LIGHTER OR LIGHTING GUN WITH A SAFETY SWITCH

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ABSTRACT

The invention provides a lighter with a safety switch, comprising: a housing, a fuel container within the housing, a piezoelectric assembly, and a vent assembly. The piezoelectric assembly comprises a piezoelectric element, a snap, as well as an upper and lower push rods arranged between the snap and piezoelectric element. The lower part of the upper push rod and the upper part of the lower push rod are connected in a manner that they can deviate from the centerline of the upper and lower push rods toward one side. Thus, the upper and lower push rods can bend to one side at the joint during the operation of the snap. The lighter further comprises a safety switch, which can prevent the upper and lower push rods from bending.
LIGHTER OR LIGHTING GUN WITH A SAFETY SWITCH

FIELD OF THE INVENTION
[0001] The present invention generally relates to a lighter apparatus, in particular, to an electronic lighter or lighting gun with a safety switch.

BACKGROUND OF THE INVENTION
[0002] The current electronic lighting gun with a single safety switch uses an obstructing block positioned in the moving route of the snap (or button). A safety switch is arranged on the surface of the lighting gun at a position corresponding to the obstructing block. The obstructing block positioned in the moving route of the snap can be switched by moving the safety switch, so as to control the movement of the snap. When the safety switch is turned to an “On” position, the snap can be operated to cause a piezoelectric element generating a spark to light the fuel gas and create flame. When the safety switch is turned to a “Off” position, the snap is obstructed, and thus cannot work. However, this lighting gun may be safe only when the safety switch is at the “Off” position. The safety switch will not function practically if it is forgotten to be set to the “Off” position after a lighting operation, so that a fire can be easily caused by a child or an idiot playing with such a lighting gun. The safety of such a lighting gun is relatively poor.

SUMMARY OF THE INVENTION
[0003] The technical problem to be solved and the technical task to be addressed by the present invention is to overcome the disadvantages stated above and provide an electronic lighter or lighting gun with a safety switch.
[0004] The present invention provides a lighter or lighting gun, which controls the lighting route of the piezoelectric element by the cooperation between a safety switch and a push rod. Therefore, it increases the difficulty for children to operate, thereby improves the safety of the lighters and lighting guns.
[0005] The invention provides a lighter with a safety switch comprising: a housing, a fuel container within the housing, a piezoelectric assembly, and a vent assembly. The piezoelectric assembly comprises a piezoelectric element, a snap, as well as an upper push rod and a lower push rod arranged between the snap and the piezoelectric element. The lower part of the upper push rod and the upper part of the lower push rod are connected in a manner that they can deviate from the centerline of the upper and lower push rods toward one side. Thus, the upper and lower push rods can be bent to one side at the joint during the operation of the snap. The lighter further comprises a safety switch, which can prevent the upper and lower push rods from bending.
[0006] According to one aspect of the present invention, the lower part of said upper push rod and the upper part of said lower push rod of the lighter can be connected through a pivot, which is arranged offset from the centerline of the two rods. The safety switch of the present invention comprises a T-shaped safety pole, a positioning block fitted over the safety pole, an obstructing block fixed on the safety pole, and a pressure spring located between the positioning block and obstructing block. The positioning block is fixed on the inner wall of the housing. The safety pole is provided with a cap-shaped cover enclosing its distal end. The head of the cap-shaped cover is exposed to the exterior of the housing. A spring is fitted over the upper and lower push rods of the lighter according to the present invention. Further, the piezoelectric assembly of the lighter according to the present invention may comprises a piezoelectric cap covering the piezoelectric element, wherein the upper part of the upper push rod is connected to the snap through a pivot or a joggle, and the lower part of the lower push rod is connected to the piezoelectric cap through a pivot or a joggle. The top surface of the piezoelectric cap may have a hook-shaped groove engaging with the lower part of the lower push rod.
[0007] Further, the present invention provides a lighting gun with a safety switch, comprising a housing, a barrel fixed to the upper part of the housing, a fuel container within the housing, a piezoelectric assembly and a vent assembly above the fuel container. The piezoelectric assembly comprises a piezoelectric element arranged in a conventional manner, a piezoelectric cap covering the piezoelectric element, and a snap. A upper push rod and a lower push rod are arranged between the piezoelectric cap and the snap. The upper part of the upper push rod is connected to the snap, while the lower part of the lower push rod is connected to the piezoelectric cap. The lower part of the upper push rod and the upper part of the lower push rod is connected through a pivot, which is arranged offset from the centerline of the push rods. A safety switch is arranged between the joint of the upper and lower push rods and the housing to prevent the upper and lower push rods from bending.
[0008] According to the present invention, the lighting routing of the piezoelectric element is controlled by the cooperation of the safety switch and the push rods. In a normal mode, the safety switch is separated from the push rods, which will bend when the snap is moved down, so the piezoelectric element cannot finish the lighting route. During the lighting operation, the safety switch has to be pushed inward and pressed to sit against the joint of the upper and lower push rods. Only under this condition can the flammable gas be ignited by pressing the snap downwardly, which controls the working mode of the piezoelectric assembly effectively, increases the difficulty for children to operate and thus improves the safety of the lighting gun.
[0009] The invention is further described in connection with the accompanying drawings and the embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS
[0010] FIG. 1 depicts the structure of the present invention in a normal mode (safety mode).
[0011] FIG. 2 depicts the operation of the present invention in the normal mode (safety mode).
[0012] FIG. 3 depicts the working mode of the present invention.
[0013] FIG. 4 is the enlarged schematic view for the push rod structure with its components according to an embodiment of the present invention.
[0014] FIG. 5 is the enlarged schematic view for the piezoelectric cap structure.
[0015] FIG. 6 is the enlarged schematic view for the safety switch structure.

