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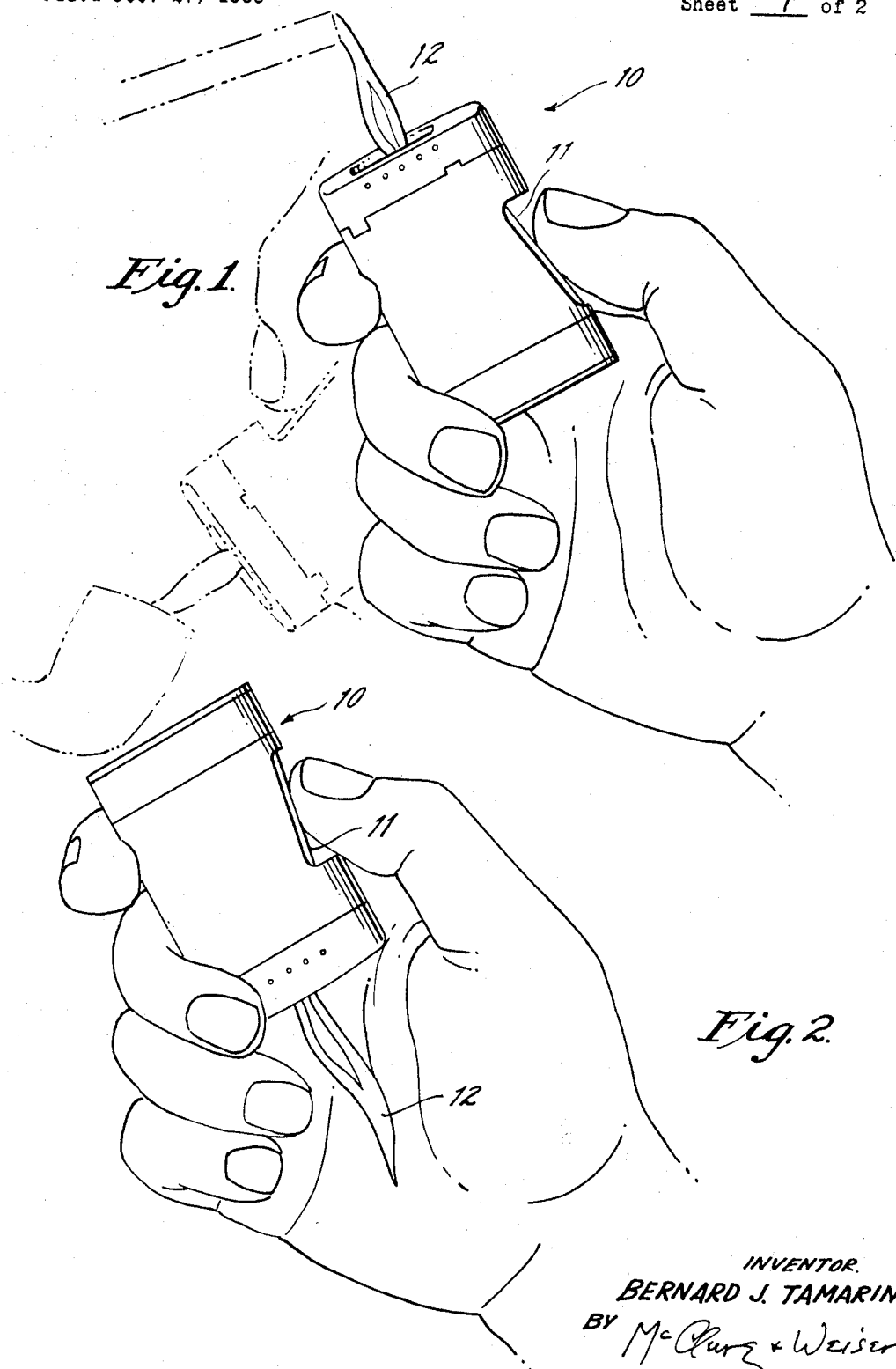
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LIGHTER WITH GRAVITY ORIENTED SAFETY MECHANISM

