

[54] CIGARETTE LIGHTER

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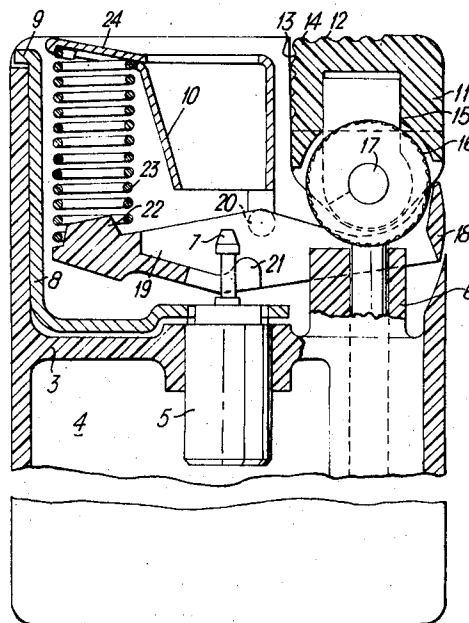
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[57]

ABSTRACT

The invention is concerned with a cigarette lighter having an actuating member and means mounting said actuating member for rocking movement to operate said lighter, said actuating member having first and second surfaces meeting at a nose and the arrangement being such that when thumb pressure is applied to said first surface said actuating member is forced to rock with a snap action as said thumb rolls over said nose onto said second surface.