DETAILED DESCRIPTION
[0016] As illustrated in FIGS. 1-3, a lighting gun with a safety switch comprises a housing 1, a barrel 2 fixed to the upper part of the casing, a fuel container 3 within the housing,
and a piezoelectric assembly and a vent assembly set above the fuel container. The piezoelectric assembly comprises a piezoelectric element 4 arranged in a conventional manner, a piezoelectric cap 5 covering the piezoelectric element and a snap or button 6. A linkage plate 17 is provided between the piezoelectric assembly and the vent assembly to enable the two assemblies to move together. A upper push rod 7 and a lower push rod 8 are provided between the snap 6 and the piezoelectric cap 5. A spring 15 (only part of it is schematically shown) is fitted over the upper and lower push rods to render the returning of the upper and lower push rods quicker and more stable. The upper part of the upper push rod 7 is connected to the snap 6 through a pivot, and the lower part of the lower push rod 8 is connected to the piezoelectric cap through a joggle. A safety switch is provided between the left of the upper and lower push rods 7, 8 and the housing 1, so as to prevent the upper and lower push rods from bending.

[0017] The lower part of the upper push rod 7 and the upper part of the lower push rod 8 are connected in a manner that they can deviate from the centerline of the upper and lower push rods toward one side. Thus, the upper and lower push rods can be bent to one side at the joint during the operation of the snap 6. In other words, the lower part of the upper push rod is connected to the upper part of the lower push rod in a manner that the upper and lower push rods can be bent to one side of the centerline of the push rods. Accordingly, operating or pressing down the snap can cause the upper and lower push rods to bend toward one side.

[0018] As schematically shown in FIG. 4, the bottom part of the upper push rod 7 and the upper part of the lower push rod 8 are connected through a pivot 9, which is arranged offset from the centerline of the push rods. FIG. 4 also illustrates the side view of the upper and lower push rods connected one another, as well as a front view and a side view of the two push rods when separated. As shown in FIG. 5, the top surface of the piezoelectric cap 5 has a hook-shaped groove 16 engaging with the lower part of the lower push rod 8 by joggling and allowing the lower push rod to be bent toward the right. The upper part of the upper push rod is connected to the snap through a pivot or a joggle, and the lower part of the lower push rod is connected to the piezoelectric cap through a pivot or a joggle.

[0019] Said safety switch is arranged at the side to which the upper and lower push rods can bend, and comprises a pole. During operation, the head of the pole can prevent the upper and lower push rods from bending to one side. As shown in FIG. 6, the safety switch consists of a T-shaped safety pole 10, a positioning block 11 fitted over the safety pole 10, an obstructing block 12 fixed on the safety pole 10, and a pressure spring 13 located between the positioning block 11 and obstructing block 12. Referring to FIGS. 1 to 3, the positioning block 11 is fixed on the inner wall of the housing 1. The safety pole 10 is provided with a cap-shaped groove 14 engaging its distal end. The head of the cap-shaped groove 14 is exposed to the exterior of the housing 1 (in the normal mode, i.e. safety mode). When the safety switch is pushed inward, the obstructing block is moved inward together with it, while the positioning block is kept stationary. Thus the pressure spring is compressed, and the vertical part of the safety pole sits against the pivoted joint of the top and bottom rods. When the force applied on the safety switch is withdrawn, the safety switch is returned to the original place by the returning of the pressure spring. The perimeter edge of the cap-shaped cover serves to restrict the travel of the cover.