Filed Dec. 27, 1966

Sheet 1 of 2



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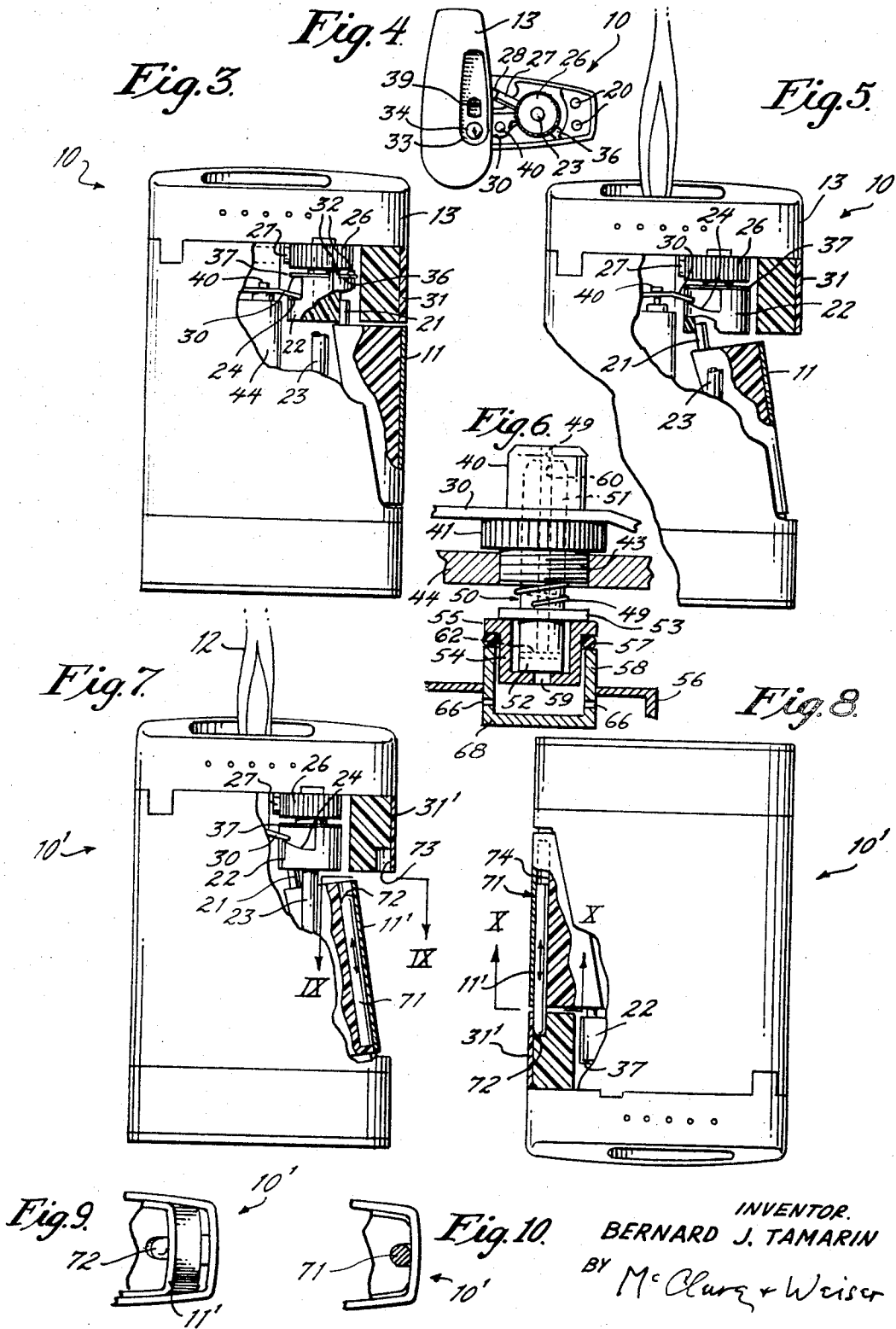
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**LIGHTER WITH GRAVITY ORIENTED
 SAFETY MECHANISM**

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14 Claims

ABSTRACT OF THE DISCLOSURE

A portable lighter is provided with safety means to prevent the person holding it from lighting it inverted instead of upright. The safety means includes an object subject to gravity-induced change in location along a path of constraint between positions in which the actuating trigger for the spark means and/or fuel valve means is free to operate and alternatively is blocked from operating.

