

Jan. 27, 1953

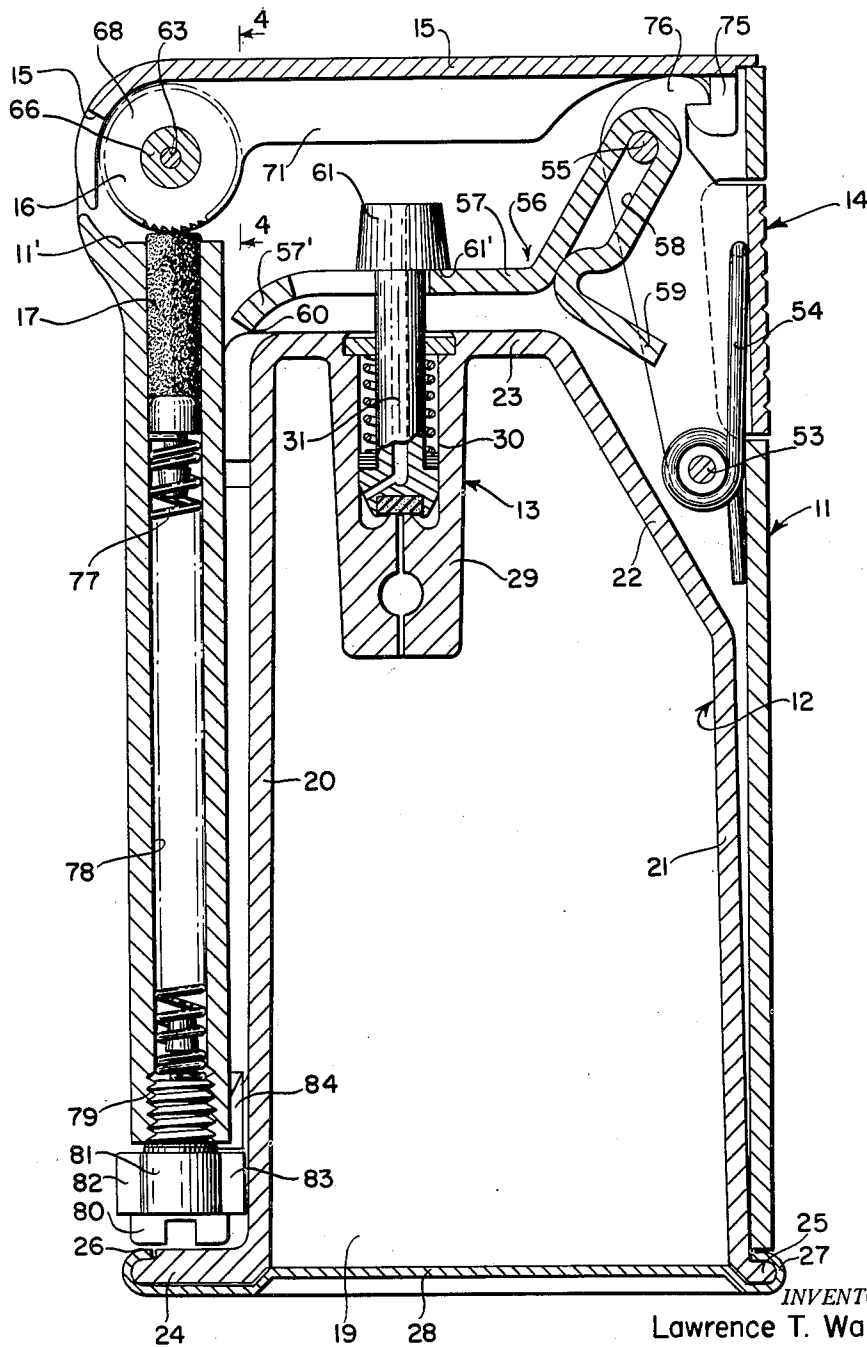
L. T. WARD
CIGARETTE LIGHTER

2,626,517

Filed March 10, 1951

3 Sheets-Sheet 1

FIG. 1



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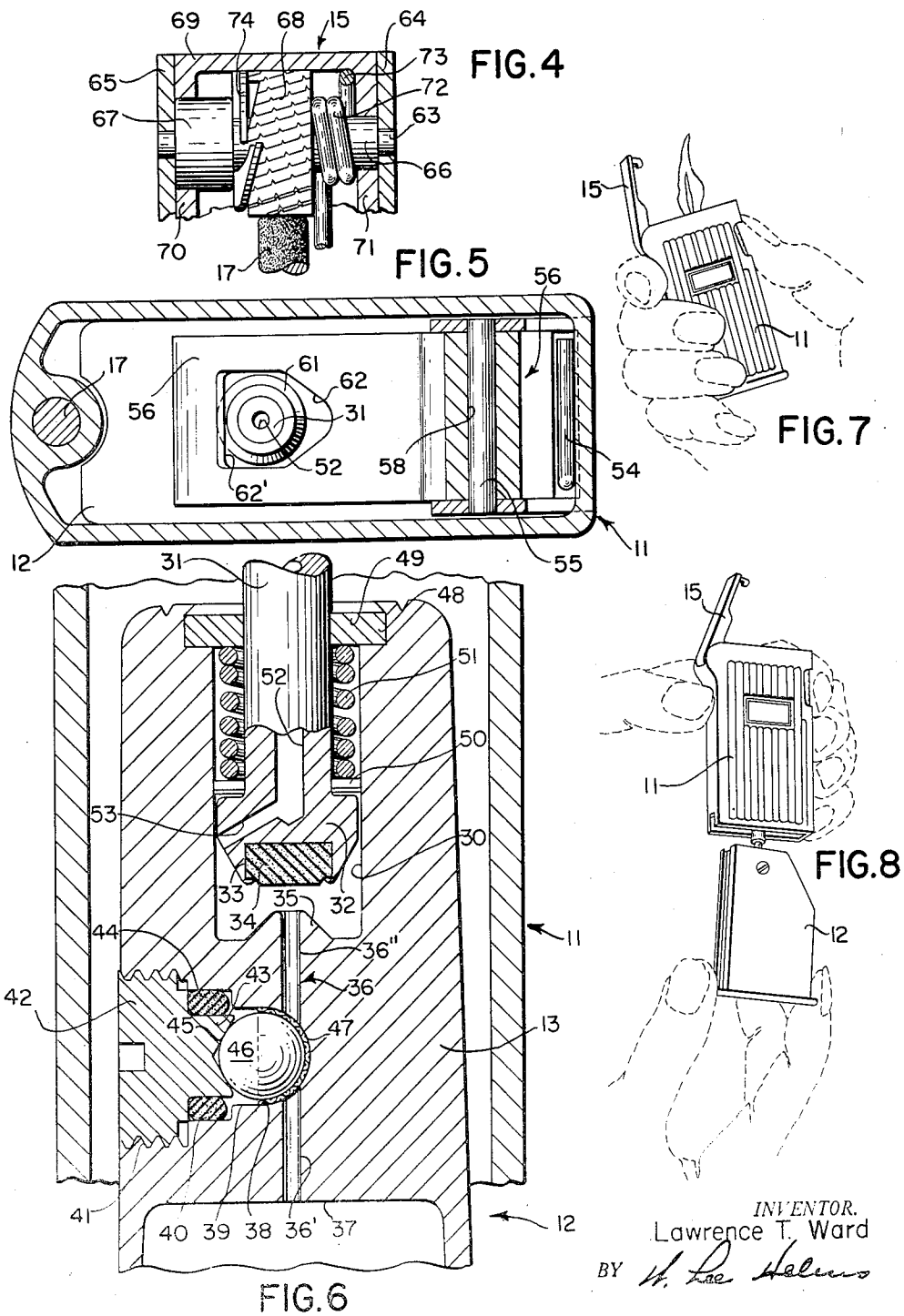
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CIGARETTE LIGHTER

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3 Claims. (Cl. 67-7.1)

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This invention relates to a cigarette lighter, and more particularly, to a lighter of the type having a replaceable tank for containing the fuel in the form of an inflammable hydrocarbon gas under pressure.

