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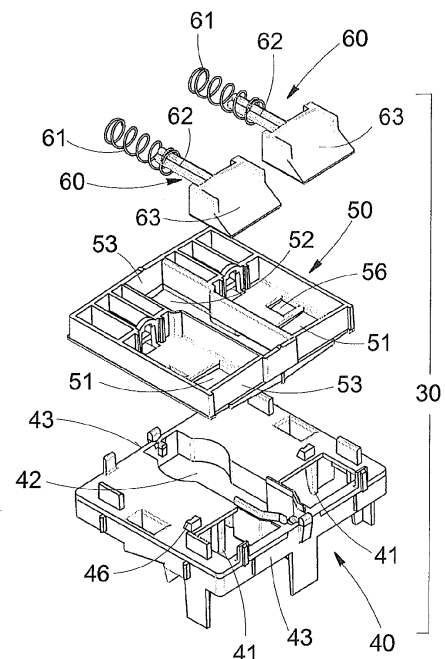
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(54) **Safety device for electrical socket**

(57) Safety device (30) for electrical sockets (1), designed to be interposed between a body (10) for containing the electrical contacts of the socket and a cover (20) having at least one pair of openings (21) for access to said phase and neutral electrical contacts of the socket, said safety system (30) comprising shutter elements (60) pushed by elastic means (61) normally to occlude said openings (21) to prevent the access to said electrical contacts and which can be moved away from said openings (21) when the pins of an electrical plug are inserted therein, but not when a foreign body is inserted in only one of said openings (21), wherein said shutters (60) are separated one in relation to the other and are placed on an oscillating body (50) able to oscillate around an axis X-X placed centrally to them when a thrust force is exerted on only one of these shutters through one of said openings (21) of the cover (20), so as to avoid any displacement of said shutters (60) from their position of occlusion of said openings (21).

FIG. 2



EP 2 709 213 A1

Description

[0001] The object of the present invention is a safety device for electrical sockets, particularly suitable for multistandard sockets, i.e. suitable for receiving different types of plugs, on the basis of the standards of the various countries.

[0002] A safety device for electrical sockets has to allow the insertion of the relative plug in the cells of the socket in order to perform the electrical connection, but has to prevent the access to these cells, and therefore to the live electrical contacts, by foreign bodies, for example if a punch is inserted in one of the cells of the socket.

[0003] For this purpose shutters placed in the body of the socket are used, so as to occlude normally the holes of access to the contact terminals, and to move, in contrast to the action of elastic means, to allow the insertion of the pins of a plug.

[0004] An "unbalanced" force which acts on the shutter, such as might be for example that of a foreign body inserted in one of the holes of access of the socket, does not succeed in producing the displacement of the shutter, which remains as protection of the underlying electrical contacts.

[0005] Existing shutters are normally made in a single part and designed for the single standards of electrical sockets.

[0006] In the case of multistandard sockets which, in addition to having the phase and neutral cells of various configuration, have the earth cell varyingly arranged along the midline of the previous ones, known shutters cannot normally be used in that they would go to occupy part of the central area of the socket, not allowing the insertion of the earth pin of the various standards.

[0007] FR - 2.826.787 A1 describes a shutter system for electrical sockets, suitable for being placed between a body of containment of the electrical contacts of the socket and a cover having a pair of openings of access to said electrical contacts, wherein the shutter is made up of a structure divided into two parts along a plane passing through the midline joining said pair of openings of access to the electrical contacts. The two parts of shutter are hooked one to the other, slide between each other and oscillate on an axis of fulcrum belonging to the same structure of the shutter, placed on a median plane orthogonal to the aforesaid plane passing through the midline of said pair of openings. With such an arrangement of parts it is not possible to keep the area between the two openings clear for the insertion of the earth pin of various standards of sockets.

[0008] The object of the invention is that of eliminating or at least reducing the disadvantages of the prior art.

[0009] In particular an object of the invention is that of providing a safety device for electrical sockets which is extremely reliable and of simple design.

[0010] Another object of the invention is that of providing such a safety device which is particularly suitable for

multistandard sockets.

[0011] These and other objects are achieved by the safety device according to the invention which has the features of the annexed independent claim 1.

[0012] Advantageous embodiments of the invention are disclosed by the dependent claims. Substantially, the safety device according to the invention comprises a support base, an oscillating body and a pair of shutters completely unrestrained one from the other, suitable for occluding the holes of access of the phase and neutral cells.

[0013] Both the support base and the oscillating body have a plurality of holes varyingly shaped according to the various standards of sockets.

[0014] More particularly, conveniently, a pair of symmetrical holes are provided, shaped in such a way as to accommodate the phase and neutral pins of different standards and a wide central window for the different earth pins.

[0015] The single shutters are placed in such a way as to leave completely clear the central zone of the socket, so as to allow the free access of the different standards of earth pins.

[0016] The shutters have a shape with plane inclined in the direction of insertion of the pins, in such a way that the latter cause the displacement thereof in contrast to the action of elastic means.

