CHILD-RESISTANT GAS LIGHTER

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ABSTRACT

A lighter that includes a hard-spring piezoelectric unit for preventing children from operating lighter. A piezoelectric ignition unit has a plunger that is movable into a main casing to generate sparks for igniting a stream of flammable fuel. A hard-spring piezoelectric unit includes a plunger which includes auxiliary spring surrounding the plunger for increasing a force needed to actuate the piezoelectric unit and a blocking means for fixing the auxiliary spring with respect to the piezoelectric unit therefore enhancing an assembly efficiency of the gas lighter in manufacturing.
CHILD-RESISTANT GAS LIGHTER

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The invention relates to a lighter, and more particularly, to a lighter that includes a hard-spring piezoelectric unit for preventing ignition of lighter. A piezoelectric ignition unit has a plunger that is movable into a main casing to generate sparks for igniting a stream of flammable fuel. A hard-spring piezoelectric unit has a plunger which includes auxiliary spring surrounding the plunger for increasing a force needed to actuate the piezoelectric unit and a blocking means for fixing the auxiliary spring with respect to the piezoelectric unit therefor enhancing an assembly efficiency of the gas lighter in manufacturing.

[0003] 2. Description of the Prior Art

[0004] Gas lighter is a common utility for ignition. A conventional gas lighter usually has a fuel-storage chamber for containing flammable fuel, an upliftable gas release nozzle mounted on the fuel-storage chamber, a piezoelectric unit having a main casing and movable plunger which when pressed downward, is able to generate sparks for ignition, an ignition trigger, and a linking lever pivotally mounted on the fuel-storage chamber which when the ignition trigger is depressed, is able to uplift the gas release nozzle to release the gaseous fuel and at the same time depress the plunger of the piezoelectric unit to generate sparks. The gas release nozzle is so positioned that the gaseous fuel being released is easily able to be ignited by the spark generated from the piezoelectric unit. Some lighters may have housing for containing the fuel-storage chamber.

[0005] As set forth by 16 C.F.R., Part 1210, such gas lighters shall have a capability of child resistance. One way to impart child resistance to a gas lighter is to provide additional spring for the piezoelectric unit, as disclosed in the U.S. Patent No. 6,267,582. For example, the additional spring is a helical spring surrounding the plunger of the piezoelectric unit and contributes to the force needed to ignite. By this way, the force to depress the ignition trigger usually can be increase to no less 4.1 kilogram, which is beyond an amount reachable by a thumb of a child.

[0006] However, such deployment has a drawback. In assembly, the helical auxiliary spring may be put onto the piezoelectric unit surrounding the plunger thereof in a former working procedure, and then conveyed to a next worker for a next procedure. It also may be installed onto the plunger of the piezoelectric unit which has already been installed in the lighter in a former working procedure and then conveyed to a next worker for a next procedure. In either process, the helical auxiliary spring is very liable to fall off from the plunger of the piezoelectric unit in both conveyance and all other working procedures with the additional spring being surrounding.

BRIEF SUMMARY OF THE INVENTION

[0007] The main object of the invention is to provide a lighter thereof has a hard-spring piezoelectric unit includes a plunger which includes auxiliary spring surrounding the plunger for increasing a force needed to actuate the piezoelectric unit and a blocking means for fixing the auxiliary spring with respect to the piezoelectric unit. The blocking means is able to prevent the auxiliary spring from falling off from a plunger of the piezoelectric unit in assembly procedures therefor enhancing an assembly efficiency of the gas lighter in manufacturing.

[0008] In accordance with one aspect of the invention, there is provided a safe lighter having a fuel-storage chamber for containing flammable fuel, a piezoelectric unit which is reinforced with an auxiliary spring surrounding the plunger that is movable into the main casing and a blocking means fixed to a top end of the plunger, an ignition trigger, and a linking lever which when the ignition trigger is depressed, is able to uplift the gas release nozzle to release the gaseous fuel and at the same time depress the plunger of the piezoelectric unit to generate sparks.

[0009] These and other objectives, features, and advantages of the present invention will become apparent from the following detailed description, the accompanying drawings, and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. 1 is a perspective schematic view showing the preferred embodiment of the gas lighter of the present invention.

[0011] FIG. 2 is a partially cross-sectional view showing the gas lighter shown in FIG. 1.

[0012] FIG. 3 is an enlarged partially cross-sectional view showing a blocking means of the preferred embodiment shown in FIG. 1.

[0013] FIG. 4 is a schematic side view showing another embodiment of the gas lighter of the present invention. And,

[0014] FIG. 5 is a schematic partially cross-sectional view showing the embodiment shown in FIG. 4.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0015] With reference to FIGS. 1 and 2, they show the preferred embodiment of a gas lighter of the present invention. The gas lighter has a fuel-storage chamber 10 for containing liquefied gaseous fuel 11, an upliftable gas release nozzle 20 mounted on the fuel-storage chamber 10, a piezoelectric unit 30 having a main casing 31 installed in the fuel-storage chamber 10 and a shaft like plunger 32 which when pressed downward, is able to actuate the piezoelectric unit 30 to generate sparks for ignition, an auxiliary spring 33 surrounding the shaft like plunger 32, a blocking means 34 fixed to a top end of the plunger 32, an ignition trigger 40 having an inner lower part 41 meeting the top end of the plunger 32, and a linking lever 50 which when the ignition trigger 40 is depressed, is able to uplift the gas release nozzle 20 to release the gaseous fuel 11 and at the same time depress the plunger 32 of the piezoelectric unit 30 to generate sparks. The gas release nozzle 20 is so positioned that the gaseous fuel 11 being released is easily able to be ignited by the spark generated by the main casing 31 of the piezoelectric unit 30.

