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GAS-FUELED LIGHTER

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Various gas-fuelled lighters have already been disclosed, which comprise a gas tank, which is firmly incorporated or replaceably inserted in the lighter housing and is provided with a gas outlet valve, which is held in its closed position by spring force and adapted to be opened when the valve stem is lifted.

In a very simple gas-fuelled lighter of this type, the valve stem is lifted with the aid of a lifting disc, which is rigidly secured to the free end of the stem and in response to the opening movement of the lighter cover is engaged from below by an actuating member participating in the movement of this lighter cover so that the disc is lifted together with the valve stem. This actuating member may comprise, for example, a nose provided at the rear end of the cover. As the movement of this lifting disc is directly derived from that of the cover, or of the actuating member provided on the cover, the actuating parts must be exactly adjusted to each other regarding their relative position and their paths of movement in order to ensure that the gas outlet valve is sufficiently opened for the ignition of the emerging gas. This is often not the case. There is no provision for a control of the height of the flame. Such a control would require a key or the provision of a rotary disc at the gas outlet valve.

For this reason, those lighters in which a rocker lever having unequal arms is interposed between the lifting disc and the actuating member associated with it have increasingly gained in significance. In various structures of this type which have been disclosed, the elongated rocker lever is loosely inserted in the lighter and supported, for example, by the fuel tank. Such lighters have the disadvantage that a replacement of the gas tank requires a partial disassembly and reassembly of the lighter. This arrangement affords the advantage that the rocker lever is equally effective in any position, owing to its rotation-symmetrical form, even when the rocker lever is freely rotatable about the valve stem. If the gas tank has a cylindrical or prismatically cross-sectional shape, it can be inserted into the lighter housing without need for special attention being given to ensure a certain position of the tank, even if the rocker lever is coupled to the vertically adjustable member of the gas throttling valve for joint rotation. Such a connection will readily enable a control of the flame because the rocker lever need only be rotated relative to the gas tank. The rocker lever itself may consist of one or two parts.

Some illustrative embodiments are shown on the accompanying drawings, with reference to which the invention will be described more fully hereinafter.

In the drawing:

FIG. 1 is a longitudinal sectional view showing a first embodiment of a lighter according to the invention.

FIGS. 2 and 3, respectively, show two modified flame control means.

FIG. 4 is a longitudinal section view showing the essential parts of a second embodiment of the lighter.

FIG. 5 is a longitudinal section view showing the top portion of a third embodiment of a gas tank with a rocker lever.

FIG. 6 is a longitudinal section view showing a fourth embodiment of a lighter.

FIG. 7 is a sectional view taken on line VII—VII of FIG. 6.

FIG. 8 is a longitudinal section view of a fifth embodiment of a gas tank with a rocker lever.

FIG. 9 is a top plan view of the lighter of FIG. 8.

The gas lighter shown in FIG. 1 comprises a housing 1 having a housing shell 2, a tiltable lighter cover 3 and a flint device 4. The housing shell 2 is in the form of a cylinder, which is formed by bending sheet metal and is open along its length and at both ends. Pairs of lugs, not shown, are provided along the longitudinal edges of the cylinder. The uppermost pair of these lugs carries a pivot pin 5, about which a friction wheel 6 is rotatable and the lighter cover 3 is tiltable. The lighter cover 3 is mounted by means of two parallel, right-angled arms 7. A driver 8 is secured to the inside of the cover. When the lighter is being opened, this driver engages a driven wheel 9, which is connected to the friction wheel 6 for joint rotation.

A second pair of lugs of the housing part 2 holds a flint tube 10, which contains a flint 11 and a spring 12, which applies pressure to the flint. The free end of the flint spring 12 bears on an L-shaped slide member 13, which is guided by another pair of lugs. When the flint spring 12 is in stressed condition, this slide member 13 is held by a housing part 14 which is also pivotally movable about the pivot pin 5 and engages the slide member 13 from below. A transverse wall 15 is disposed adjacent to the lowermost pair of lugs. The lower end of the flint tube 10 extends through and is held at the central opening of this transverse wall. An over center spring 16 bears on the transverse wall 15 and surrounds the flint tube 10. The upper end of the spring 16 contacts with the web 17 of a bent member 18. For this purpose, the web 17 has an opening, through which the flint tube 10 extends. Two parallel limbs 19 of the bent member 18 engage the arms 7 of the lighter cover 3 at eccentric points and move the cover automatically into the open or closed positions, respectively, when the movement in one direction or the other has been initiated by hand.