12 Claims, 7 Drawing Figures



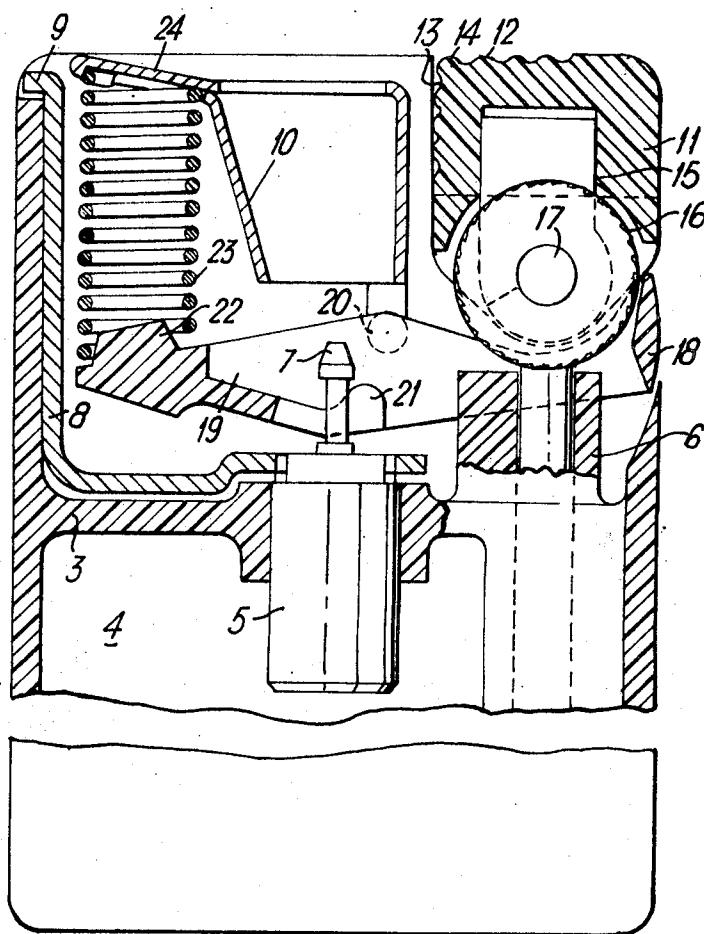
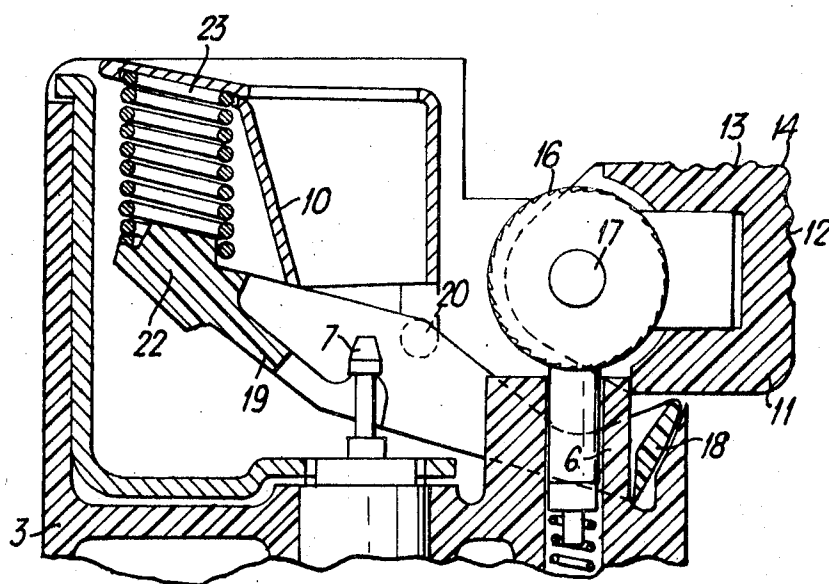
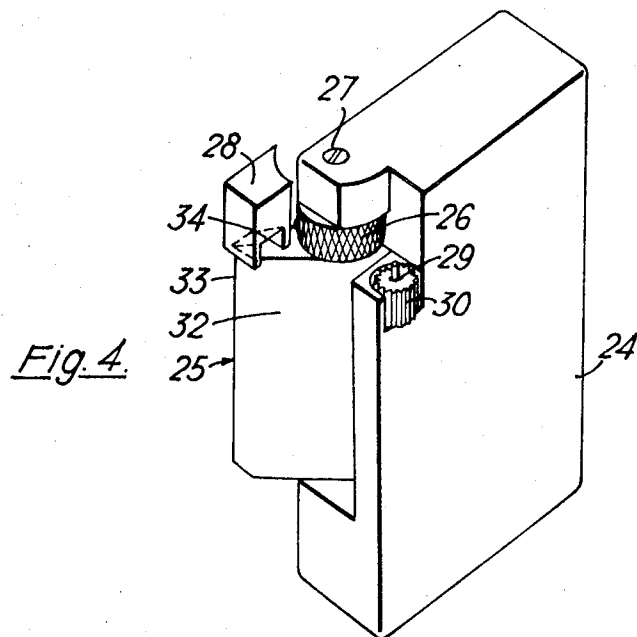
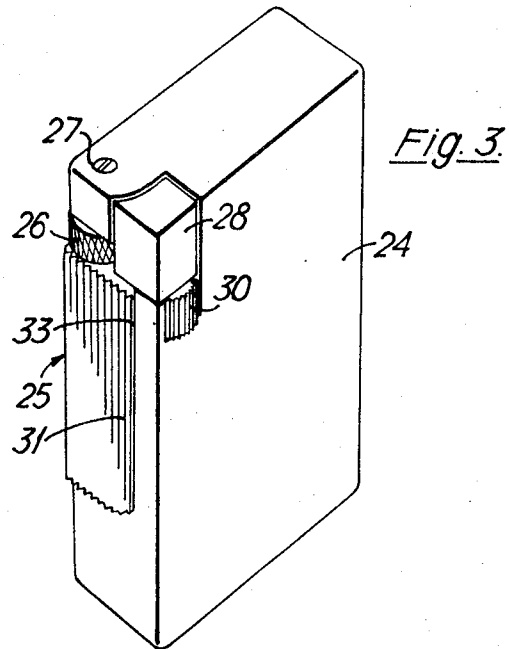


Fig. 1.



*Fig. 2.*





## CIGARETTE LIGHTER

In the operation of most cigarette lighters it is desirable that the actuating member should move suddenly, with a so called snap action, when manual pressure is applied, in order to provide a corresponding acceleration of a moving part of the ignition mechanism, such as a flint wheel, the hammer or crystal of a piezo electric mechanism, or the rotor of an electromagnetic generator. This snap action has previously been obtained by means such as a toggle action or a four bar chain which moves over a dead centre position, but they all require a comparatively large number of interconnected parts.

According to the present invention a cigarette lighter has an actuating member which rocks about an axis to operate the lighter, the actuating member having two surfaces meeting at a nose and the arrangement being such that when thumb pressure is applied to a first one of the surfaces the actuating member is forced to rock with a snap action as the thumb rolls over the nose onto the second one of the surfaces.