Lighters of this type are usually provided with a valve on the tank adapted to be actuated so as to release the inflammable gas, the latter then being ignited by means of a spark-emitting mechanism so as to provide a flame. In the prior art these gas lighters comprised an actuating member adapted to be pressed by the hand of the operator so as to actuate the valve and release the fuel gas and also a separate means for actuating the spark-emitting mechanism, the latter usually being in the form of a conventional thumb wheel for rotating a flint wheel against a flint. It was thus necessary to resort to the manual manipulation of two separate members in order to produce a flame. More specifically, the forefinger of the operator first pressed a member to actuate the valve and release the inflammable gas after which the thumb was employed to rotate the flint wheel and thereby ignite the discharging gas.

This necessity for actuating two separate and independent members in order to produce a flame has numerous disadvantages. Since exhaustion of the inflammable gas within the tank requires that the latter be replaced with a new tank at considerable expense, it will be obvious that it is of the utmost importance to prolong the useful life of the tank as long as possible before replacement becomes necessary. Of course, most smokers who use a gas type lighter do not take great care to operate the valve actuating member and the flint wheel simultaneously so that usually a time lag occurs between the instant the gas is emitted from the valve and the instant when this emitted gas is ignited by actuating the flint wheel. The gas emitted during this time lag interval is wasted and the useful life of the tank is thereby considerably reduced.

A further disadvantage of providing a separate means for actuating the valve independent of the means for emitting the spark resides in the obvious inconvenience and difficulty of operation of the lighter since it is somewhat awkward for the user to actuate the valve with one finger while rotating the flint wheel with another finger.

It is therefore a primary object of the present invention to eliminate the above-noted disadvantages of prior art gas lighters by means of a novel construction whereby the operation of a single

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actuating member causes the actuation of the valve simultaneously with the actuation of the spark-emitting mechanism. That is, by means of the present invention, a flame is instantly produced by pressing merely a single actuating member, thereby providing not only increased ease of operation but also eliminating wastage of gas which occurs in the prior art gas lighters wherein two independent actuating members must be manipulated to produce a flame.

Another disadvantage of the prior art lighters resides in the large finger pressure that must be exerted in order to rotate the conventional thumb wheel to which the flint wheel is attached. This disadvantage is obviated in the present invention since the energy for rotating the flint wheel is provided by and stored within a spring, the energy being released and the flint wheel rotated by a simple light pressure on the actuating member. This energy is manually supplied to the spring with relatively little effort by merely closing the lighter cover. Much less force is needed to close the lighter cover than is required to rotate a conventional thumb flint wheel since the cover has a torque arm many times larger than the radius of the usual thumb wheel.

A further advantage of the present invention resides in the lack of danger of accidental lighting should the lighter be dropped. This is due to the fact that release of the actuating member immediately extinguishes the flame, the latter continuing only so long as the actuating member is continually pressed, and it is highly improbable that the lighter could fall into a position where the actuating member might be continuously depressed.

Another object of the present invention is to provide a novel economical structure for the valve actuating mechanism which enables the tank to be quickly and easily inserted into or removed from the outer case. Furthermore, the flint assembly is so constructed as to provide a simple effective locking mechanism for retaining the tank in assembled position within the outer case.

The prior art gas lighters have another serious defect which is eliminated by the present invention. It will be obvious that as the inflammable fuel gas within the tank continues to be discharged, the gas pressure within the tank will be lowered in proportion to the amount of gas used up. Since the rate of discharge of the gas through the valve is proportionate to the gas pressure within the tank, it will be seen that the flame produced by the lighter will continue to become smaller and weaker as the gas within

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the tank continues to be exhausted. In the present invention a novel means is provided for adjustably varying the velocity of the gas through the valve and hence the size and strength of the flame. That is, when the gas pressure within the tank gets low this novel means may be adjusted so as to produce a large strong flame notwithstanding the low gas pressure.

