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(54) **KEY STRUCTURE OF ELECTRONIC PRODUCT AND ELECTRONIC PRODUCT**

(57) A key structure of an electronic product and the electronic product are provided. The key structure is installed on a housing of the electronic product to trigger a switch element in the housing. The key structure includes a key body, an operating part and an execution part. One end of the key body has a fixing portion fixed to the housing. The operating part installed at an outer surface of the key body is operated by an external force,

where a distance between the operating part and the fixing portion is a first distance. The execution part is located between the switch element and the key body, and the key body drives the execution part to move for triggering the switch element, where a distance between the execution part and the fixing portion is a second distance, and the first distance is smaller than or greater than the second distance.

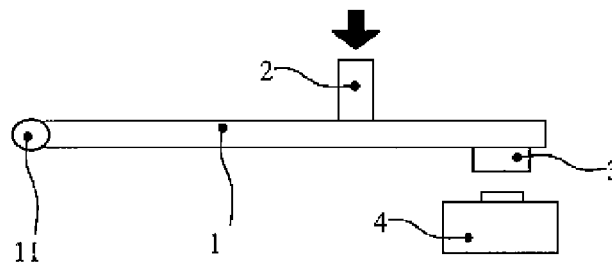


FIG.2

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The invention relates to a key structure on a housing of an electrical appliance, and particularly relates to a key structure of an electronic product and the electronic product with a good operating feeling.

Description of Related Art

[0002] FIG. 1 is a schematic diagram of a simplified structure of a key structure of a push-button switch in the existing technique. As shown in FIG. 1, the key structure 9 illustrated in a simple way mainly includes a key body 91, an operating part 92 and an execution part 93, which is adapted to press and trigger a switch element 8. In this structure, in order to ensure an accurate motion and a good operating feeling, a center of the operating part 92 and a center of the switch element 8 have to be consistent along a motion direction. In an actual practise, when an upper surface of the operating part 92 is pressed, the execution part 93 contacts the switch element 8. After keeps on pressing and a certain pressure and stroke are reached, the switch element 8 is triggered to implement an operation of electrical function.

[0003] However, when an internal structure of the electronic product is very compact and has a narrow space due to other structures around the key structure of the electronic product or due to an electrical design, since the conventional key structure requires an up and down straight moving space and a space for assembling a fixed structure, the key structure cannot be normally assembled for usage. Even if the key structure is constrainedly assembled, problems of key failure and poor operating feeling are probably occurred.

[0004] The information disclosed in this Background section is only for enhancement of understanding of the background of the described technology, and therefore it may contain information that does not form the existing technique already known to a person of ordinary skill in the art.

SUMMARY OF THE INVENTION

[0005] The content of the invention introduces a series of simplified forms of concepts, which will be described in detail in following embodiments. The content of the invention does not mean to limit key features and necessary technical features of the technical solutions to be protected by the invention, and does not try to determine a protection range of the technical solutions to be protected.

[0006] A main purpose of the invention is to overcome at least one defect of the aforementioned existing technique and provide a key structure of an electronic product

adapted to a narrow installation space.

[0007] Another purpose of the invention is to overcome at least one defect of the aforementioned existing technique and provide a key structure of an electronic product with a good operating feeling.

[0008] Another main purpose of the invention is to overcome at least one defect of the aforementioned existing technique and provide an electronic product with a good operating feeling.

[0009] In order to achieve the aforementioned purposes, the invention provides following technical solutions:

[0010] The invention provides a key structure of an electronic product, where the key structure is installed on a housing of the electronic product, and the key structure is adapted to trigger a switch element in the housing of the electronic product. The key structure includes a key body, an operating part and an execution part. One end of the key body has a fixing portion, and the fixing portion is fixed and assembled to the housing. The operating part is installed at an outer surface of the key body, the operating part is operated by an external force, and a distance between the operating part and the fixing portion is a first distance. The execution part is located between the switch element and the key body, the key body drives the execution part to move, the execution part is adapted to trigger the switch element, and a distance between the execution part and the fixing portion is a second distance. The first distance is smaller than or greater than the second distance.