This construction is extremely simple and involves the minimum number of parts and yet is comfortable to operate and provides surprisingly good acceleration of the actuating member as it rocks about its axis. In practice the actuating member will be positioned so that when the lighter is grasped in the operator's hand, the operator's thumb naturally comes to rest with one half against the first surface of the actuating member and the longitudinal centre line of the thumb substantially adjacent to the nose. To operate the lighter thumb pressure is applied against the first surface of the actuating member with a frictional component away from the nose. The operator increases this frictional component until a position of unstable equilibrium is reached upon which the actuating member is free to rock and the applied thumb pressure which has reached a peak value prior to movement being possible, produces a very sudden and advantageous acceleration of the actuating member. This is partly due to the nose passing over a dead centre position relatively to the pivotal axis of the actuating member. As the actuating member rocks the thumb rolls over the nose so that the other half comes into engagement with the second surface of the actuating member. Since this second surface is swinging towards a plane parallel to that previously adopted by the first surface, the applied thumb pressure continues to be transmitted to the actuating member through the second surface so that the acceleration of the actuating member is maintained and there is no danger of the thumb slipping off the actuating member as it rocks about its pivot. We believe that the best results are produced if the actuating member is pivoted about an axis extending substantially parallel to the nose and lying in the included angle between the first and second surfaces. The perpendicular distance between the pivotal axis and each of the two surfaces, or extension of the surface, is dependent for effective operation on the size of an average thumb and is preferably at least 6 mm.

It will be appreciated that no additional parts are required to provide the snap action and it is possible to make the actuating member much smaller and more chunky than the actuating member of conventional lighters. In the case in which the actuating member rotates a flint wheel, the simplicity of the construction

and the saving in additional parts and space may be improved further by mounting the actuating member to rock about the same pivot pin as that on which the flint wheel rotates. In this way no separate supports are required for the actuating member and the whole ignition mechanism can be mounted on the single pin. This feature is valuable in enabling the lighter to be made cheaply enough to be of the throw away kind which are not intended to be serviced. The actuating member and flint wheel may be provided with a complementary ratchet engagement.

Since, at the end of the operative rocking motion of the actuating member, the operator's thumb comes to rest on the second surface, the actuating member may readily be held in this position by maintaining the thumb pressure. This makes the invention particularly applicable to automatic cigarette lighters in which a gas valve or snuffer cap or gas valve and snuffer cap are opened by the operative movement of the actuating member and are maintained open by holding the actuating member in the position it adopts at the end of its operative stroke, the parts returning to the rest position under spring action when the manual pressure is released from the actuating member after operation of the lighter.

The return spring may be a torsion spring accommodated within the actuating member. The actuating member may be mounted at an upper corner of the lighter and rockable about a horizontal axis, the first surface being the upper surface of the actuating member and the second surface being the upright front surface of the actuating member nearer to the burner. The actuating member will then be pivoted about an axis extending parallel to the nose or corner edge, at which the top and front surfaces meet one another, and rearwardly of the front surface, the actuating member being rockable backwards and downwards away from the burner to operate the lighter. This is perhaps the simplest construction and leads to the possibility of making a fully automatic throw away gas burning cigarette lighter. For such a lighter the actuating member preferably engages one end of the lever which is rocked and opens the burner shut off valve as the actuating member makes its operative stroke. Both the lever and actuating member may be made of a synthetic plastics material and the return spring may be a compression spring acting on the end of the lever remote from the actuating member as described in our copending British Application No. 43225/70.

Alternatively the actuating member may be mounted to rock about an upright axis. If the actuating member is again mounted adjacent to an upper corner of the lighter, the two surfaces may both be upright surfaces of the actuating member which are exposed where the lighter is in the rest position.

The invention also makes possible an important improvement in so called roller lighters, that is lighters having a rectangular box shape and an actuating member consisting of a serrated roller let into a corner edge, usually but not necessarily a vertical corner edge, of the lighter body at the intersection of two side walls. Normal roller lighter have a hinged lid which first has to be opened after which the thumb is drawn across the serrated roller actuating member which is coupled to a flint wheel. Since the roller actuating member necessarily has a small diameter, it is difficult to rotate the flint wheel with the desirable acceleration by thumb

pressure applied to the small roller. It has also not been possible to make roller lighters fully automatic and, for example, in the case of a gas burning roller lighter, the gas valve has been controlled by the preliminary operation of opening the hinged lid. This is naturally a disadvantage since roller lighters are normally expensive, highly embellished lighters.

