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(11) **EP 1 722 165 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 158(3) EPC

(43) Date of publication:
15.11.2006 Bulletin 2006/46

(51) Int Cl.:
F23Q 2/28 (2006.01)

(21) Application number: **04721448.1**

(86) International application number:
PCT/CN2004/000214

(22) Date of filing: **18.03.2004**

(87) International publication number:
WO 2005/083325 (09.09.2005 Gazette 2005/36)

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PL PT RO SE SI SK TR**

(30) Priority: **01.03.2004 CN 200420005602**

(71) Applicant: **Zhu, Xin-qiu**
Leqing, Zhejiang 325600 (CN)

(72) Inventor: **Zhu, Xin-qiu**
Leqing, Zhejiang 325600 (CN)

(74) Representative: **Grünecker, Kinkeldey,
Stockmair & Schwanhäusser**
Anwaltssozietät
Maximilianstrasse 58
80538 München (DE)

(54) **A PIEZOELECTRIC IGNITING MECHANISM OF LIGHTER FOR PREVENTING CHILDREN TO TURN ON**

(57) A piezoelectric ignition mechanism of a child-resistant lighter that suitable to any piezoelectric lighter is provided, which includes an energy accumulating conduct tube and a core element. A plexor preferably includes an impact shaft disposed in the energy accumulating conduct tube that is roundness. A guiding shaft is positioned on the energy accumulating conduct tube. A guiding slot assembly that controls the movement of the energy accumulating conduct tube is located on the core element, which is associated with the energy accumulating conduct tube. The guiding slot assembly further has a pair of circular control guiding slots and a pair of ignition guiding slots. The energy accumulating conduct tube is positioned in the guiding slot assembly. The guiding shaft and the impact shaft of the energy accumulating conduct tube are positioned respectively in the control guiding slots and in the ignition slots.

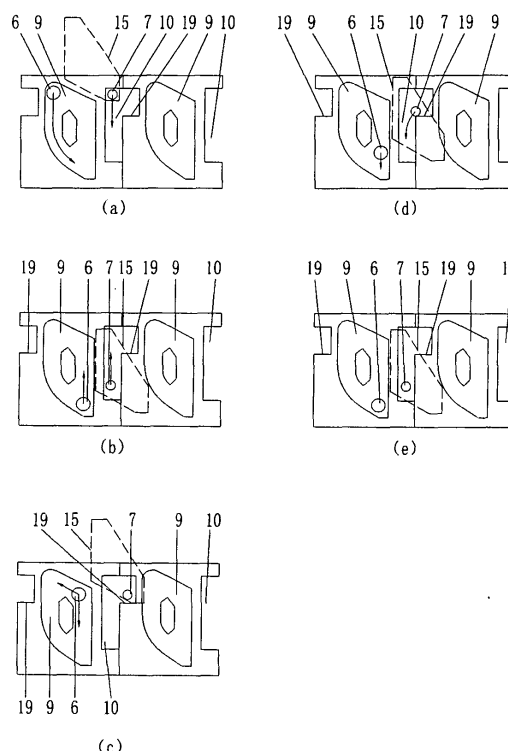


FIG 2

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to ignition mechanism of lighter. More specifically, to structures involving a piezoelectric ignition mechanism that prevents inadvertent operation by children.

Description of the Related Art

[0002] Conventional lighter provided a direct ignition mechanism that will be easily inadvertent operated by children. Thereby, misfortunes such as fire or injurer may occur. Some lighter makers added various safety latch lock on the lighter that increases product cost and inconvenience for user's operation. Some makers increase the pressing force of ignition mechanism to 9.5 to 10 pound so as to keep the CR law of some countries that makes activation of the lighter more difficult.

SUMMARY OF THE INVENTION

[0003] The primary object of the present invention is by providing a piezoelectric ignition mechanism of a child-resistant lighter with increased safety and low fabrication cost to overcome the deficiencies mentioned above..

