the hole (12) in the valve lever (5). When this valve lever (5) is in the retracted position shown in Figure 1, the projection (18) is immediately above the hole (12).

The operation of this lighter will now be described in more detail with reference to Figure 2.

When the cap (2) shown in this Figure in broken lines is raised from the body (1) by sliding it in the direction of the arrow (22), the valve lever (5) which is no longer held in its retracted position by the cam surface (20) on the projection (18) is pushed back towards the outside by the end (14) of the spring (15), into its operating position. This movement is effected in the direction of the arrow (25).

The wheel (4) may now be rotated in the direction of the arrow (23) by the user's finger, which produces the desired spark. The user's finger then continues its movement downwards in the direction of the arrow (24) to come to rest on the front ridged end (6) of the valve lever (5) thus causing it to rock over a boss (26) on the body (1). During this movement the edge of the rear end of the hole (9) co-act with the head of the valve to raise the valve (3) into the position in which it allows the gas to escape. The gas is then ignited by the space produced by the wheel (4).

In Figure 2, the valve lever (5) is shown in broken lines in its operating position before it has been acted upon by the user's finger and in fully drawn lines in the operating position after the user's finger has tipped it up. If the user relaxes his pressure on the front end (6) of the valve lever (5), the latter returns into its position shown in broken lines under the effect of the valve-head of the valve (3) so that the gas ceases to escape. This happens, for example, if the lighter is dropped or at the moment when the user prepares to close it again.

After use, the cap (2) is engaged on the body (1) again. During this movement the point of the cam surface (20) comes into contact with the surface (21) of the hole (12) in the valve lever (5) and the further the cap (2) is pushed down, the more the cam surface (20) causes a movement of the valve lever (5) counter to the effect of the spring (15), from its operating position into its retracted position wherein the cap may be pushed completely down on the body (1).

In the embodiment shown in Figures 4 and 5, the lighter according to the invention again has a body (101) and a cap (102). In this instance, the cap is mounted so that it pivots on the body (101) around a hinge (130).

The valve lever (105) again has a ridged front end (106) and an elongated hole (107) which allows it to slide on either side of the mechanism (108) of the wheel (104). It again has an elongated hole (109) which co-acts in the same way as in the above-described embodiment with the valve (103) of the lighter.

However, in this embodiment the valve lever (105) has two lateral guide pins (131) which are able to slide in grooves (132) in the body (101) to guide the movement of the valve lever (105) from its retracted position shown in Figure 4 into its operating position shown in fully drawn lines in Figure 5.

In this embodiment, a curved rod (133) is rigidly fixed to the cap (102) and co-acts with the hole (112) in the valve lever (105). This curved rod (133) may adopt a substantially helical shape which develops around the hinge (13); becoming further removed between its end (134) which is connected to the cap (102), and its opposite free end (135).

In the embodiment shown in the Drawings, the curved rod (133) is in the form of the arc of a circle which is eccentric relative to the hinge (130).

Referring now to Figure 5, it will be seen that

the lighter is opened by pivoting its cap (102) around the hinge (130) in the direction of the arrow (136). During this movement the curved rod (133) has the effect of a cam relative to the hole (112) in the valve lever (105). While, when the lighter is closed, it is the end (134) of the rod (133) which traverses the hole (112), it is its end (135) which traverses it in its open position; as a result, the valve lever (105) passes from its retracted position into its operating position, following the arrow (125).

The rest of the process is effected in the same way as in the lighter shown in Figures 1 and 2, that is, the rotation of the wheel (104) in the direction of the arrow (123) and the pressing down of the end (106) of the valve lever (105) in the direction of the arrow (124) by the user's finger. In this movement, the valve lever (105) rocks over the pins (131) which have moved from the rear end of the grooves (132) to their front end.

As a result, the valve (103) is lifted up, thus allowing the escape of gas which is ignited by the space produced by the wheel (104).

When the pressure of the finger on the end (106) of the valve lever (105) is relaxed, the valve (103) returns to its position down inside the body (101) so that the lighter goes out.

If the lighter is then closed by pivoting the cap (102) around the hinge (130) in the opposite direction to that of the arrow (136), the curved rod (133) co-acts with the hole (112) in the valve lever (105) and causes the valve lever (105) to return into its retracted position, the pins (131) sliding in the reverse direction in the grooves (132) in the body (101). The valve lever (105) being retracted, the cap (102) may be closed up completely.

In the same way as before, the lighter shown in Figures 6 and 7 has a body (201), a cap (202) mounted on the body (201) so that it can pivot around a hinge (230), a valve (203), a wheel (204) and a valve lever (205).

A stop (240) is mounted on the body (201) so that it can pivot around an axle (241), via means which are not shown.

Furthermore, a lever (242) is rigidly mounted on the cap (202) and when the lighter is closed it is disposed in a recess (243) in the body (201). At the end (244) of the lever (242) a first rod (245) is hinged, being hinged at its other end (246) on a second rod (247), which is hinged in turn at its end (248) on the valve lever (205) (Figure 7).