A gas tank 20 is inserted from below into the cylindrical housing shell 2. To enable a firm grip, this tank comprises a lower section 21 having a milled periphery.
A gas outlet valve 22 of known type is centrally disposed in the top of the gas tank 20. This valve has a hollow valve stem 23, which can be lifted and which is surrounded by a spring 24 tending to close the valve. The upper end portion of the valve stem 23 forms an outflow nozzle. Adjacent to this upper portion, a peripherally continuous stop shoulder 25 is provided for lifting the stem. According to the invention, a rocker lever 26, of circular disc-shape, is disposed between the top of the gas tank 20 and the stop shoulder 25. The valve stem 23 extends through the central opening of this lever with a clearance which is sufficient for the necessary range of pivotal movement. This arrangement provides for the mounting of the circular rocker lever 26 on the gas tank 20. As a result, the gas tank 20, which has a circular cross-section in this embodiment, can be inserted in any desired position into the housing shell 2. Each of the arms 7 of the lighter cover 3 is provided with a nose 27 for actuating the rocker lever 26. During the opening movement of the cover 3, these noses exert force from below on one end of the rocker lever 26 so that this end is lifted. The opposite end of the rocker lever bears on an offset portion 25a of the housing so that the rocker lever acts as a one-armed lever, the intermediate portion of which co-acts with the stop shoulder 25 of the valve stem 23 to lift the latter and thus to open the gas outlet valve 23. The offset portion 28 is formed by an inwardly protruding tongue of a resilient, hook-shaped sheet metal plate, which is secured to the housing shell 2 below the opening 30 provided in the shell 2. The lug 29 has an offset portion 31, which protrudes out of this opening 30 and is continued by the downwardly inclined tongue 28. A conical ring 32 is vertically slidable disposed on the outside around the cylindrical housing shell 2 adjacent to the opening 30. When this latter ring is moved downwardly, it will urge the offset portion 31 of the sheet metal lug 29 and its tongue 28 increasingly inwardly. The offset portion 31 tends to spring outwardly. Owing to the downward inclination of the tongue 28, the point of engagement of the disc-like rocker lever 26 with this tongue will be raised as the tongue is being urged inwardly. The vertically movable ring 32 thus enables a change of the extent of the angular movement performed by the rocker lever 26 when the lighter is being actuated so that the valve stem 23 is raised to a larger or smaller extent and the angle of the flame is thus controlled. When it is desired to replace the gas tank 20, the ring 32 is lifted as far as possible so that the tongue 28 can spring back freely as soon as the tank and its rocker lever 26 are pulled out of the housing and the lever 26 slides past the tongue 28. The same operation takes place when the gas tank is being introduced.

As is apparent from FIG. 2, the extent to which the gas outlet valve is opened can be adjusted by other means, namely, by a change of the distance between the disc-shaped rocker lever 26 in position of rest and the stop shoulder 25c of the valve stem 23c.

For this purpose, the stop shoulder 25c is formed in known manner as a nut, which is in threaded engagement with screw threads 33 formed on the top end portion of the valve stem 23c. When the nose becomes effective on the rocker lever 26 bears in this embodiment directly on the raised portion of the top of the gas tank 20.

In the structure shown in FIG. 3, an adjustment of the range of the pivotal movement of the rocker lever for controlling the flame is effected by a vertical adjustment of the entire gas tank 20a together with the disc-shaped rocker lever within the lighter housing so that the rocker lever enters the range of movement of the pressure nose at an earlier or later time. For this purpose, the housing shell 2a and the gas tank 20a are provided in their lower portion with screw threads 34, respectively, so that they can be threadably engaged to a greater or lesser degree with each other. According to FIG. 4, the nose 27c, which forms the actuating member for the disc-shaped rocker lever, is provided on one of the spring-loaded arms 19 of the bent member 18 which contributes to the movement of the lighter cover 3 into its open and closed position (see FIG. 1). These arms are pivotally movable beyond a neutral position. It is obvious that each of the two arms 19 may be provided with a nose 27c. This arrangement of the nose or noses 27c has the advantage that the forces which become effective when the rocker lever is being actuated will not apply additional load to the bearings between the arms 19 and the lighter cover 3. An interposed member 35 is arranged between a disc-shaped rocker lever part 26c and the stop shoulder 25c of the liftable valve stem 23c. This interposed member 35 transforms the pivotal movement of the lever into the opening movement of the gas outlet valve 22c and forms an effective part of the disc-shaped rocker lever. The latter comprises the disc-shaped part 26c and the disc-shaped interposed member 35. In a manner known per se, the stop shoulder 25c is formed directly out of the wall of the hollow valve shaft 23c, the upper end portion of which forms a hollow rivet. This design provides a flaring outlet opening 36, which affords the advantage that the flame has a higher stability in wind, and the point of engagement of the rocker lever consists of the two discs 26c, 35 is as close as possible to the geometrical axis of the valve stem. This is important for the provision of a large leverage by a rocker lever which is approximately circular. It is also possible to determine the necessary play between the stop shoulder 25c and the rocker lever 26c, 35 by the inclination of the shoulder.