This invention relates to a hand-held lighter for cigarettes, cigars, pipes or the like, especially such a lighter provided with safety means to preclude lighting thereof in an inverted position. In a preferred embodiment, the fuel valve-actuating and spark-actuating trigger of the lighter accommodates a gravity-urged safety device that is located free of abutting fixed parts of the lighter when the lighter is upright but that engages such an abutting fixed part when the lighter is inverted, thereby preventing the fuel from being released and lit in that position.

Hand-held lighters have various types of triggers, usually pivoted at one end and leaving the other end manually depressible, as by the holder's thumb. The depressible end, although preferably located nearer the top than the bottom of the lighter, often may be depressed with the lighter in an inverted position as well as when upright. Lighting when inverted presents an obvious safety hazard of burning the holder's hand and possibly further damage or injury.

A primary object of the present invention is provision of a hand-held lighter that will not light when in an inverted position.

Another object is provision of such a lighter that will remain lighted in an inverted position if lit before being inverted.

A further object is provision of such a safety lighter in which the safety action is accomplished through gravity.

Other objects of the present invention, together with means and methods for attaining the various objects, will be apparent from the following description and the accompanying diagrams.

FIG. 1 is a side elevation of a hand-held lighter lit in an upright position and, in phantom, inverted as to light a pipe;

FIG. 2 is a side elevation of a hand-held lighter lit in a similar position to that of the preceding view but inverted;

FIG. 3 is a side elevation, partly in section, of a conventional lighter; and

FIG. 4 is a plan, on a reduced scale, of the lighter shown previously, with the top pivoted aside;

FIG. 5 is a side elevation, partly in section, and otherwise similar to that of FIG. 3 but with the trigger depressed; and

FIG. 6 is a side elevation, on an enlarged scale and partly in section, of valve mechanism of the same lighter.

FIG. 7 is a side elevation, partly in section and otherwise

similar to FIG. 5, of a lighter according to this invention;

FIG. 8 is a side elevation, partly in section, of the lighter of FIG. 7 in an inverted position;

FIG. 9 is a fragmentary sectional plan taken at IX—IX on FIG. 7; and

FIG. 10 is a fragmentary sectional plan taken at X—X on FIG. 8.

In general, the objects of the present invention are accomplished, in a hand-held lighter, by providing the spark-actuating and/or fuel valve-actuating trigger thereof with safety means movable to and from a plurality of rest positions including a first rest position occupied thereby when the lighter is upright and a second rest position occupied thereby when the lighter is inverted, the safety means engaging both the lighter body and the trigger in the inverted position so as to prevent movement of the trigger to actuate the spark means and/or valve means in that position of the lighter, the safety means being disengaged in the upright position of the lighter so as to permit actuating movement of the trigger. A preferred embodiment of safety means is shown and described by way of example rather than limitation.

FIG. 1 shows lighter 10 held by hand with trigger 11 depressed by the holder's thumb to produce flame 12 at the top thereof. Shown in phantom in the same view is the lighter tipped to an inverted position, as to light a pipe (shown fragmentarily in phantom). FIG. 2 shows the same lighter lighted in an inverted position, as might occur if the user does not examine the lighter before depressing the trigger. The likely resultant hand injury is obvious.

FIG. 3 shows lighter 10 in side elevation and partly sectioned away to show the interior at a level below windscreen 13, which is pivotally mounted at the top of the lighter. Trigger 11, which is pivotally mounted (at a concealed location) near the base of the lighter is shown in undepressed position, with its exterior surface flush with that of abutting portion 31 of the lighter body. Projecting upward from the top interior end of the trigger is detent 21, which engages a slot in cam wheel 22 (shown partly cut away), which is mounted for rotation on vertical axle 23 (also partly cut away). At the left, cam surface 24 of the cam wheel engages strip-like valve lifter 30. Mounted for rotation about axle 23 is serrated striking wheel 26, which engages cylindrical flint 27 extending from the left. The striking wheel is not affixed to the axle but is keyed by key 26 on plate 37 affixed to the striking wheel and resting between pair of ears 32 upstanding from the peripheral edge of cam wheel 22, whereupon the striking wheel may be removed readily for replacement at the top of the lighter.