Moreover, on the body (201) of the lighter a slideway (249) is provided which allows the valve lever (205) to slide from its retracted position shown in Figure 6 into its operating position shown in fully drawn lines in Figure 7. The valve lever (205) has, as previously, a hole (207) in which the mechanism (208) of the wheel (204) is engaged and a hole (209) which can co-act with the valve (203).

Finally, a compression spring (250) is disposed around the first rod (245) between its end (244) connected to the lever (242) and the pivoting stop

(240).

In the position shown in Figure 6, the compression spring (250) urges the end (244) of the lever (242) towards the left of the Drawing, thus keeping the cap (202) shut.

When the cap (202) is opened (Figure 7) by pivoting it around the hinge (230) in the direction of the arrow (236), the end (244) of the lever (242) pushes the first rod (245) which, in turn, pushes the second rod (247). The hinges (244, 246 and 248) allow this movement, which causes the valve lever (205) to move in the direction of the arrow (225). During this movement, the valve lever (205) slides in the guides (249) on the body (201) and takes up its operating position.

When the lighter is in its configuration shown in Figure 7, the compression spring (250) acting between the stop (240) which has pivoted around the axle (241) and the hinge (244) keeps the cap open.

The spark is then produced by rotating the wheel (204) in the direction of the arrow (223), after which the end (206) of the valve lever (205) is pushed down in the direction of the arrow (224) to bring the valve lever (205) into its position shown in broken lines in Figure 7. This movement is effected by the valve lever (205) rocking over the stop (251) on the body (201) due to a reduction in the thickness of the rear section (252) of the valve lever (205); this reduction in thickness allows the valve lever (205) to rock despite the guides (249).

When the pressure on the end (206) of the valve lever (205) is relaxed, the lighter goes out, and the cap (202) may be closed again. During this movement around the hinge (230) the pivoting of the end (244) of the lever (242) causes traction on the rods (245 and 247) and, as a consequence, a movement of the valve lever (205) in the opposite direction to that of the arrow (225). The valve lever (205) thus again being in its retracted position, the cap (202) may be closed up completely.

In the same way, the lighter shown in Figures 8 and 9 has a body (301), a cap (302) mounted on the body (301) so that it can pivot around a hinge (330), a valve (303), a wheel (304), and a valve lever (305). The valve lever is mounted so that it slides in guides (349) on the body (301) and has a rear section (352) with a reduced thickness to allow it to rock over a stop (351) on the body (301). As before, the valve lever (305) has a hole (307) in which the mechanism (8) of the wheel is engaged, and another hole (312), the edges of which can co-act with the valve (303).

The valve lever (305) again has a rear hole (313) in which the end (314) of a spring (315) mounted on the body (301) is engaged.

Moreover, a cam (360) is mounted rigidly on the cap (302). This cam (360) is in the form of a sector of a circle, the axis of which is offset relative to the hinge (330) towards the body (301). This cam can co-act with the end surface (361) on the valve lever (305) to bring it from its retracted position shown in Figure 8 into its



operating position shown in fully drawn lines in Figure 9.

Moreover, a lever (342) is again mounted rigidly on the cap (302) and when this cap is closed, the lever (342) is housed in a recess (343) in the body (301). At the end of the lever (342) a first rod (362) is hinged, being hinged at its other end on a second rod (363) mounted on the body (301) in a recess (343) therein so that it can rotate at its end (364). Another leg (365) of the spring (315) urges the rod (363) towards the left in Figure 8.

When the lighter is in its closed position shown in Figure 8, the leg (365) of the spring (315) holds it closed, pushing back the lever (342) via the rod (363).

If the cap (302) is opened by pivoting it around the hinge (330) in the direction of the arrow (336) (Figure 9), the cam (360) pushes the valve lever (305) in the direction of the arrow (325) to bring it into its operating position.

The wheel (304) may then be actuated in the direction of the arrow (323) to produce a spark, after which the valve lever (305) is pushed down via its end (306) in the direction of the arrow (324). As a result, there is a pivoting movement around the stop (351) on the body (301) and the valve (303) is raised, allowing gas to escape, which is ignited.

When the pressure on the end (306) of the valve lever (305) ceases, the lighter goes out.

If the lighter is then closed by pivoting the cap (302) in the direction opposite to that of the arrow (336) the leg (314) of the spring (315) which holds the surface (361) of the valve lever (305) in contact with the cam (360), causes the displacement of the valve lever (305) in the opposite direction to that of the arrow (325), that is to say, its return towards the retracted position. The cap (302) is then closed completely by the pressure exerted by the end (365) of the spring (315) on the rod (363).

Figures 10 to 18 show electric lighters according to the invention in various embodiments corresponding to the lighters shown in Figures 1 to 9.

Referring more particularly to Figures 10 to 12, which correspond to Figures 1 to 3 respectively, it can be seen that a lighter has a body (1'), a cap (2'), a valve (3') and a valve lever (5').

An ignition circuit (70) has a switch (71) actuated by means of a push-button (72) disposed so that it can be actuated by the valve lever (5').

Other elements of the mechanism of the lighter shown in Figure 10 are identical with those of the lighter mechanism in Figure 1 and will not therefore be described in more detail.