Other advantages of the invention are inherent in the structure as claimed and disclosed in the specification and in the drawings wherein:

Figure 1 is a vertical sectional view of a cigarette lighter embodying the present invention, the parts being shown in normal relation before actuation;

Figure 2 is a vertical sectional view of the upper portion of the lighter with the parts shown in the positions they assume after the lighter has been actuated and while the flame continues;

Figure 3 is a view similar to Figure 2 but showing the relative positions of the parts as the tank is inserted into the case;

Figure 4 is a vertical sectional view taken along line 4—4 of Figure 1;

Figure 5 is a horizontal sectional view taken on the line 5—5 of Figure 3;

Figure 6 is a vertical sectional view through the valve assembly and taken substantially on the line 6—6 of Figure 1;

Figure 7 is a perspective view showing the manner of manually holding and manipulating the lighter so as to produce a flame, and

Figure 8 is a perspective view showing the manner of inserting or removing the tank with respect to the case.

Referring now to the drawing, the cigarette lighter comprises generally an outer case 11, a gas tank 1 within the case 11 and provided with a valve assembly indicated generally at 13, an actuating member 14 for actuating the valve assembly 13 when depressed, a cover plate 15 pivoted to the top of the case 11, and a spark-emitting mechanism comprising a flint wheel 16 and a flint 17.

In more detail, the tank 12 is preferably in the form of a casting having a pair of side walls 18, 19 and end walls 20, 21, 22 integral with a top wall 23. The lower edges of the walls 20, 21 are provided with horizontal flanges 24, 25 around which extend the upturned edges 26, 27 of a bottom plate 28.

The top wall 23 of the tank 12 is provided with a downwardly depending lug portion 29 which serves as a housing for the valve assembly 13. The lug portion 29 is provided with a vertically extending recess 30 of substantially cylindrical form within which a valve stem 31 is slidably mounted for vertical movement. As best seen in Figure 6, the lower end of the valve stem 31 has an enlarged head portion 32, the latter having a cylindrical exterior surface slidably engaging the interior wall surface of the recess 30. The lower end of the head portion 32 is provided with a recess 33 having mounted therein a valve seat member 34 formed of resilient material such as neoprene. The bottom of the recess 30 is provided with an upstanding projecting portion 35. A channel 36 of relatively small diameter extends vertically from the top surface of the projecting portion 35 down to the bottom wall 37 where it communicates with the interior of the tank 12.

The lug portion 13 is further provided with a substantially semi-spherical concave recess 38 which extends across and communicates with

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the vertical channel 36. As shown in Figure 6, the right-hand end of the semi-spherical recess 38 extends slightly to the right of the right-hand wall of the channel 36. The left-hand end of the semi-spherical recess 38 leads into a cylindrical recess 39 of substantially equal diameter as the recess 38. The recess 39 in turn communicates with a somewhat larger cylindrical opening 40 which in turn communicates with an internally threaded aperture 41 leading to the exterior wall surface of the tank 12. A screw 42 is threadedly engaged within the threaded aperture 41 and is provided at its inner end with a reduced shank portion 43. A resilient sealing washer 44 is mounted within the annular space between the reduced shank portion 43 and the cylindrical recess 40.

The inner end of the reduced shank portion 43 is provided with a recessed conical shape as at 45 so as to receive and abut against a spherical ball 46 extending within the semi-spherical recess 38. A sheet of mesh material, such as a metal or fiber cloth or screen 47 is compressed against the surface of the concave recess 38 by the ball 46.