[0020] As shown in FIGS. 1 to 3, the present invention works as follows: in the normal mode (safety mode), the top and bottom rods are collinear (seen in FIG. 1). When the snap is pressed down, the top and bottom rods will bend to the right side simultaneously (as shown in FIG. 2). Meanwhile, the push rods will move down with the snap until the route of the snap terminate. Since the piezoelectric element cannot finish the routing to light because of the bending of the push rods, the flammable gas will not be ignited, and the safety function is fulfilled. During lighting (refer to FIG. 3), only if the user presses inward the safety switch and press it, that is, pushes the head of the cap-shaped cover 14 at the distal end of the safety pole 10 and enables the vertical part of the safety pole 10 to sit against the pivoted joint of the top and bottom rods, the upper and lower push rods cannot bend. At this time, pressing down the snap can cause the piezoelectric element to fulfill the lighting routines to ignite the flammable gas. The returning of the upper and lower push rods may be achieved by the returning of the snap, its own gravity center, and the returning of the spring. And the returning of the safety switch may be achieved by the returning of the pressure spring.

[0021] According to the present invention, the lighting routine of the piezoelectric element is controlled by the cooperation of the safety switch and the push rods. In a normal mode, the safety switch is separated from the push rods, which will bend when the snap is moved down, so the piezoelectric element cannot finish the lighting routine. During the lighting operation, the safety switch should be pushed inward and pressed to sit against the joint of the upper and lower push rods. Only under this condition can the flammable gas be ignited by pressing downward the snap, which controls the working mode of the piezoelectric assembly efficiently, increases the difficulty for children to operate and thus improves the safety of the lighting gun.

1. A lighter with a safety switch, comprising:
   a housing;
   a fuel container within the housing;
   a piezoelectric assembly, comprising a piezoelectric element, a snap, and an upper push rod and a lower push rod arranged between the snap and piezoelectric element, the lower part of the upper push rod and the upper part of the lower push rod connected in a manner that they can deviate from the centerline of the upper and lower push rods toward one side, and the upper and lower push rods capable of bending to one side at the joint during the operation of the snap;
   a vent assembly; and
   a safety switch, which can prevent the upper and lower push rods from bending.

2. The lighter with a safety switch according to claim 1, wherein:
   the lower part of the upper push rod and the upper part of the lower push rod can be connected through a pivot, which is arranged offset from the centerline of the two rods.

3. The lighter with a safety switch according to claim 1, wherein:
   the safety switch comprises a T-shaped safety pole, a positioning block fitted over the safety pole, an obstructing block fixed on the safety pole, and a pressure spring located between the positioning block and obstructing block, the positioning block fixed on the inner wall of the housing, the safety pole is provided with a cap-shaped
cover enclosing its distal end, and the head of the cap-shaped cover is exposed to the exterior of the housing.

4. The lighter with a safety switch according to claim 1 or 2, wherein a spring is fitted over the upper and lower push rods.

5. The lighter with a safety switch according to claim 1, wherein the piezoelectric assembly further comprises a piezoelectric cap covering the piezoelectric element, and wherein the upper part of the upper push rod is connected to the snap through a pivot or a joggle, and the lower part of the lower push rod is connected to the piezoelectric cap through a pivot or a joggle.

6. The lighter with a safety switch according to claim 5, wherein the top surface of the piezoelectric cap may have a hook-shaped groove engaging with the lower part of the lower push rod.

7. The lighter with a safety switch according to claim 1, wherein the safety switch, which is arranged at the side to which the upper and lower push rods can bend, comprises a pole, the head of the pole can prevent the upper and lower push rods from bending to one side during operation of the safety switch.

8. A lighting gun with a safety switch comprising,
   a housing;
   a barrel fixed to the upper part of the housing;
   a piezoelectric assembly above the fuel container, comprising a piezoelectric element arranged in a conventional manner, a piezoelectric cap covering the piezoelectric element, a snap, and an upper push rod and a lower push rod arranged between the snap and piezoelectric element, the upper part of the upper push rod is connected to the snap, the lower part of the lower push rod is connected to the piezoelectric cap, and the lower part of the upper push rod and the upper part of the lower push rod are connected through a pivot, which is arranged offset from the centerline of the push rods;
   a vent assembly above the fuel container; and
   a safety switch arranged between the joint of the upper and lower push rods and the housing, which can prevent the upper and lower push rods from bending.

9. The lighting gun with a safety switch according to claim 8, wherein:
   the safety switch comprises a T-shaped safety pole, a positioning block fitted over the safety pole, an obstructing block fixed on the safety pole and a pressure spring located between the positioning block and obstructing block, the positioning block fixed on the inner wall of the housing, the safety pole is provided with a cap-shaped cover enclosing its distal end, and the head of the cap-shaped cover is exposed to the exterior of the housing.

10. The lighting gun with a safety switch according to claim 8 or 9, wherein a spring is fitted over the upper and lower push rods.

11. The lighting gun with a safety switch according to claim 8, wherein the upper part of the upper push rod is connected to the snap through a pivot or a joggle, and the lower part of the lower push rod is connected to the piezoelectric cap through a pivot or a joggle.

12. The lighting gun with a safety switch according to claim 8, wherein the top surface of the piezoelectric cap may have a hook-shaped groove engaging with the lower part of the lower push rod.

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