We appreciate that the invention is applicable to roller lighters by replacing the conventional serrated roller by an elongate actuating member mounted in a similar position as the conventional roller but rockable, instead of fully rotatable, about a longitudinal axis and having first and second longitudinal surfaces meeting at the corner edge.

The provision of the first and second surfaces and the nose give the actuating member all the advantages previously discussed, for example the ability to rotate the flint wheel with considerable acceleration. It also makes possible what can still be termed a roller lighter which is automatic. Since the actuating member can readily be held in the position it adopts at the end of its operative stroke, it can be connected to a snuffer cap or gas valve or snuffer cap and gas valve and hold these parts open against a return spring. This avoids the necessity of a hinged lid although the lid may be retained for aesthetic reasons without any functional coupling to the gas valve in the case of a gas burning cigarette lighter.

Three examples of cigarette lighters constructed in accordance with the present invention are illustrated in the accompanying drawings, in which:

FIG. 1 is an elevation of one lighter with parts broken away and parts in section;

FIG. 2 is a view similar to FIG. 1 showing the actuating member in its operative position;

FIG. 3 is a perspective view of a second lighter with the parts in their rest position;

FIG. 4 is a view similar to FIG. 3 but with the parts in the operated position;

FIG. 5 is a perspective view of a third lighter with the parts in their rest position;

FIG. 6 is a view similar to FIG. 5, but showing the parts in the operated position; and,

FIG. 7 is an exploded perspective view of the third lighter.

The lighter of FIGS. 1 and 2 has a moulded plastics body 3 incorporating an integral gas reservoir tank 4 and an integral flint tube 6. Mounted in the top wall of the tank 4 is a valve assembly 5 incorporating the usual gas pressure reducing valve and burner shut off valve which is opened upon raising of a burner nozzle 7 against spring action. The pressure reducing valve is adjustable by means of a control member 8 having a finger piece 9 accessible to one side of a metal chimney 10 into which the burner nozzle 7 discharges, to protect the plastic lighter parts from the heat of the flame.

The lighter is fully automatic and has a moulded plastics actuating member 11 in the form of a thumbpiece having a first serrated operating surface 12, a second serrated operating surface 13 at right angles to the surface 12, and connected to it across a right angular nose 14. The actuating member 11 is mounted together with a pawl 15 and a flint wheel 16 on a common axle pin 17 the ends of which snap into complementary recesses in the body 3. The flint wheel 17 is formed with a conventional ratchet cooperating with the pawl.

Imaginary planes touching the raised parts of the serrated surfaces 12 and 13 are spaced 12 mm and 7 mm respectively from the axis of the pivot pin 17.

A gap between the bottom of the actuating member 11 and the adjacent edge of the wall of the body 3 is normally closed by an upstanding flange 18 moulded integrally with a synthetic plastics lever 19 which is pivoted at 20 to ears projecting from the bottom of the chimney 10 and has a cam 21 for engagement with the underside of the head of the burner nozzle 7. The end of the lever 19 remote from the flange 18 forms an anchorage 22 for a helically coiled compression spring 23, the other end of which takes a reaction from a flange 24 formed integrally with the chimney 10. The spring 23, acting through the lever 19 and its flange 18, which engages the actuating member 11, forms the main return spring for the actuating member 11 and tends to hold it in its rest position as shown in FIG. 1.

Upon operation of the lighter the operator grasps the lighter in the palm of his hand and places his thumb on the surface 12. Pressure is then applied downwards with a centre of pressure slightly in front of, that is to the burner side of, the axis of the pin 17. At the same time lateral thumb pressure is applied tending to rock the actuating member 11 in a clockwise direction, as shown in FIG. 1, about the pivotal axis, until a position of unstable equilibrium is produced. The actuating member then accelerates through 90° to the FIG. 2 position as the nose 14 rocks over a dead centre position over the axis of the pin 17. As the actuating member 11 rocks to the FIG. 2 position, it forces the flange 18 downwards and causes the lever 19 to rock in the clockwise direction shown in the drawings against the action of the spring 23 so that the cam 21 lifts the head of the burner nozzle 7, opening the burner shut off valve and causing fuel gas to be discharged into the chimney 10. At the same time the actuating member carries with it the flint wheel 16 which causes a shower of sparks from a flint projecting from the top of the flint tube 6 to be directed at the gas flow between the burner nozzle 7 and the bottom of the chimney 10 so that the gas is ignited.