It will be seen that the lower portion 36' of the channel 36 communicates at its lower end with the interior end of the tank 12 and at its upper end with the space between the ball 46 and the surface of the concave recess 38, the ball 46 being held spaced from said surface of the recess 38 by the mesh screen 47. The upper portion 36'' of the channel 36 communicates at its lower end with said space between the ball 36 and surface of the recess 38 and at its upper end with the interior of the recess 30. It will thus be seen that as the gas is discharged from the interior of the tank 12 it flows upwardly through channel portion 36', through the space between the ball 46 and the surface of recess 38 and then upwardly through the channel portion 36'' into the recess 30.

The relatively narrow space between the ball 46 and the surface of recess 38 acts as a constriction throttling the flow of discharging gas. The rate of discharge of the gas may be varied by changing the size of this constriction; that is, by varying the space between the ball 46 and the surface of recess 38. This space may be varied by rotating the pressure adjusting screw 42 so as to exert more or less pressure on the ball 46 tending to move the latter toward or away from the surface of the recess 38.

The upper end of the recess 30 is enlarged at 48 so as to receive a washer 49 which is secured therein. The lower portion of the valve stem 31 is provided with one or more washers 50 which have outer peripheries in slidably sealing engagement with the interior wall surface of recess 30. A coil spring 51 extends around the valve stem 31, the upper end of the spring 51 abutting against washer 49 and its lower end abutting against washer 50. The spring 51 is under compression and tends to urge the valve stem 31 downwardly so as to maintain the valve seat member 34 in abutment with the top of the projection 35, thereby sealing off the upper end of the channel 36 as shown in Figure 1.

The valve stem 31 is provided with an axial longitudinally-extending channel 52 communicating with the atmosphere at its upper discharge end. The lower end of the channel 52 communicates with an angularly extending channel 53 which in turn communicates with the interior of the recess 30. It will thus be seen that when the valve stem 21 is in the raised position shown in

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Figure 6, gas may flow upwardly through the channel 36, into the recess 39, through the channel 53, and then upwardly through the channel 52 of valve stem 31.

Referring now to Figure 1, the actuating member 14 is in the form of a lever having a lower end pivotally mounted to the case 11 at 53. A spring 54 biases the actuating member 14 about the pivot point 53 in a clockwise direction as viewed in Figure 1, thereby normally maintaining the actuating member 14 in the position shown in Figure 1. The upper end of the actuating member 14 has secured thereto a pin 55 to which a valve lifting lever 56 is slidably and pivotally mounted. The lever 56 is preferably formed of a single integral member having a horizontal portion 57 with a downwardly turned portion 57' at one end, the opposite end being bent so as to form a longitudinal slot 58 receiving the pin 55 and a projecting portion 59.

The down-turned end portion 57' of the lever 56 engages the top of the tank 12, as at 69, so as to form a fulcrum contact therewith. That is, the lever 56 may pivot upwardly or counter-clockwise about the contact point 69. The upper end of the valve stem has affixed thereto an enlarged annular cap 61 providing a shoulder portion 61' adapted to coact with the lever 56. The latter is provided with an opening 62 (see Figure 5) somewhat larger than the diameter of the cap 61. In the assembled position shown in Figure 1, the lower shoulder surface 61' of the cap 61 abuts against the lever 56 adjacent the marginal edge of the opening 62. Referring now to Figure 2, it will be seen that when the connecting member 14 is depressed to the left or pivoted counter-clockwise, the lever 56 will be fulcrumed upwardly or counter-clockwise about the fulcrum point 69 on the tank 12, thereby causing the lever 56 to push upwardly against the shoulder portion 62 of the cap 61 and thereby move the valve stem 31 upwardly with respect to the tank 12 so as to cause the valve assembly 13 to assume the open position shown in Figure 6.

The outer case 11 is substantially in the form of a rectangular container open at both the top and bottom. As best seen in Figure 4, a pin 63 is mounted at its opposite ends in the spaced parallel side walls 64, 65 of the case 11 and extends therebetween. A cylindrical sleeve 66 is rotatably mounted on the pin 63 and is provided with an enlarged cylindrical portion 67 abutting against the interior surface of the side wall 65. A flint wheel 68 is rotatably mounted on the sleeve 66.