[0011] In an embodiment of the invention, the fixing portion is fixed to the housing through an engagement structure.

[0012] In an embodiment of the invention, the engagement structure includes an engaging post and an engaging hole, and the engaging post and the engaging hole are adapted to engage to each other. The engaging post is disposed on the housing and correspondingly the engaging hole is formed on the key body, or the engaging post is disposed on the key body and correspondingly the engaging hole is formed on the housing.

[0013] In an embodiment of the invention, the fixing portion further includes a positioning portion, the positioning portion includes a positioning post and a positioning sleeve, and the positioning post is adapted to be inserted into the positioning sleeve. The positioning post is disposed on the housing and correspondingly the positioning sleeve is formed on the key body, or the positioning post is disposed on the key body and correspondingly the positioning sleeve is formed on the housing.

[0014] In an embodiment of the invention, the engaging post includes a post body and an engaging claw, an engaging step is formed at one side of the engaging hole, and the engaging claw is engaged to the engaging step.

[0015] In an embodiment of the invention, the key body is made of a flexible material.

[0016] In an embodiment of the invention, the operating part and the key body are formed integrally, or the operating part is assembled and fixed to the key body.

The execution part is located at an inner surface of the key body. The execution part and the key body are formed integrally, or the execution part leans against the key body.

[0017] In an embodiment of the invention, the key body presents a plate shape, the key body has an operating plane, the operating plane is located at an end of the key body away from the fixing portion, the operating plane is shifted to an outside of the housing by a certain distance, and the operating part is formed on an outer surface of the operating plane.

[0018] In an embodiment of the invention, L1 is the first distance, L2 is the second distance, H1 is a distance between a top effecting end surface of the switch element and a bottom surface of the execution part, H2 is a distance between an initial position and a motion position of the switch element, and H3 is a stroke of the operating part, where $H3=(H1+H2)*L1/L2$, and H3 maybe selectively between 0.3 mm and 0.5 mm.

[0019] According to another aspect, the invention provides an electronic product having a housing, where the housing is installed with any one of the aforementioned key structures of the electronic product.

[0020] Compared to the existing techniques, the invention has following advantages. The center of operating part and the center of the switch element are misaligned, which is different to the technical solution of the existing key structure design where the two are located on a same central line. When an internal structure of the electronic product is very compact and has a narrow space due to other structures around the key structure of the electronic product or due to an electrical design, key fitness of the existing technique cannot be implemented, and by applying the key structure of the invention, the electrical switch element can be placed to a portion with relatively large space.

[0021] Moreover, even in case of the misalignment, the embodiment of the invention may further achieve good key operating feeling.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] By considering the detailed description of the preferred embodiment of the invention below with the accompanying drawings, all kinds of objectives, features and advantages will be more obvious. The accompanying drawings are merely exemplified illustrations of the invention, and are not certainly drawn to scale. In the accompanying drawings, the same reference numbers always refer to the same or similar components.

FIG. 1 is a schematic diagram of a simplified structure of a key structure of a push-button switch in the existing technique.

FIG. 2 is a schematic diagram of a key structure of a simplified model according to an embodiment of the invention.

FIG. 3 is a schematic diagram of various parameters

of a key structure of a simplified model according to an embodiment of the invention.

FIG. 4 is a top view of a key structure of an electronic product according to an exemplary embodiment of the invention.

FIG. 5 is a cross-sectional view of the key structure of FIG. 4 viewing along an A-A line.

FIG. 6 is an exploded view of a key structure of an electronic product before assembling.

FIG. 7 is a structure schematic diagram of the key structure of the electronic product after assembling.