A gas outlet valve 22 in another manner with the gas outlet valve 22c. The closing spring 24c of the gas outlet valve 22c bears on a member 38, which guides the valve stem 23c and is in screw-threaded engagement with a cup-like recessed portion 39 of the top of the gas tank 26c. This arrangement enables a vertical adjustment of the member 38, the lower end of which bears on a pressure plate 40, which has a central gas passage 41, which is surrounded by a valve seat 42 for a valve member 43. The latter valve member consists of a resilient plug, which is formed at the lower end of the valve stem 23c. Throttling elements 45 are inserted between the pressure plate and the bottom of the cup-like top portion 39. This bottom has also a gas passage 44. A screw adjustment of the vertically adjustable member 38 enables a variation of the pressure acting on the throttling elements and consequently on the control of the flow rate of the gas. The gas tank 20c has a circular cross-section. Because the rocker lever consisting of the parts 26c, 35c has also the form of a circular disc, the gas tank 20c can be introduced into the housing 2 in any desired position. The vertically adjustable member 38 of the gas throttling valve has an upper portion formed with external teeth 46, which co-act with similar internal teeth of the rocker lever part 26c while providing for the free play required for a pivotal movement of part 26c. As a result, these two parts are connected for joint rotation. In this case, the height of the flame is controlled by an adjustment of the pivoting movement of the rocker lever 26c, which is automatically locked in the lighter housing upon pivot rotation whereas its freedom of pivotal movement is preserved, and a manual rotation of the gas tank 20c is utilized for a vertical adjustment of the member of the pivoting member 38. As in FIG. 1, the gas tank protrudes below the housing 2c, the rocker lever 26c has peripheral teeth 47. The nose 27c is changed in the spaces between these teeth when the lighter is open. A supporting disc 48 is inserted between the rocker lever 26c, 35 and the gas tank 20c. In its peripheral portion,
this supporting disc 48 is formed with a raised annular rim 49 for supporting the rocker lever part 26c. The disc 48 has internal teeth, by which it is coupled for joint rotation with the vertically adjustable member 38 of the gas throttling valve 37. In order to limit the range of angular movement of the gas tank 20c and with it the vertical adjustment of the member 38, the top of the tank is provided with a peripheral step 50, into which a lug 51 extends, which is bent from the periphery of the supporting disc and co-acts with a stop 52 as shown in the step.

FIG. 5 shows a modification of the structure of FIG. 4. In this case, the rocker lever part 26d is not directly coupled to the vertically adjustable member 38 of the gas throttling valve 37 but consists of an annular disc, which is spaced around the member 38. A supporting disc 48d is coupled to the vertically adjustable member 38 for joint rotation and serves for connecting the latter to the rocker lever part 26d for joint rotation. The disc 48d has a number of openings 53, which receive lugs 55, which are bent down from the inner rim 54 of the annular rocker lever part 26d. A step 52d is directly provided on the top of the gas tank 20d, adjacent to the outer rim of the supporting disc 48d. This rim has teeth 56, at least one of which can be bent into the range of the stop 52d to serve as a complementary stop, in order to limit the adjusting range of the gas throttling valve 37. Owing to the annular shape of the rocker lever part 26d, the point at which this part is supported is closer to the valve stem 23d. This results in more favorable force relations so that the supporting disc 48d is reliably urged against the top of the gas tank 20d. Besides, only the supporting disc 48d interengages with the teeth 46 of the vertically adjustable member 38 of the gas outlet valve. This supporting disc is not pivotally moved so that these teeth need be provided only in a short range and there is no need for a free play.

FIGS. 6 and 7 show an embodiment of a gas-fuelled lighter which comprises a drive member 57, which is connected by links 58 to the cover 1 and is displaceably displaced during the actuation of the lighter. The drive member 57 has a projecting part 58 secured therewith, which is formed at its end with a nose 27e, which serves as an actuating member for the rocker lever 26e. This nose acts from above on the rim of the circular rocker lever 26e so that the latter bears on the projection of the gas tank 20 at a point between this rim and the point at which the lever 26e engages the stop shoulder 25 of the liftable valve stem 23. In order to adjust the height of the flame, it is possible, e.g., to provide for an adjustment of the projecting part 58 relative to the drive member 57 so that the relative position of the rocker lever 26e and the nose 27e acting on it can be varied.