The cover, indicated generally at 15 is of substantially U-shape in cross section and has a horizontal section 69 formed integral with vertical sections 70, 71. The latter are suitably apertured so as to receive the enlarged portion 67 and the sleeve 66 respectively. As shown in Figure 1, the pin 63, sleeve 66 and flint wheel 68 are mounted at the upper left-hand end of the case 11 and the cover 15, when in a horizontal position, extends across the open upper end of the case 11 so as to close said end. When the cover 15 is pivoted upwardly or counter-clockwise about the axis of the pin 63 the upper end of the case 11 will be exposed so as to allow the flame from the valve assembly to project upwardly therefrom.

A spring 72 is coiled about the sleeve 66 and has one end (not shown) abutting against the case 11 and the opposite end 73 abutting against the under surface of the horizontal section 69 of the cover 15 so as to bias the latter about the axis of the pin 63 in an upward or counter-clockwise di-

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rection as viewed in Figure 1. The spring also abuts against the inner surface of the vertical section 71 and the right-hand face of the flint wheel 68 so as to hold the flint wheel 68 against lateral sliding movement on the sleeve 66. The left-hand face of the flint wheel 68 is provided with conventional ratchet teeth adapted to be engaged by a conventional ratchet pawl washer 74.

As shown in Figure 1, the right-hand end of the cover 15 has secured thereto a locking means in the form of a downwardly-dependent detent or hook 75. The upper end of the actuating member 14 is provided with a locking means in the form of a detent 76 engageable with the detent 75 so as to maintain the cover 15 in the normal horizontal closed position shown in Figure 1. When the actuating member 14 is depressed or pushed inwardly so as to pivot counter-clockwise about the pivot point 53, the locking detent 76 will be disengaged from the detent 75, thereby allowing the spring 73 to pivot the cover 15 upwardly to the position shown in Figure 2. The upward or counter-clockwise movement of the cover 15 is stopped when a shoulder portion 15' of the latter abuts against the portion 11' of the case 11.

During this upward movement of the cover 15 the ratchet pawl washer 74 will be rotated counter-clockwise since the washer 74 is non-rotatably engaged with the undersurface of the horizontal section 69 of the cover 15. During this counter-clockwise movement of the washer 74, it will drivingly engage the ratchet teeth of the flint wheel 68 so as to rotate the latter about the sleeve 66 thereby causing sparks to be emitted from the flint 17 toward the fuel gas being ejected from the upper discharge end of the axial channel 52 of the valve stem 31. After the cigarette has been lit and the actuating member 14 has been released so as to extinguish the flame, the cover 15 is then manually moved by the forefinger back to the horizontal position at which point the locking detents 75, 76 will be mutually engaged so as to maintain the cover 15 in the closed position. During this closing movement of the cover 15 the ratchet pawl washer 74 will be rotated in a clockwise direction along with the cover 15 but the flint wheel 68 will not be rotated since the washer 74 in this direction of rotation will merely ratchet past the ratchet teeth on the wheel 68. The frictional effect of the spring 72 abutting against the right-hand face of the flint wheel 68 also serves to hold the latter against rotation during the closing movement of the cover 15.

The flint 17 is resilient pressed against the flint wheel 16 by means of a conventional flint spring device 77 mounted within a vertical channel 78 formed in the case 11. The lower end of the channel 78 is threaded as at 79 to receive the flint screw 80 which abuts against the lower end of the flint spring 77. As heretofore described this flint mounting arrangement is conventional.