[0004] In accordance with the primary object of the present invention, an improved structure of a piezoelectric ignition mechanism of child-resistant lighter is provided, wherein it includes an energy accumulating conduct tube and a core element. A plexor preferably including an impact shaft is positioned in the energy accumulating conduct tube, which has roundness shape. A guiding shaft mounts on the energy accumulating conduct tube. A guiding slot assembly that controls the movement of the energy accumulating conduct tube is located on the core element which is associated with the energy accumulating conduct tube. The guiding slot assembly further includes a pair of circular control guiding slots and a pair of ignition guiding slots. The energy accumulating conduct tube is positioned in the guiding slot assembly. The guiding shaft and the impact shaft of the energy accumulating conduct tube are positioned respectively in the control guiding slots and in the ignition slots.

[0005] The circular control-guiding slot includes an arc-guiding slot and 3 segments of straight guiding slots, and one of the straight guiding slots having a slope shape is positioned on the top of the circular guiding slot. The

circular control guiding slot has a shape of "



or" ", and the ignition guiding slot has an inverse L-shape.

[0006] The present invention comprises an energy accumulating conduct tube and a core element. A plexor preferably including an impact shaft disposed in the energy accumulating conduct tube. The energy accumulating conduct tube is roundness. A guiding shaft is positioned on the energy accumulating conduct tube. A guiding slot assembly that controls the movement of the energy accumulating conduct tube is positioned on the core element that associated with the energy accumulating conduct tube. The guiding slot assembly further has a pair of circular control guiding slots and a pair of ignition guiding slots. The energy accumulating conduct tube is positioned in the guiding slot assembly. The guiding shaft and the impact shaft of the energy accumulating conduct tube are positioned respectively in the control guiding slots and in the ignition slots.

[0007] When the lighter in an activated configuration:

[0008] The first step as pressing the energy accumulating conduct tube for the first time, the guiding shaft moves down along one side of the control guiding slot, that is, the arc guiding slot and rotates itself, meanwhile, the impact shaft cannot make the energy accumulating spring produce deposit energy.

[0009] The second step, weakening the force pressed on the energy accumulating conduct tube, due to the upward action of the returning spring, the guiding shaft and an energy release limit window drive the impact shaft moving up vertically together, and the impact shaft slides along the bottom bevel edge of the energy release limit window and stops on the energy accumulating block when it moves up on the half way.

[0010] The third step, immediately following the second step, pressing the energy accumulating conduct tube for the second time, the guiding shaft then moves down vertically while the impact shaft remains on the energy accumulating block and causes energy depositing on the energy accumulating spring. Continue pressing the energy accumulating conduct tube, the guiding shaft may be driven down to the bottom, then the upper bevel edge of the energy release limit window forces the impact shaft sliding away from the energy accumulating block and the energy accumulating spring releases instantly, so cause the plexor impacts the strike peg with heavy force to produce high voltage spark. Due to children's simplicity activity, he may loose hold of his hand after the first pressing on the energy accumulating conduct tube and during the resetting process of the energy accumulating conduct tube, he will not press the tube again for depositing energy on the energy accumulating conduct tube. Therefore, the lighter will be driven back by returning spring 11 directly to the deactivated configuration, that is the configuration before the operation. Thus prevented inadvertent operation by children.

[0011] Compare to prior designs, the advantageous effects of the present invention are as followings:

1. It is versatility that the present invention shares the same operation way, same configuration and

same dimension with conventional piezoelectric ignition element, and can be used in any of prior designs of lighter.

2. It is convenience for production and management because the present invention shares the same cost and same production arts and crafts with the piezoelectric lighter without safety measures.

3. It is safe and economical that the present invention resolves the problem of inadvertent operation by children without adding any additional safety latch or lock.

[0012] Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The present invention will become more fully understood from the detailed description given herein below and the accompanying drawings which are given by way of illustration only, and thus are not limitative of the present invention, and wherein:

FIG 1 is a schematic drawing of present invention illustrating the structure of a piezoelectric ignition mechanism.

FIG 2 is a schematic drawing of present invention illustrating the piezoelectric ignition mechanism during the activated configuration.