FIG. 4 shows lighter 10 from the top, with wind-screen 13, which is retained pivotally by screw 34, pivoted aside as for replacement of flint 27, seen in channel 28 and abutting serrated striking wheel 26. Pair of spare flints 20 are visible in suitable recesses at the right of the top. Recess 33, which accommodates the head of screw 34 in the top of the windscreen has aperture 39 therethrough to let the flame through when the windscreen is in place over the top of the lighter body, in which position the flame aperture is located directly over apertured valve-jet cap 40 affixed to strip-like valve lifter 30. When trigger 11 is depressed, as shown in FIG. 5, which shows the valve lifter raised at its end engaging cam surface 24 of cam wheel 22, the fuel valve is opened accordingly.

FIG. 6 shows, in side elevation and partly in section, the fuel valve means and closely related parts. Underlying centrally apertured valve-jet cap 40 and attached strip-like valve lifter 30 is jet-retaining means comprising serrated intermediate surface 41 and, thereunder, threaded lower end 43 screwed into the top of fixed tank housing

44. Underlying that lower end and about upper stem 51 of valve jet 50 is compression spring 49, which bears at its lower end against jet collar 53, thereby biasing the valve jet in the downward direction. The upper stem of the jet extends upward through the aforementioned elements (where it is shown in broken lines) and terminates within the apertured cap. Lower stem 52 of the valve jet extends downward into cup 54, which has top flange 55 underlying jet collar 53 and resting on resilient O-ring 57 on the top edge of inlet 58 to fuel tank 56. The cup has aperture 59 through the center of its base portion, which is closed off by the bottom of the lower stem in the illustrated position. Jet bore 60 extends axially from the top of upper stem 51, in line with aperture 49 in cap 40 to intersection with transverse bore 62 near the bottom of lower stem 52. Inlet baffle plate 68 terminates the cylindrical inlet to the fuel tank inside, with passages 66 therebetween for flow of fuel therethrough.

It will be apparent that depression of trigger 11 pivots cam wheel 22 by means of detent 21, thereby raising strip-like valve lifter 30, which raises attached cap 40, thereby permitting valve jet 50 to rise, whereupon fuel issues through aperture 59 in the cup and passes into transverse bore 62 and then axial bore 60 in the valve jet. The fuel issues through aperture 41 in cap 40, where it begins to burn. Rotation of the cam wheel also rotates adjacent striking wheel 26, by means of key 36, against flint 27, thereby striking sparks to light the fuel as it begins to issue. It will be understood that the fuel issues in gaseous form, although it may be stored in the fuel tank under sufficient pressure to keep it liquid until released. Examples of suitable fuels are propane and butane.

It will also be apparent that lighter 10 will light in an inverted position as well as in an upright position. According to this invention, however, as shown in the remaining views, similar lighter 10' is modified to eliminate that undesirable characteristic. Modified parts similar to those of lighter 10 are designated by corresponding numbers with primes added. The modification comprises long and short longitudinal bores 74 and 73 in trigger 11' and fixed abutting portion 31' of the lighter body, respectively, being aligned in the undepressed position of the trigger. Pin 71, which has rounded top end 72, rests entirely within bore 74 in the trigger when the lighter is in an upright position, whether undepressed or depressed, as shown in elevation in FIG. 7 and in sectional plan in FIG. 9. When the lighter is inverted with the trigger undepressed, as shown in elevation in FIG. 8 and in sectional plan in FIG. 10, the pin slides under the influence of gravity partway into the shorter bore in the fixed abutting portion of the lighter body, thereby precluding depression of the trigger in that position. Of course, unless the trigger can be depressed, no fuel can be released and no spark produced. When the lighter is returned to an upright position, the pin slides back into the longer bore in the trigger itself, free of the bore in the fixed abutting body portion, whereupon the trigger can be depressed again.