A tank lock member 81 is rotatably mounted on the flint screw 80 and is provided with radially extending projections 82, 83. A lug 84 is secured to the exterior surface of the wall 20 of tank 12. When the tank 12 is in proper assembled relation within the case 11 and the lock member 81 is manually rotated to a locking position, the lug 84 will be immediately above and in abutting engagement with one of the projections 82, 83 on the lock member 81, thereby holding the tank 12 within the case 11 and prevent-

ing accidental removal thereof. When it is necessary to remove the tank 12 for replacing, the lock member 81 is merely rotated to the unlocking position whereby neither of the projections 82, 83 will be in engagement with the lug 84 so as to allow the tank 12 to be quickly and easily withdrawn from the bottom of the case 11 in the manner shown in Figure 8.

The insertion of the tank 12 into the case 11 is accomplished with equal facility. As shown in Figure 3 before the tank 12 is placed within the case 11 the lever 56 hangs downwardly from the pin 55 in a position whereby the tapered exterior surface of the valve stem cap 61 will initially engage the left-hand marginal edge 62' of the recess 62 as the tank 12 is moved upwardly toward the assembled position. Continued upward movement of the tank 12 causes the cap 61 to slide or ratchet past the edge 62' until when the assembled position is reached the valve stem 31 will project upwardly through the opening 62 with the shoulder portion 61' of the cap 61 abutting against the lever 56 adjacent the right-hand marginal edge of the opening 62, as shown in Figure 1. The down-turned end portion 57 of the lever 56 will then be in engagement with the top of the tank 12 at the fulcrum point 60. The tank lock member 81 is then rotated so as to bring either of the projections 82, 83 in engagement with the lower surface of the lug 84 on the tank wall 20, thereby rendering the tank 12 locked in assembled relation within the case 11.

The operation of the lighter will now be briefly summarized. Referring to Figure 7, the lighter is preferably grasped by the hand in the manner shown with the thumb resting against the actuating member 14. The thumb then depresses actuating member 14 inwardly so as to pivot it about the pivot point 53, thereby causing lever 56 to pivot upwardly about the fulcrum point 60 on the tank 12. As shown in Figure 2, this causes the lever 56 to press upwardly against the shoulder portion 61' of the valve stem cap 61, thereby moving the valve stem 31 upwardly and causing the valve seat member 34 to uncover the upper discharge end of the channel 36. This allows the fuel gas within the tank 12, preferably a hydrocarbon such as butane, to flow upwardly through channel 36, into the recess 30, through the axial opening 52 of the valve stem 31, and into the atmosphere at the upper discharge end of the valve stem 31.

While the valve assembly 13 has been actuated in the manner described above, the depression of the actuating member 14 by the thumb has also served to disengage locking detent 76 from the locking detent 75 on the cover 15, thereby allowing spring 72 to pivot the cover 15 upwardly about the axis of the pin 63. During this upward pivotal movement of the cover 15 the ratchet pawl washer 74 will be rotated therewith so as to rotate the flint wheel 68 across the top surface of the flint 17, thereby directing a shower of sparks toward the fuel gas being emitted from the upper discharge end of the valve stem 31.

The emitted gas is thus ignited so as to produce a flame projecting upwardly from the upper open end of the case 11, as shown in Figure 7. When the cigarette has been ignited and the flame is no longer desired, the operator merely releases the thumb pressure on the actuating member 14, thereby allowing the spring 54 to pivot the actuating member 14 back to the initial position shown in Figure 1, at which position the

valve assembly 13 will be closed as a result of the coil spring 51 moving the valve stem 31 downwardly so as to seal off the upper end of the channel 36. The forefinger of the operator may then be employed to pivot the cover 15 downwardly back to the closed position.

It will be noted that it requires little force to pivot the cover 15 back to the closed position in view of the relatively long torque arm provided by the length of the cover. In other words, the energy stored in the spring 72 for actuating the flint wheel 68 is supplied by exerting a relatively small force through a large distance, rather than exerting a relatively large force through a small distance as is the case with conventional thumb wheel arrangements for rotating the flint wheel.