[0014] In FIGs. 1 and 2, comprising:

1. energy accumulating conduct tube □ 2 guiding slot assembly □ 3 core element; 5. energy accumulating spring; 6. guiding shaft; 7. impact shaft; 8. plexor; 9. control guiding slot; 10. ignition guiding slot; 11. returning spring; 12. strike peg; 13. conduct sheet copper; 14. piezoelectric ceramic; 15. energy release limit window; 16. discharge sheet copper; 17. copper cap; 18. discharge wire; 19. energy accumulating block.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0015] The preferred embodiment:

[0016] As shown in figs. 1 and 2, a piezoelectric ignition mechanism of a child-resistant lighter comprising:

energy accumulating conduct tube 1 □ guiding slot assembly 2 □ core element 3; energy accumulating

spring 5; energy release limit window 15; guiding shaft 6; impact shaft 7; plexor 8; control guiding slot 9; ignition guiding slot 10; energy accumulating block 19; returning spring 11; strike peg 12; conduct sheet copper 13; piezoelectric ceramic 14; discharge sheet copper 16; copper cap 17 and discharge wire 18. Thereinto, control guiding slot 9 which is positioned in guiding slot assembly 2 guides the travel distance of guiding shaft 6 and consequently drives energy release limit window 15 moving, thereby fulfils the activating process of impact shaft 7 among energy accumulating block 19 and ignition guiding slot 10.

[0017] Referring to figs.2 (a), (b), (c), (d), wherein solid and fine lines illustrate the spread inner circle structure of the guiding slot assembly 2; dotted lines illustrate energy release limit window 15; and a large and a small circle refer to guiding shaft 6 and impact shaft 7 respectively.

[0018] When the lighter in an activated configuration:

The first step, as pressing energy accumulating conduct tube 1 for the first time, guiding shaft 6 will move down along one side of control guiding slot 9 as indicated in FIG 2(a) to FIG 2(b), and the impact shaft 7 and energy release limit window 15 move down together with it, in the meantime impact shaft 7 cannot make energy accumulating spring 5 produce deposit energy;

The second step, weakening the force pressed on energy accumulating conduct tube 1, due to the upward action of returning spring 11, guiding shaft 6 and energy release limit window 15 drive impact shaft 7 moving up vertically together; then impact shaft 7 slides along the bottom bevel edge of energy release limit window 15 and stops on energy accumulating block 19 when it moves up on the half way. The third step, immediately following the second step, pressing energy accumulating conduct tube 1 for the second time, guiding shaft 6 then moves down vertically to the place as indicated in FIG2 (d) while impact shaft 7 remains on energy accumulating block 19 causing energy depositing on energy accumulating spring 5. Continue pressing energy accumulating conduct tube 1 downward, guiding shaft 6 may be driven down to the bottom as indicated in FIG2 (e), then the upper bevel edge of energy release limit window 15 forces impact shaft 7 sliding away from energy accumulating block 19 as shown with dotted arrowhead in FIG2 (d) while energy accumulating spring 5 releases instantly, so cause plexor 8 impact the strike peg 12 with heavy force to produce high voltage spark. The releasing of the pressure adding on energy accumulating conduct tube 1 will deactivate ignition, and the lighter will return to the configuration before activating by returning spring 11.

[0019] When a child operates the lighter inadvertently, as he presses energy accumulating conduct tube 1, due to children's simplicity activity, he may loose hold of his hand on the tube 1 when guiding shaft 6 moves down to the place as indicated in FIG2(b). Thus the lighter passes through the configurations of FIG2 (a) to FIG2 (b), in the middle of which passes through FIG2 (c) when the child cannot press energy accumulating conduct tube 1 quickly enough for the second time. As a result the lighter is driven back by returning spring 11 directly to the deactivated configuration as indicated in FIG2 (a) (the configuration before the operation). Thus prevented inadvertent operation by children.

[0020] The invention being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

[0021] It is versatility that the present invention shares the same operation way, same configuration and same dimension with the conventional piezoelectric ignition elements and can be used in any of prior designs of lighters. It is safe and economical of the present invention and resolves the problem of inadvertent operation by children without adding any safety latch or lock. It is also suitable for Industry production.