It will be seen from Figure 11, which shows the lighter from Figure 10 with its cap (2') lifted, that the valve lever (5') has been displaced in the direction of the arrow (25') towards its operating position where it may be actuated by the user's finger. It passes thereafter from the position shown in broken lines into the position shown in fully drawn lines in which it causes the push-

button (72) to be depressed, which closes the switch (71) of the ignition circuit (70) and simultaneously causes the lifting of the valve 3', thus allowing the escape of gas which is ignited by means of the ignition circuit.

As in the lighter shown in Figures 1 to 3, when the finger-pressure on the end of the valve lever (5') is relaxed, the lighter goes out and may be closed.

It will be observed that, differing from the lighter shown in Figures 1 to 3, a cover (73) has been provided here, having a hole (74) for the valve lever (5') to pass through, another hole (75) for the valve (3') to pass through, and a third hole (76) for the projection (18') which is connected to the cap (2') of the lighter to pass through.

Figures 13 and 14 show a lighter with a mechanism which is identical with that of the lighter in Figures 4 and 5, and which will not therefore be described in more detail.

A push-button (172) is provided below the valve lever (105') and enables a switch (171), disposed in the ignition circuit (170) of the lighter, to be closed.

Figure 14 shows the lighter from Figure 13 with its cap (102') open and its valve lever (105') in the operating position. The valve lever (105') is pressed down in the direction of the arrow (124') to allow the valve (103') to be opened and the switch (171) to be closed.

The electric lighter shown in Figures 15 and 16 is similar to that shown in Figures 6 and 7.

However, it has a push-button (272) provided to close a switch (271) disposed in the ignition circuit (270) of the lighter.

The displacement of the valve lever (205') from its retracted position shown in Figure 15 into its operating position shown in fully drawn lines in Figure 16 is effected as described with reference to Figure 7. Ignition of the lighter is effected in the same way as in the lighters shown in Figures 10 and 13.

Similarly, the lighter shown in Figures 17 and 18 is an electric lighter like the lighter shown in Figures 8 and 9, and the movement of the valve lever (305') from its retracted position shown in Figure 17 into its operating position shown in fully drawn lines in Figure 18 is effected in the same way.

A push-button (373) is disposed beneath the valve lever (305') so that as the latter is pushed down in the direction of the arrow (324') a switch (371) disposed in the ignition circuit (370) of the lighter is closed.

It will be appreciated that as a result, in these different embodiments the lighter according to the invention allows the flame to go out as soon as the pressure on the valve lever ceases. As a result, there is in particular a reduced consumption of gas and greater safety in use, since the lighter goes out automatically if it is dropped.

Furthermore, the fact that the valve lever is retractable prevents it from being actuated involuntarily and makes the lighter more aesthetically pleasing.



CLAIMS

1. A gas-operated cigarette lighter comprising a body and a cap which, together with the body, defines an internal space when it is in the closed position, and a valve mounted on the body in the said space and able to move from a closed position in which the release of gas is prevented into an open position in which it allows the gas to escape, characterised by the fact that it comprises a valve lever mounted on the said body to allow the valve to be opened, this valve lever being movable from a retracted position in which it is completely contained in the said space into an operating position in which it may be actuated by the user, and means provided for moving the valve lever from its retracted position into its operating position when the cap is displaced from its closed position into its open position.
2. A cigarette lighter according to Claim 1, characterised by the fact that the lighter is a lighter with a wheel, the operating position of the valve lever being such that it may be actuated by the same finger of the user as that which effects the rotation of the wheel.
3. A cigarette lighter according to Claim 1, characterised by the fact that the lighter is an electric lighter, with a switch disposed in the ignition circuit and able to be closed by the valve lever when this valve lever is in the position in which it causes the valve to open.
4. A cigarette lighter according to any one of Claims 1 to 3, characterised by the fact that the cap may be raised from the body by sliding, elastic means urging the valve lever towards its operating

position, and a wedge-shaped cam connected to the cap co-acting with a surface on the valve lever to bring it back into the retracted position when the cap is replaced on the body.

5. A cigarette lighter according to any one of Claims 1 to 3, characterised by the fact that the cap is mounted pivotably on the body, means being provided to translate its pivoting movement into a movement of the valve lever between its retracted position and its operating position.

6. A cigarette lighter according to Claim 5, characterised by the fact that the said means comprise a curved rod connected to the cap and passing through a hole provided in the valve lever.

7. A cigarette lighter according to Claim 5, characterised by the fact that the said means comprise a lever arm connected to the cap and a stop mounted on the body, a first rod being hinged at one of its ends on the arm of the lever and at its other end to a second rod which is hinged in turn on the valve lever, a compression spring being disposed between the stop and the hinge for the first rod on the lever arm.

8. A cigarette lighter according to Claim 5, characterised by the fact that the said means comprise a cam connected to the cap and co-acting with a surface on the valve lever to bring it into its operating position, and a spring to keep this surface pressed against the cam.

9. A cigarette-lighter constructed, arranged and adapted to operate substantially as hereinbefore described, and as shown in Figure 1 to 3, 4 and 5, 6 and 7, 8 and 9, 10 to 12, 13 and 14, 15 and 16, or 17 and 18.