The proper timing of the spark emission with respect to the fuel gas emission is automatically assured by the mechanism of the present invention and human error is no longer a factor producing waste of fuel gas due to improper timing. It will also be obvious that the use of the single actuating member 14 for simultaneously effecting both the spark emission and the fuel gas emission renders the operation of the lighter more convenient and simple than is the case with conventional gas lighters which require the user to press a gas discharge member with one finger and a thumb flint wheel with another finger.

The means for restricting the flow of the gas fuel through the channels 36 comprising the ball 46, mesh screen 47 and adjusting screw 42, in addition to providing the function of increasing the strength and height of the flame as the gas pressure within the tank 12 is lowered due to discharge of the gas, also serves to vary the flow of gas through the channel 36 so as to accommodate varying gas pressures within the tank 12 due to temperature variations of climate or geography. Furthermore, by adjusting the screw 42, the size of the flame may be varied as desired to suit the needs of the individual smoker. For example, pipe smokers would normally require a larger size flame than those who intend to use the lighter for cigarettes.

It is to be understood that the specific embodiment shown in the drawings and described above is merely illustrative of one of the many forms which the invention may take in practice, many variations and modifications thereof being readily apparent to those skilled in the art. The scope of the invention is delineated in the appended claims.

I claim:

1. A cigarette lighter comprising a casing having longitudinal and transverse side walls, a top plate pivoted at one end and adapted to co-act with igniting means, said top plate being further adapted to close the top of said casing, an inner rectangular fuel tank detachably held within said casing and containing gaseous fuel under pressure, a burner valve disposed in the top of the tank and having a bored plunger valve stem, a burner head on said valve, a finger depressible element disposed in a side wall and having means to engage the top plate in closed position, a lever pivotally secured to the finger element and fulcrumed at its opposite end on said tank, said lever element having a centrally disposed aperture therein for engaging said burner head.

2. A cigarette lighter comprising a casing having longitudinal and transverse side walls, a top closure plate pivoted at one end and adapted to co-act with igniting means including a flint, said top plate being further adapted to close the top

of said casing, an inner fuel tank having an interiorly disposed plug having a bore hole therein, said tank being detachably held within said casing and containing gaseous fuel under pressure, a burner valve, including a burner head, disposed in said plug and having a bore stem terminating in an enlarged base, said plug having a passage communicating between said bore and the interior of the tank, a finger depressable element having closure means to engage the top plate in closed position, a lever pivotally secured to the finger element at one end and fulcrumed to said tank at the opposite end, said lever element having a central aperture therein for engaging said burner head, a flint wheel disposed adjacent said burner valve and adapted to engage said flint upon rotation of the closure plate, an axle for said flint wheel journaled into opposed longitudinal walls of the casing, a spring disposed about said axle and adapted to rotatably urge the top plate upward, and closure means on said top cover plate for engaging the closure means of said finger depressible element.

3. A cigarette lighter comprising a casing having longitudinal and transverse side walls, a top closure plate pivoted at one end and adapted to co-act with igniting means including a flint, said top plate being further adapted to close the top of said casing, an inner fuel tank having an interiorly disposed plug having a bore hole therein, said tank being detachably held within said casing and containing gaseous fuel under pressure, a burner valve, including a burner head, disposed in said plug and having a bore stem terminating in an enlarged base, said plug having a passage communicating between said bore and the interior

of the tank, a finger depressible element having closure means to engage the top plate in closed position, a lever pivotally secured to the finger element at one end and fulcrumed to said tank at the opposite end, said lever element having a central aperture therein for engaging said burner head, a flint wheel disposed adjacent said burner valve and adapted to engage said flint upon rotation of the closure plate, an axle for said flint wheel journaled into opposed longitudinal walls of the casing, a spring disposed about said axle and adapted to rotatably urge the top plate upward, closure means on said top cover plate for engaging the closure means of said finger depressible element, and a ratchet-washer disposed on said axle and adapted to engage the flint wheel to effect counter-clockwise rotation when the top closure plate is raised by the action of the spring disposed about the axle.

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