Claims

1. A piezoelectric ignition mechanism of child-resistant lighter includes an energy accumulating conduct tube and a core element; a plexor preferably includes an impact shaft disposed in the energy accumulating conduct tube; wherein said energy accumulating conduct tube is in the shape of roundness; and wherein, further comprising:

a guiding shaft is positioned on said energy accumulating conduct tube;

a guiding slot assembly that controls the movement of said energy accumulating conduct tube is located on said core element which is associated with said energy accumulating conduct tube;

a pair of circular control guiding slots and a pair of ignition guiding slots are positioned on said guiding slot assembly;

wherein said energy accumulating conduct tube is positioned in the guiding slot assembly; the guiding shaft and the impact shaft of said energy accumulating conduct tube are positioned respectively in said guiding slot and in said ignition slot.

2. The piezoelectric ignition mechanism of child-resistant

lighter of claim 1, wherein said circular control-guiding slot includes an arc-guiding slot and 3 segments of straight guiding slots, and one segment of the straight guiding slots having a slope shape is positioned on the top of the circular guiding slot.

3. The piezoelectric ignition mechanism of child-resistant lighter of claim 2, wherein said circular control

guiding slot has a " " or " " shape

4. The piezoelectric ignition mechanism of child-resistant lighter of claim 1 or claim 2, wherein said ignition guiding slot has an Inverse L-shape.

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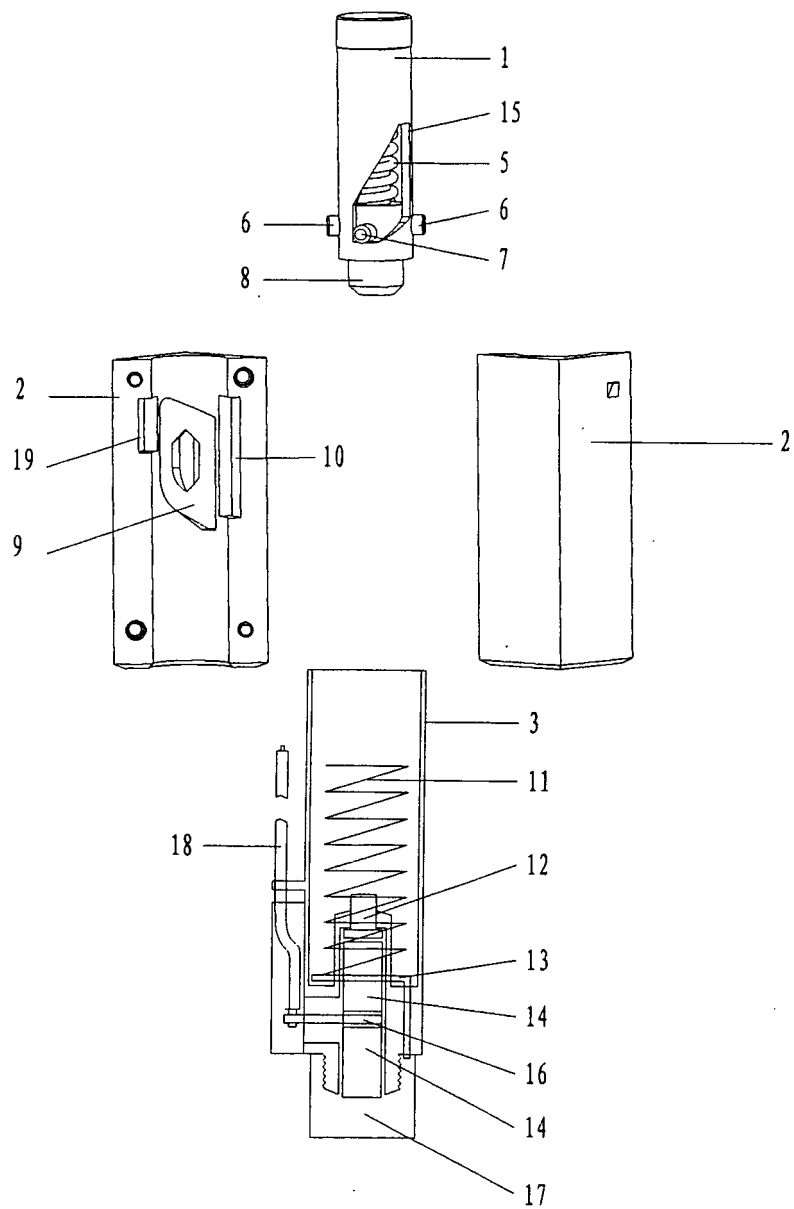