DESCRIPTION OF EMBODIMENTS

[0023] The exemplified embodiments will now be described more comprehensively by referring to the accompanying drawings. However, the exemplified embodiments may be applied in various forms, and should not be understood as being limited to the embodiments expounded herein. On the contrary, the invention will be comprehensive and complete through the embodiments provided, and the conceptions of the exemplified embodiments are conveyed to a person of ordinary skill in the art comprehensively. The same reference numbers in the drawings refer to the same or similar structures, and therefore detailed descriptions thereof will be omitted.

[0024] The invention provides a key structure of an electronic product, and the key structure can be installed on a housing of the electronic product, where the key structure can be used to trigger at least one switch element in the housing of the electronic product to implement instruction input.

[0025] FIG. 2 is a schematic diagram of a key structure of a simplified model according to an embodiment of the invention. FIG. 3 is a schematic diagram of various parameters of a key structure of a simplified model according to an embodiment of the invention. As shown in FIG. 2 and FIG. 3, the key structure of the embodiment mainly includes a key body 1, an operating part 2 and an execution part 3.

[0026] The key body 1 of the present embodiment may selectively include a fixing portion 11, and the fixing portion 11 may be selectively located at one end of the key body 1, and the fixing portion 11 may be fixed to a housing of an electronic product, so as to fix the key body 1 in the housing of the electronic product. The fixing portion 11 may be quickly assembled and fixed to the housing through an engagement structure. The operating part 2 is installed on an outer surface of the key body 1, and the operating part 2 may be in form of an input device such as a button or a keycap, etc., which is adapted to be pressed or toggled by an operator though an external force by using a hand or other tools. Therefore, the operating part 2 may be located at an outer surface of the housing of the electronic product or can be located higher than the outer surface of the electronic product. As shown in FIG. 3, a distance between the operating part 2 and the fixing portion 11 is a first distance L1, and the distance

defined here is measured from a central line of one part to a central line of another part.

[0027] The execution part 3 of the present embodiment is located between the switch element 4 and the key body 1, and the key body 3 may be selectively assembled to an inner surface of the main body 1, and the main body 1 may drive the execution part 3 to move directly. The execution part 3 is adapted to trigger the switch element 4 downward, as shown in FIG. 3, a distance between the execution part 3 and the fixing portion 11 is a second distance L2. In the embodiment shown in the figure, the first distance L1 is selectively smaller than the second distance L2, such that a stroke of the operating part 2 may be smaller than a stroke of the execution part 3. The distance defined here is measured from a central line of one part to a central line of another part. In another embodiment, the execution part 3 and the operating part 2 may be selectively located at the same side of the key body 1, and in this case, the switch element 4 may be selectively pulled for triggering.

[0028] The aforementioned "outer side", "inner side" are defined with reference of the housing of the electronic product. One side of the housing corresponding to internal circuits and electrical devices is generally defined as the inner side, and one side of the housing corresponding to an external surface is generally defined as the outer side.

[0029] The above embodiment of the invention applies a leverage principle. The key body 1 is selectively made of a flexible material, one end of the key body 1 is fixed, and the operating part 2 of the key and the switch element 4 are located at another end of the key body 1. When the operating part 2 is pressed as that shown in FIG. 2, the front end of the key is pressed accordingly and contacts the switch element 4.

[0030] Calculation is performed as follows according to various parameters:

L1 is the first distance between a center of the operating part 2 and a center of the fixing portion 11;
L2 is the second distance between a center of the switch element 4 and the center of the fixing portion 11;

H1 is a distance between a top effecting end surface of the switch element 4 and a bottom surface of the execution part 3 (the so-called "bottom" is only described as the lowest end surface of the execution part 3 in accordance with the upper and lower relations of the drawings, and the invention is not limited thereto, and those skilled in the art may express the same by using other locality words);

H2 is an operation stroke of the switch element 4 (a distance between an initial position and a motion position);

H3 is a stroke of the operating part 2.