As the actuating member 11 rocks to the FIG. 2 position the operator's thumb rolls over the nose 14 and comes to rest on the surface 13. Whilst the thumb pressure is maintained on this surface the actuating member and other parts are held in the FIG. 2 position so that the flame continues to burn. However as soon as the thumb is released from the surface 13, the parts return to their FIG. 1 position under the action of the return spring 23 and of the spring in the burner shut off valve, so that the flame is extinguished.

The parts described, particularly the synthetic plastic mouldings, and the assembly of the ignition mechanism on the single pin 17, provide for maximum cheapness of production. In this form the lighter can be marketed as a throw away lighter, that is one of which the gas reservoir tank may or may not be rechargeable a small number of times and for which service and maintenance are not available. The body 3 may be arranged to be fitted into an embellished metallic outer casing in which the lighter can be replaced by a new one when it is no longer servicable. On the other hand the mechanical advantages obtainable from the particular construction of actuating member and igniting mechanism, and from the construction of lever 19, return

spring 23, and chimney 10, make these features equally applicable to so called quality lighters.

The lighter of FIGS. 3 and 4 is a so called quality lighter having an embellished metal outer casing 24 of generally rectangular box shape. The lighter is a modified roller lighter of which the roller actuator 25 has a generally pear shaped cross section rather than a circular one. The actuating member 25 is mounted with a flint wheel 26 on a common axle pin 27. The actuating member 25 and flint wheel 26 have, on their adjacent surfaces, complementary ratchet teeth. The actuating member 25 is hollow and contains a helically coiled torsion spring which tends to rotate the actuating member in an anticlockwise direction as seen from above to the rest position as shown in FIG. 3. At the same time the spring produces an axial reaction urging the actuating member 25 upwards into engagement with the bottom of the flint wheel 26 so that the ratchet teeth tend to engage one another.

The actuating member 25 is rigidly fitted with a burner cover piece 28 which, in the rest position, overlies a burner nozzle 29 connected through the usual burner shut off valve and gas pressure reducing valve to a gas reservoir tank within the casing 24. The gas pressure reducing valve and hence the height of the flame is adjustable by rotation of a knurled wheel 30.

The actuating member 25 has a first serrated surface 31 and a second serrated surface 32 which intersect one another at a curved nose 33. To operate the lighter the thumb is placed over the surface 31 with the centre line of the thumb lying down the nose 33. The component of the thumb pressure along the surface 31 away from the nose 33 is increased until the actuating member suddenly moves with a snap action over the dead centre position into the FIG. 4 position. As this movement occurs the ratchet teeth, in engagement with one another cause the flint wheel 26 to be rotated and a stream of sparks to be directed to the burner nozzle 29. At the same time an inclined under surface 34 of the burner cover 28 rides off the burner nozzle 29 which is allowed to rise under internal spring pressure to open a burner shut off valve and allow the fuel gas to flow. Since, at the end of the operative movement of the actuating member, the thumb comes to rest on the surface 32, the actuating member can readily be held in this position so that the flame continues to burn. As soon as the thumb pressure is released from the surface 32 the actuating member returns to the FIG. 3 rest position under the action of its internal torsion spring, the ratchet teeth riding over one another as this occurs. As the burner cover 28 returns to its rest position the surface 34 rides over the burner nozzle 29 forcing it downwards to close the burner shut off valve and extinguish the flame. Instead of the inclined surface 34, some leaf spring, moving with the actuating member, could be used to operate the burner shut off valve.

The third example of a lighter, illustrated in FIGS. 5 to 7, is a fully automatic gas burning cigarette lighter. It has a main body 36 which incorporates a gas fuel reservoir tank having an inlet valve 36 accessible at the bottom of the body. An upper wall of the body 35 supports a U-shaped part 37 and is formed with two apertures 38 and 39. An angular hood 40 formed with a flame aperture 41 is mounted on the part 37. A rigid pin 42, which extends from the gas tank up through the aperture 38, forms a pivotal mounting for an actuating member 43, the actuating member having a bore 44

which receives the pin 42. A hairpin torsion spring 45 has its elbow within the aperture 39 and its longer arm 46 received in a bore 47 in the bottom of the actuating member 43. The effect of the spring is to urge the actuating member to return to its rest position shown in FIG. 5.