In the embodiment shown in FIGS. 8 and 9, the actuating member 27f acts also from above on the bulged, disc-like rocker lever 26f, which is provided with apertures. In this case, however, different means are provided for adjusting the flame. For this purpose, the valve stem 23f provided with the stop shoulder 25f has a square cross-section. The valve stem 23f is mounted in a fitting guide of the vertically adjustable member 38f of the gas outlet valve so that these two parts are connected for joint rotation. Similar means are provided to connect the rocker lever 26f to the valve stem 23f for joint rotation while allowing for the free play required for the pivotal movement of the rocker lever. The rocker lever 26f has peripheral teeth 47f. The actuation of the lighter causes a step of the actuation member 23f teeth 47f so that the rocker lever 26f with it the vertically adjustable member 38f are locked against rotation. When the rocker lever 26f is locked, the gas tank 20f can be rotated in the lighter housing through a corresponding angle in order to adjust just the valve 37f, which is provided in this case with a wick 62 force-fitted in a rubber disc.

As is apparent, all illustrative embodiments which have been shown have the common feature that the rocker lever, which is permanently connected to the gas tank, is substantially of circular outline in plan view and is centrally held on the valve stem so that the rocker lever will automatically enter the range of action of the actuating member provided on the lighter housing when the gas tank is inserted into the latter. It will be understood that insignificant deviations of the rocker lever from a circular or rotation-symmetrical shape, e.g., any polygonal configurations, are also within the scope of the invention.

What I claim is:

1. A gas-fuelled lighter, which comprises a lighter housing, a gas tank removably supported in said housing, a gas outlet valve means on said tank, said gas outlet valve means comprising a valve member and a valve stem connected to said valve member and axially movably mounted in said tank to move said valve member between open and closed positions, said valve stem including a stop shoulder, said lighter further comprising biasing means urging said valve member to said closed position, a rocker lever permanently mounted on said gas tank, said rocker lever being substantially of circular outline and having a central opening receiving said valve stem, said lever being engageable with said stop shoulder in the direction of movement of said valve stem from said closed position to said open position of said valve member, a fulcrum for said rocker lever, and actuating means movably carried by said housing and adapted to cooperate with said rocker lever and operable to urge said lever against said shoulder to move said valve member to said open position, said actuating means and said stem being movably relative to said fulcrum in the axial direction of said stem, said circular outline of the rocker lever enabling the same to be positioned in any angular orientation within the housing while maintaining the same relationship with the fulcrum and the stop shoulder.

2. A gas-fuelled lighter as set forth in claim 1, in which said rocker lever is a planar disc.

3. A gas-fuelled lighter as set forth in claim 1, in which said rocker lever comprises a first disc-like member resting on said fulcrum, and a second disc-like member resting freely on said first disc-like member and operable to urge said first disc-like member to said closed position.

4. A gas-fuelled lighter as set forth in claim 1, in which said fulcrum is constituted by an annular portion protruding upwardly from the top of said gas tank.

5. A gas-fuelled lighter as set forth in claim 1, which comprises a gas throttling valve communicating with said gas outlet valve means, said gas throttling valve comprising a throttling valve member which is movable to vary the rate of gas flow out of said gas outlet valve, said rocker lever being rotatably mounted relative to said gas tank and coupled to said throttling valve member.

6. A gas-fuelled lighter as set forth in claim 5, which comprises means connecting said rocker lever to said valve stem for joint rotation with a backlash enabling a pivotal movement of said rocker lever.

7. A gas-fuelled lighter as set forth in claim 5, in which said fulcrum is constituted by a disc resting on the top of said tank and including an annular supporting portion engaging said rocker lever, said disc being coupled to said throttling valve member for joint rotation.

8. A gas-fuelled lighter as set forth in claim 7, in which said rocker lever includes an annular portion spaced around said throttling valve member and supported by said annular supporting portion and connected to said disc for joint rotation.

9. A gas-fuelled lighter as set forth in claim 8, in which said disc is formed with a series of peripherally spaced openings and said rocker lever comprises a first
part forming said annular portion and carrying downwardly bent lugs at the inside periphery of said annular portion, said lugs engaging said openings, said rocker lever comprising a second part interposed between said first part and said stop shoulder and formed with said rim portion.

10. A gas-fuelled lighter as set forth in claim 1, which comprises a lighter cover mounted on and movable relative to said housing and two arms pivoted to said lighter cover; over center spring means operatively connected to said arms and urging them from a neutral position into either of two opposite extreme positions in which said cover is respectively open and closed, said actuating means comprising a nose carried by said arms; said rocker lever having an outer portion engageable by said nose.

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