[0031] In the aforementioned embodiment, each of the parameters may be adjusted to find the most suitable

operation strokes to improve the operating feeling.

[0032] Through theoretical calculation, it is known $H3/L1 = (H1+H2)/L2$;

Therefore, $H3 = (H1+H2) * L1/L2$;

5 The specific value of H3 may be set according to a required key pressing feeling, and values of H1 and H2 may be accordingly deduced. In the present embodiment, regarding a general electronic product, in order to acquire a better operating feeling, H3 may be set between 0.3 mm and 0.5 mm as an example, and the corresponding value range may be obtained according to the aforementioned equation.

[0033] It should be understood that the invention may be applied to a large-volume product or a product with similar usage environment. For example, on the large-volume product, the key operating feeling is quite the opposite, and a longer pressing stroke is needed to perform an obvious pressing process. At this time, H3 may be selectively greater than 0.5 mm according to requirement. However, the specific value is not limited thereto.

[0034] In the above embodiment, the first distance L1 is selectively smaller than the second distance L2. However, it should be understood that the first distance L1 may be selectively greater than the second distance L2, i.e.

25 H3 is greater than H1+H2.

[0035] In the embodiment of the invention, the center of the operating part 2 and the center of the switch element 4 are misaligned, which is different to the technical solution of the existing key design where the two are located on a same central line. When an internal structure of the electronic product is very compact and has a narrow space due to other structures around the key structure of the electronic product or due to an electrical design, key fitness of the existing technique cannot be implemented. By applying the structure of the above embodiment of the invention, the electrical switch element 4 may be placed to a portion with relatively large space, and even in case of the misalignment, the above embodiment of the invention may further achieve good key operating feeling.

[0036] A specific embodiment of the invention is described below with reference of a product structure. FIG. 4 is a top view of a key structure of an electronic product according to an exemplary embodiment of the invention. FIG. 5 is a cross-sectional view of the key structure of FIG. 4 viewing along an A-A line. FIG. 6 is an exploded view of the key structure of the electronic product before assembling. FIG. 7 is a structure schematic diagram of the key structure of the electronic product after assembling.

[0037] As shown in the figures, the key structure may be installed to a housing 5 of an electronic product, and the key structure may be used to trigger at least one switch element in the housing of the electronic product to implement instruction input. The structural principle of the key structure has been introduced in the aforementioned description, so that details thereof are not repeated. The key body 1 is made of a flexible material, and

the flexible material is, for example, plastic or other flexible metal or non-metal materials. The operating part 2 is located at the outer surface of the key body 1, and the execution part 3 is located at the inner surface of the key body 1. The key body 1 presents a plate shape, the key body 1 has an operating plane, the operating plane is located at an end of the key body 1 away from the fixing portion 11, and the operating plane is shifted to an outside of the housing by a certain distance. The operating part 2 is formed on an outer surface of the operating plane.

[0038] Mainly referring to FIG. 5, the fixing portion 11 may be quickly assembled and fixed to the housing 5 through an engagement structure. A general engagement structure may include an engaging post 51 and an engaging hole 111, and the engaging post 51 and the engaging hole 111 are adapted to engage to each other. As shown in figures, the engaging post 51 may be formed integrally with the housing 5, and correspondingly the engaging hole 111 is formed on the key body 1. The engaging hole 111 is a through hole with a specific shape formed on the key body 1, and the engaging post 51 may penetrate through the engaging hole 111 and selectively engage with the key body 1 at the edge of the engaging hole 111 through an engaging claw. Certainly, position relationship of the two may be exchanged. For example, the engaging post 51 may be disposed on the key body 1, and correspondingly the engaging hole 111 is formed on the housing 5. It should be understood that other engagement structures may also be selected to be the engagement structure, which is not limited thereto. Moreover, the fixing portion 11 is not limited to be fixed to the housing 5 only through the engaging structure, and it may also be fixed through screw connection or ultrasonic welding, for example.