Lighter 10' of this invention can be used in inverted position as well as lighter 10, such as to light a pipe as shown in FIG. 1. The holder of the lighter need simply light the lighter by depressing the trigger before inverting the lighter. This is what most users would normally do, so there is little or no necessity for anyone to discard an old habit pattern or to learn a new one, except those few persons who tend to invert the lighter before lighting it. A careless user who might undertake to light the lighter in an inverted position, perhaps not having checked the position originally, would be prevented from doing so and thereby protected from being burned by the lighter of this invention.

The claimed invention:

1. In a hand-held lighter having a body, an internal fuel supply, valve means for releasing fuel for burning, spark means for igniting the released fuel, and trigger

means supported on but movable with respect to the body for actuating the valve means and spark means upon movement of the trigger, the improvement comprising safety means responsive to the orientation of the lighter and operatively interconnected with the trigger, the safety means being movable to and from a plurality of rest positions including a first rest position occupied thereby when the lighter is upright and a second rest position occupied thereby when the lighter is inverted, the safety means engaging both the lighter body and the trigger in the inverted position so as to prevent actuating movement of the trigger in that position of the lighter, the safety means normally being disengaged in non-inverted positions of the lighter so as to permit actuating movement of the trigger.

2. The apparatus improvement of claim 1 wherein the trigger is pivotally supported at one end by the body, the other end of the trigger being manually depressible toward the interior of the body.

3. The apparatus improvement of claim 2 wherein the depressible end of the trigger abuts part of the body, and both that end of the trigger and that abutting part of the body are bored internally, their respective bores aligning with another when the trigger is in an undepressed position and misaligning when the trigger is in a depressed position, and wherein the safety means comprises a safety device fitting movably within either bore and having a rest position such that it is located partially within each bore when the trigger is in an undepressed position and the lighter is inverted, depression of the trigger being precluded by such engagement of both the body and the trigger by the safety device when in that rest position.

4. The apparatus improvement of claim 3 wherein the safety device is positioned by gravity.

5. The apparatus improvement of claim 3 wherein the safety device consists essentially of a solid cylinder.

6. In a hand-operated lighter having a depressible valve-actuating trigger pivotally supported at one end, the improvement comprising a safety device normally located within a hollow in the trigger when the lighter is in an upright position and adapted to protrude partially therefrom into engagement with an abutting fixed portion of the lighter when in an inverted position such that the trigger cannot then be depressed.

7. The apparatus improvement of claim 6 wherein the pivotally supported end of the trigger is located below the depressible end when the lighter is upright.

8. The apparatus improvement of claim 6 wherein the abutting fixed portion of the lighter is recessed to receive the protruding part of the safety device in the inverted position.

9. The apparatus improvement of claim 6 wherein the safety device is a metal pin.

10. The apparatus improvement of claim 9 wherein the trigger is hollowed by a bore within which the entire length of the pin fits slidably, and the abutting fixed portion of the lighter has a bore aligned therewith when the trigger is in the undepressed position within which the pin fits slidably but only for part of its length.

11. In a portable lighter having a body and a depressible trigger mounted relative thereto for actuating means from the class consisting of spark means and fuel valve means, the improvement comprising a safety device for preventing movement of the trigger to actuate such means when the lighter is in inverted position, comprising an object susceptible of gravity-induced change in location upon change in orientation of the lighter between upright and inverted positions when the trigger is undepressed, the location occupied by the object when the lighter is in inverted position with the trigger undepressed effectively blocking any attempted depression of the trigger, and the location of the object when the lighter is in an upright position effectively freeing the trigger for depression, and including means for constraining the path

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of movement of the object between the locations in which the trigger is blocked and free, respectively.

12. The apparatus improvement of claim 11 wherein the movable object of the safety device is movable along its constrained path from the free trigger location to blocked trigger location by inverting the lighter.

13. The apparatus improvement of claim 11 wherein the movable object of the safety device is movable along its constrained path from the blocked trigger location to the free trigger location by turning the lighter upright.

14. The apparatus improvement of claim 11 wherein the blocking of the actuating trigger is occasioned when the object occupies simultaneously portions of its path of

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constraint established by abutting fixed parts of the trigger and the body, respectively.

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U.S. Cl. X.R.

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