In addition to the actuating member 43 there are also mounted on the pin 42 a flint wheel 48 and a ratchet part 49, the flint wheel 48 being substantially accommodated within the aperture 38. A flint 50 is urged from the end of a bore 51, which is formed in the top wall of the body 35 and which opens into the aperture 38, into engagement with the flint wheel 48 by a helically coiled compression spring 52, which is itself held in position by means of a screw 53 which screws into a tapped entrance to the bore 51.

The actuating member 43 is provided with a cam 54 which engages with the head of a burner shut off valve nozzle 55. When the actuating member is rotated from its rest position in an anticlockwise direction as seen from above to the FIG. 6 position, the cam 54 rides out of engagement with the nozzle 55, allowing the nozzle to move under spring action to open the burner shut off valve and allow gaseous fuel to be discharged from the gas tank to atmosphere. At the same time the movement of the actuating member rotates the flint wheel 48 and causes a stream of sparks to be directed from the exposed end of the flint 50 above the nozzle 55 to ignite the gas as a flame 56 burning through the aperture 41.

In order to produce a concentrated stream of sparks to ignite the flame, the flint wheel has to be rotated with a high acceleration, and this is achieved by rotating the actuating member 43 with a snap action. In accordance with the main feature of the invention, the actuating member has first and second serrated operating surfaces 57 and 58. In order to operate the lighter the operator places his thumb on the surface 57 with the centre line of the thumb substantially overlapping a nose 59 formed where the surfaces 57 and 58 meet one another. A frictional force is applied to the surface 57 away from the nose 59 until a position of unstable equilibrium is reached whereupon the actuating member rocks suddenly to the FIG. 6 position and the thumb rolls over the nose onto the surface 58, thus operating the lighter. If the thumb pressure is maintained on the surface 58, the flame continues to burn and as soon as the pressure is released from the surface 58, the parts adopt their rest position and the flame is extinguished primarily under the action of a spring 45.

I claim:

1. A cigarette lighter having a casing, a burner in said casing, an actuating member, and means mounting said actuating member on said casing for rocking movement from a first position to a second position to operate said lighter, said actuating member having first and second surfaces lying at an acute angle to each other and meeting at a nose, said first surface being shorter than the terminal phalanx of a human thumb and aligned with a side of said casing when said actuating member is in said first position, and said second surface being nearer said burner than said first surface, said mounting means being so positioned that when the base of the terminal phalanx of the thumb of a hand holding said casing is used to press said first surface inwardly of said lighter and away from said burner, said actuating member is caused to rock away from said burner with a snap ac-



tion while said phalanx rolls over said nose to press against said second surface.

2. A cigarette lighter according to claim 1, wherein said actuating member is pivoted about an axis extending substantially parallel to said nose and lying in the included angle between said first and second surfaces.

3. A cigarette lighter according to claim 2, in which the perpendicular distance between said pivotal axis and the plane of each of said surfaces is at least 6 mm.

4. A cigarette lighter according to claim 1, in which said actuating member rotates a flint wheel, and a common pivot pin rockably mounts said actuating member and rotatably mounts said flint wheel.

5. A cigarette lighter according to claim 4, in which said actuating member and said flint wheel are provided with a complementary engagement means.

6. A cigarette lighter according to claim 1, in which said actuating member is rockable about an upright axis.

7. A cigarette lighter according to claim 6, in which said actuating member is mounted at a side of said lighter, said first and second surfaces both being exposed when said actuating member is in its rest position.

8. A cigarette lighter according to claim 1, where said actuating member is let into a corner of a body of said lighter at the intersection of two walls of said body.

9. A gas burning cigarette lighter according to claim 1, comprising a burner valve operatively connected to

be opened upon rocking of said actuating member to operate said lighter.

10. A automatic cigarette lighter according to claim 1, comprising at least one flame extinguishing means connected to be opened by the operative movement of said actuating member and maintained open by holding said actuating member in its second position, and a return spring for returning said actuating member to said first position when the manual pressure is released from said actuating member after operation of said lighter.

11. A cigarette lighter having an actuating member and means mounting said actuating member adjacent the top of said lighter for rocking movement about a horizontal axis to operate said lighter, said actuating member having first and second surfaces meeting at a nose, said first surface being the upper surface of the actuating member and said second surface being the upright front surface of said actuating member nearer to a burner, whereby when thumb pressure is applied to said first surface said actuating member is rockable with a sharp action backwards and downwards away from said burner to operate said lighter as said thumb rolls over said nose onto said second surface.

12. A cigarette lighter according to claim 10, in which said return spring is a torsion return spring accommodated within said actuating member.

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