[0039] The fixing portion 11 further includes a positioning portion, the positioning portion includes a positioning post 52 and a positioning sleeve 112, and the positioning post 52 is adapted to be inserted into the positioning sleeve 112. The positioning post 52 may be formed integrally with the housing 5, and correspondingly the positioning sleeve 112 is formed on the key body 1. Certainly, position relationship of the two may be exchanged. For example, the positioning post is disposed on the key body 1, and correspondingly the positioning sleeve is formed on the housing. The positioning portion limits a position of the fixing portion 11.

[0040] As shown in the figures, the engaging post 51 mainly includes a post body and an engaging claw, and an engaging step 113 may be formed at one side of the engaging hole 111, where the engaging step 113 may be formed integrally with the positioning sleeve 112, and the engaging claw may be engaged to the engaging step 113. By setting the engaging step 113, the fixing portion 11 may be conveniently disassembled.

[0041] FIG. 6 and FIG. 7 illustrate an assembling method of two parts of the invention. The oval hole in the middle of the positioning sleeve 112 is aligned with and pressed to the corresponding positioning post 52 on the

housing 5, and the key body 1 is fixed by the engaging post 51 on the housing 5, and the operating part 2 of the key may be exposed to the outer surface of the housing 5 of the electronic product, which may be used for a press operation.

[0042] In the embodiment of the invention, the center of operating part 2 and the center of the switch element 4 are misaligned, which is different to the technical solution of the existing key structure design where the operating part and the switch element are located on a same central line. When an internal structure of the electronic product is very compact and has a narrow space due to other structures around the key structure of the electronic product or due to an electrical design, key fitness of the existing technique cannot be implemented. By applying the structure of the above embodiment of the invention, the electrical switch element 4 may be placed to a portion with relatively large space, and even in case of the misalignment, the above embodiment of the invention may further achieve good key operating feeling.

Claims

1. A key structure of an electronic product, wherein the key structure is installed on a housing (5) of the electronic product, the key structure is adapted to trigger a switch element (4) in the housing (5) of the electronic product, and the key structure comprising:

a key body (1), wherein one end of the key body (1) has a fixing portion (11), and the fixing portion (11) is fixed to the housing (5);
an operating part (2), installed at an outer surface of the key body (1), wherein the operating part (2) is operated by an external force, and a distance between the operating part (2) and the fixing portion (11) is a first distance (L1);
an execution part (3), located between the switch element (4) and the key body (1), wherein the key body (1) drives the execution part (3) to move, the execution part (3) is adapted to trigger the switch element (4), a distance between the execution part (3) and the fixing portion (11) is a second distance (L2), and the first distance (L1) is smaller than or greater than the second distance (L2).

2. The key structure of the electronic product as claimed in claim 1, wherein the fixing portion (11) is fixed to the housing (5) through an engagement structure.
3. The key structure of the electronic product as claimed in claim 2, wherein the engagement structure comprises an engaging post (51) and an engaging hole (111), and the engaging post (51) and the engaging hole (111) are adapted to engage to each

other, wherein the engaging post (51) is disposed on the housing (5) and correspondingly the engaging hole (111) is formed on the key body (1), or the engaging post (51) is disposed on the key body (1) and correspondingly the engaging hole (111) is formed on the housing (5).