[0016] As specifically shown in the enlarged view in FIG. 3, the blocking means 34 of this preferred embodiment is a plug like body having a shank 342 inserted in a hole defined in the top end of the plunger part 32 of the piezoelectric unit 30 and a cap 341 a diameter of which is at lest larger than an inner diameter of the auxiliary spring 33. It could be understood by a person having ordinary skill in the art that since the blocking means 34 has the cap 341 whose diameter is larger than the inner diameter of the auxiliary spring 33 and which is able to prevent the auxiliary spring 33 from falling off from the
plunger 32, the auxiliary spring 33 will not be liable to fall off in assembly either being put onto the main casing 31 surrounding the plunger 32 thereof in a prior working procedure or being installed onto the plunger 32 which has already been installed in the gas lighter in a prior working procedure and then conveyed to a next worker for a next procedure. Thus, it is able to be understood that an assembly efficiency of the gas lighter of the invention in manufacturing is enhanced. There might be a plurality of flanges 343 formed on the blocking means 34 around the shank 342 for increasing a pressure between the shank 342 and the hole of the plunger 32.

[0017] Shown in FIGS. 4 and 5 is the piezoelectric unit 30 of another embodiment of the invention. The plunger 32 of the piezoelectric unit 30 has a pillar 321 formed on the top end thereof. The blocking means 34 is an elastic ring covering on the pillar 321. In assembly, a worker is able to first put the auxiliary spring 33 on the plunger 32 and then install the blocking means 34 with a central hole of the elastic ring covering on the pillar 321 and fixed there by a friction between the ring and the plunger 32. The pillar 321 may also have a head 322 and the head 322 may also have a tapering top surface 323. The head 322 is able to help prevent the ring from falling off from the pillar 321 and the tapering top surface is able to facilitate insertion of the pillar 321 through the central hole of the elastic ring.

[0018] From above description, it is seen that the objects of the present invention have been fully and effectively accomplished. Embodiment of the invention has been shown and described for the purposes of illustrating the functional and structural principles of the present invention and is subject to change without departure from the invention’s principles. Therefore, this invention includes all modifications encompassed within the spirit and scope of the following claims.

What is claimed is:
1. A lighter comprising:
a fuel-storage chamber for containing flammable fuel,
a piezoelectric unit mounted on said fuel-storage chamber,
having a main casing, a plunger which is movable into said main casing when pressed downward, is able to actuate said piezoelectric unit to generate sparks for ignition, an auxiliary spring surrounding said plunger, and a blocking means fixed to a top end of said plunger, an ignition trigger, when depressed, is able to release said flammable fuel and at the same time depress said plunger of said piezoelectric unit to generate sparks.
2. The lighter as claimed in claim 1, wherein said blocking means has a shank inserted in a hole defined in said top end of said plunger and a cap a diameter of which is less than an inner diameter of said auxiliary spring.
3. The lighter as claimed in claim 2, wherein a plurality of flanges are formed on said blocking means around said shank.
4. The lighter as claimed in claim 1, wherein said blocking means is an elastic ring covering on a pillar formed on said top end of said piezoelectric button.
5. The lighter as claimed in claim 1, wherein said blocking means is made of plastic.
6. The lighter as claimed in claim 1, wherein said blocking means is made of metal.
7. The lighter as claimed in claim 3, wherein said pillar has a head.
8. The lighter as claimed in claim 4, wherein said head has a tapering top surface.
9. A lighter comprising:
a fuel-storage chamber for containing flammable fuel,
a piezoelectric unit mounted on said fuel-storage chamber,
having a main casing, a plunger which is movable into said main casing when pressed downward, is able to actuate said piezoelectric unit to generate sparks for ignition, an auxiliary spring located inside of said main casing,
an ignition trigger, when depressed, is able to release said flammable fuel and at the same time depress said plunger of said piezoelectric unit to generate sparks.
10. A lighter comprising:
a housing, a fuel-storage chamber for containing flammable fuel,
a piezoelectric unit disposed within said housing, having a main casing, a plunger which is movable into said main casing when pressed downward, is able to actuate said piezoelectric unit to generate sparks for ignition, an auxiliary spring surrounding said plunger, and a blocking means fixed to a top end of said plunger, an ignition trigger, when depressed, is able to release said flammable fuel and at the same time depress said plunger of said piezoelectric unit to generate sparks.
11. The lighter as claimed in claim 10, wherein said blocking means has a shank inserted in a hole defined in said top end of said plunger and a cap a diameter of which is larger than an inner diameter of said auxiliary spring.
12. The lighter as claimed in claim 11, wherein a plurality of flanges are formed on said blocking means around said shank.
13. The lighter as claimed in claim 10, wherein said blocking means is an elastic ring covering on a pillar formed on said top end of said piezoelectric button.
14. The lighter as claimed in claim 10, wherein said blocking means is made of plastic.
15. The lighter as claimed in claim 10, wherein said blocking means is made of metal.
16. The lighter as claimed in claim 12, wherein said pillar has a head.
17. The lighter as claimed in claim 13, wherein said head has a tapering top surface.

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