FIG 1

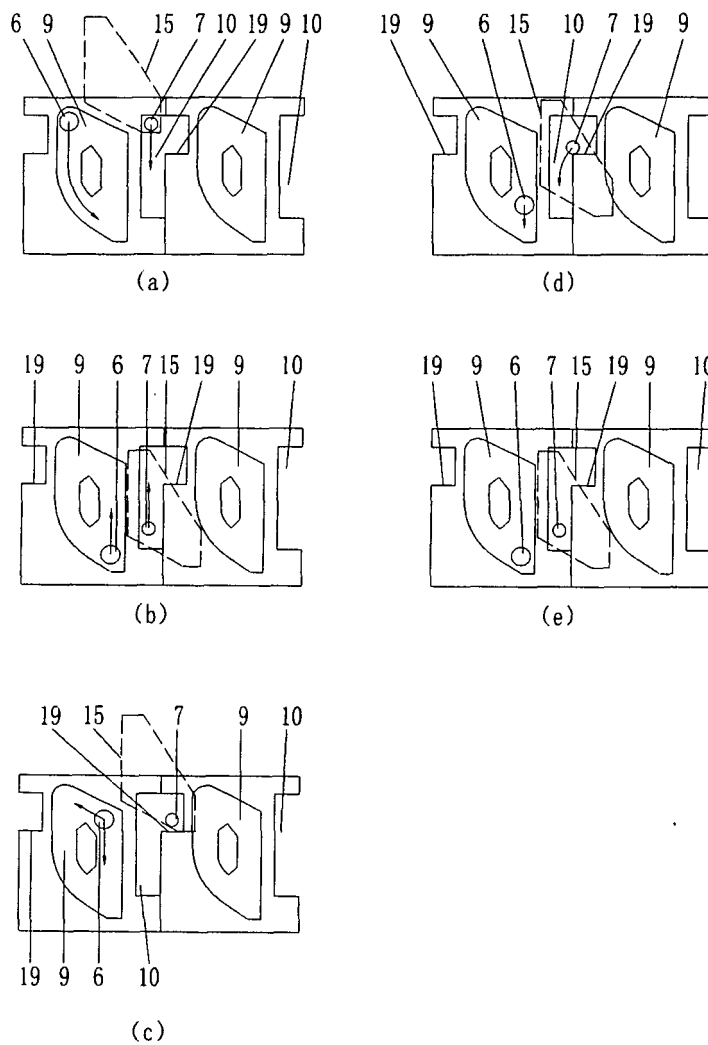


FIG 2

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2004/000214

A. CLASSIFICATION OF SUBJECT MATTER

F23Q2/28

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F23Q1/+ F23Q 2/+ F23Q 3/+ F23Q 7/+ F24C 3/10 F24C 5/14 A47F47/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Chinese Patent Documents

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPOC PAJ WPI CPRS CNKI lighter ignitor hammer piezoelctric groove slot

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN2330884Y (RUAN Jun Qiang) 28.JULY1999 (28.07.1999)	1-4
A	CN1158957A (JAPAN SMOKING ARTICLES CORPORA (JP)) 10.September1997 (10.09.1997)	1-4
A	US5262697A(Marcel Meury,Tarragona,Spain) 16.November1993(16.11.1993)	1-4
A	US5059852A(Marcel Meury,Tarragona,Spain) 22.October1991(22.10.1991)	1-4

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

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“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

“&” document member of the same patent family

Date of the actual completion of the international search

06.January2005(06-01-05)

Date of mailing of the international search report

07 · APR 2005 (07 · 04 · 2005)

Name and mailing address of the ISA/CN

6 Xitucheng Road., Jimen Bridge, Haidian District,
100088, Beijing, China

Authorized officer

JIANG Yan

Telephone No. (86-10)62084688

Facsimile No. (86-10)62019451



INTERNATIONAL SEARCH REPORT
 Information on patent family members

 International application No.
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