4. The key structure of the electronic product as claimed in claim 3, wherein the fixing portion (11) further comprises a positioning portion, the positioning portion comprises a positioning post (52) and a positioning sleeve (112), and the positioning post (52) is adapted to be inserted into the positioning sleeve (112), wherein the positioning post (52) is disposed on the housing (5) and correspondingly the positioning sleeve (112) is formed on the key body (1), or the positioning post (52) is disposed on the key body (1) and correspondingly the positioning sleeve (112) is formed on the housing (5). 10
5. The key structure of the electronic product as claimed in claim 3, wherein the engaging post (51) comprises a post body and an engaging claw, an engaging step (113) is formed at one side of the engaging hole (111), and the engaging claw is engaged to the engaging step (113). 15
6. The key structure of the electronic product as claimed in any of claims 1-5, wherein the key body (1) is made of a flexible material. 20
7. The key structure of the electronic product as claimed in any of claims 1-5, wherein the operating part (2) and the key body (1) are formed integrally, or the operating part (2) is assembled and fixed to the key body (1), wherein the execution part (3) is located at an inner surface of the key body (1), wherein the execution part (3) and the key body (1) are formed integrally, or the execution part (3) leans against the key body (1). 25
8. The key structure of the electronic product as claimed in any of claims 1-5, wherein the key body (1) presents a plate shape, the key body (1) has an operating plane, the operating plane is located at an end of the key body (1) away from the fixing portion (11), the operating plane is shifted to an outside of the housing (5) by a certain distance, and the operating part (2) is formed on an outer surface of the operating plane. 30
9. The key structure of the electronic product as claimed in any of claims 1-5, wherein L1 is the first distance, L2 is the second distance, H1 is a distance between a top effecting end surface of the switch element (4) and a bottom surface of the execution part (3), H2 is a distance between an initial position and a motion position of the switch element (4), and 35

H3 is a stroke of the operating part (2), wherein $H3 = (H1 + H2) * L1 / L2$, and H3 is between 3 mm and 0.5 mm.

10. An electronic product, having a housing (5), wherein the housing (5) is installed with at least one key structure of the electronic product as claimed in any of claims 1-9. 40

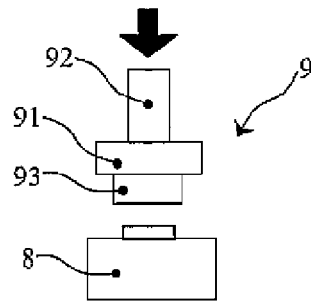


FIG.1

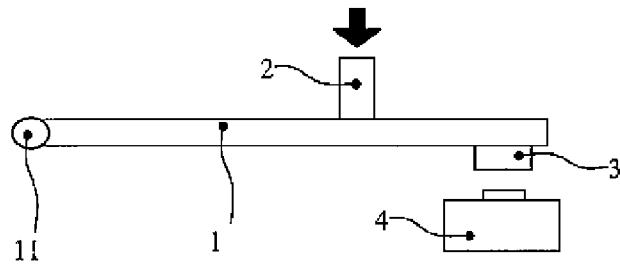


FIG.2

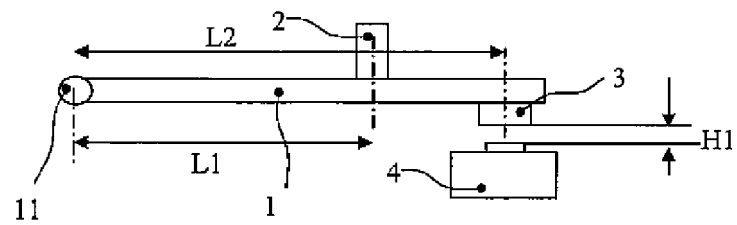


FIG. 3

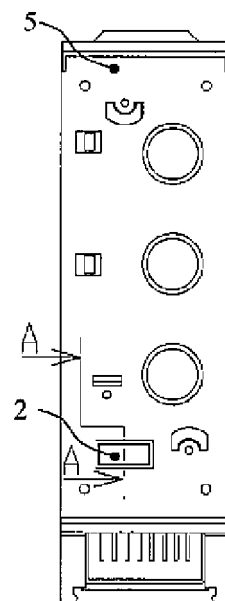


FIG. 4

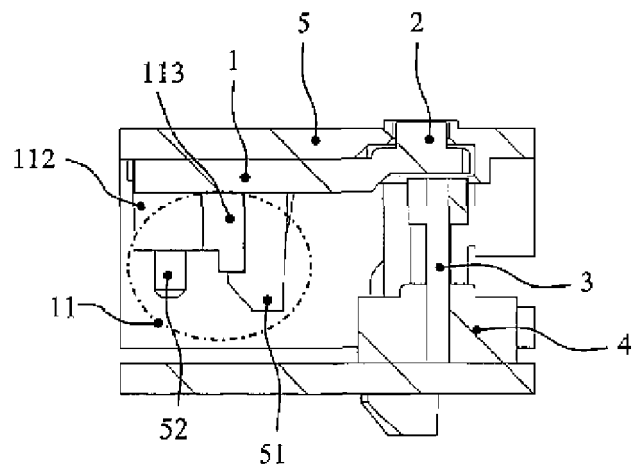


FIG.5

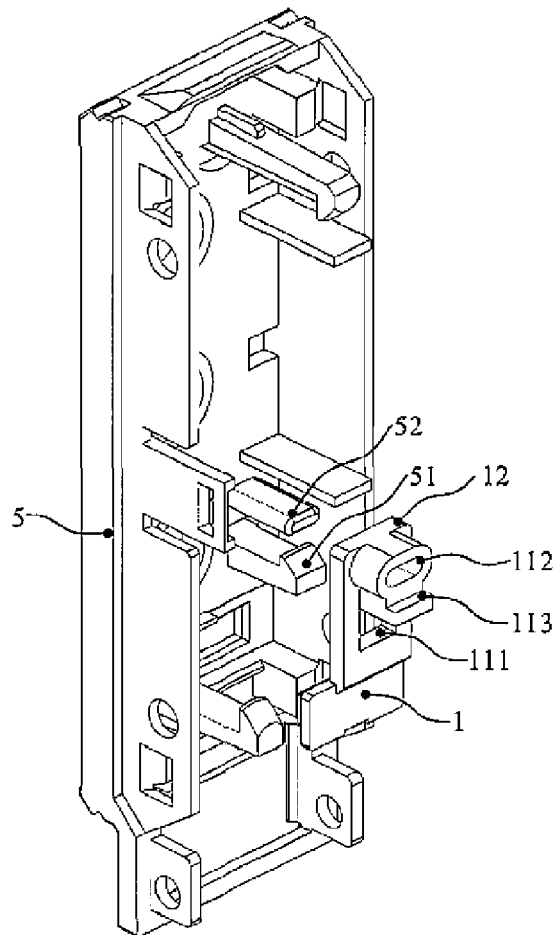


FIG.6

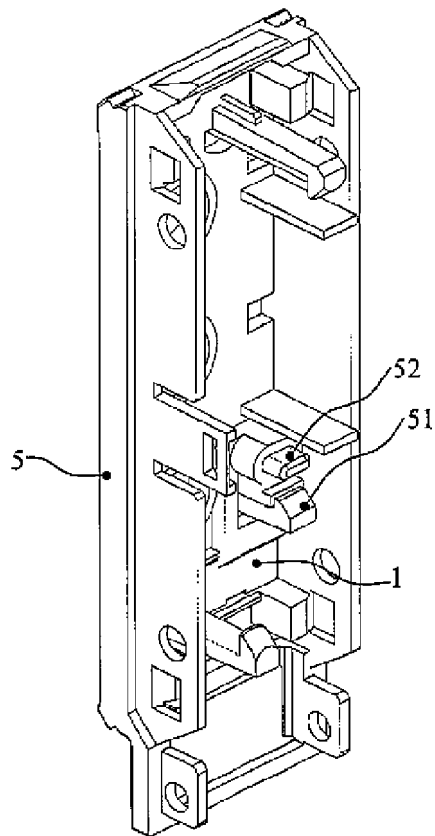


FIG.7



EUROPEAN SEARCH REPORT

Application Number
EP 16 20 2136

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CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 16 20 2136

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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