[0017] If a thrust force is exerted only on one of the two shutters, such as might be the case wherein a foreign body is inserted in one of the holes corresponding to the phase or neutral cells, the oscillating body oscillates around its median axis and the displacement of the shutters is prevented by a projection present on the support base and on a cover respectively.

[0018] Further features of the invention will be made clearer by the following detailed description, referred to one of its embodiments purely by way of a non-limiting example illustrated in the accompanying drawings, in which:

Figure 1 is a schematic perspective view of a multiple power socket incorporating the safety device according to the invention;

Figure 2 is a blown-up view of the components of the safety device;

Figure 3 is a view of the safety device assembled;

Figure 4 is a sectioned view of the safety device of Figure 3 provided with cover, taken along line IV-IV;

Figure 5 is a partial sectioned view taken along line V-V of Fig. 4;

Figure 6 is a section like that of Figure 4, with the inclined oscillating body which prevents the displacement of the shutters;

Figure 7 is a perspective view from above of the safety device according to the invention, with the oscillating body inclined;

Figure 8 is a fictitious schematic view, with the shutters seen from below inside the cover in order to

show the projections for blocking their displacement when the oscillating body is inclined;

Figures 9 and 12 are schematic views showing various types of plugs which can couple with the multi-standard socket provided with the safety device according to the invention.

[0019] Referring to these drawings, and for the time being in particular to Figure 1, reference numeral 1 denotes a multistandard socket provided with the safety device according to the invention which will be described in detail herein below.

[0020] The socket 1 comprises substantially a box of containment 10, wherein are housed the electrical contacts and the cells suitable for receiving the jacks or pins of various plugs, and a cover 20 carrying means 27 for the assembly of the socket 1 in frames of support of modular electrical apparatuses. More particularly the socket 1 occupies two modules of these series of modular electrical apparatuses.

[0021] The safety device according to the invention, denoted by reference numeral 30, is illustrated in particular in Figures 2 and 3 and is placed inside the box 10, and closed above by the cover 20.

[0022] It substantially comprises a support base 40, an oscillating body 50 and a pair of shutters 60.

[0023] Both the support base 40 and the oscillating body 50 have, adjacent to one of their sides, a respective pair of openings 41, 51, in this case with a substantially rectangular shape, placed aligned one with the other. Below these openings the cells of the phase and neutral terminals of various standards are positioned, not shown in the drawings for reasons of clarity and because considered in themselves known.

[0024] In the central part of the base 40 and of the oscillating body 50, between the abovementioned pairs of openings 41, 51, and perpendicularly to the side adjacent to which they are placed, a respective elongated opening 42, 52 is provided, extending practically between two opposite sides of the aforesaid elements.

[0025] Below said elongated openings 42, 52, also arranged aligned one with the other, the cells of the earth terminals of various standards of the socket are positioned.

[0026] Correspondingly a pair of openings 21 are formed in the cover 20, placed aligned with the aforementioned openings 41, 51, and shaped in such a way as to be able to accommodate pins of the various standards of plugs, and an elongated opening 22, aligned with the aforementioned openings 42, 52, shaped in such a way as to be able to accommodate the earth pins of the various standards of plugs.

[0027] The oscillating body 50 has two opposite sides 53 with a cusp shape, which rest centrally at corresponding opposite sides 43 of the support base 40, so as to be able to oscillate around an axis X-X (see in particular Figure 7) passing through the midline of said elongated openings 42 - 52.

[0028] The shutters 60 are placed on the oscillating body 50 to cover the underlying holes 51, where they are pushed by respective springs 61 placed around corresponding stems 62 and acting between them and respective small contrast walls 54 provided on the oscillating body and provided with respective holes 55 wherein the aforementioned stems 62 slide.

[0029] The shutters 60 have a wedge shape, with an inclined upper wall 63 turned towards a respective shaped opening 21 above of the cover 20.

[0030] On the support base 40, behind the aforementioned openings 41, two small projections 46 are provided, placed aligned with corresponding holes 56 formed in the oscillating body 50 behind the aforementioned openings 51.

[0031] The projections 46 arrive at a lower level than the openings 56 when the oscillating body 50 is perfectly plane, yet are suitable for inserting in these openings when the oscillating body is made to oscillate in one direction or in the other.

[0032] Two further projections 26 are provided inside the cover 20 (see in particular Figure 8), arriving at a higher level than the shutters 60 when the oscillating body 50 is in a perfectly horizontal position yet interfering with these shutters when the oscillating body is made to oscillate in one direction or in the other, as will be explained in greater detail herein below.

[0033] The sections of Figures 4 and 5 show schematically the proper functioning of the safety device according to the invention when a plug is inserted in the socket 1.

[0034] In Figure 4 the two side arrows indicate the insertion of the phase and neutral pins in the pair of shaped openings 21 of the cover 20, below which the shutters 60 are placed, while the central arrow indicates the direction of insertion of the earth pin in the central opening 22 of the cover, which freely communicates with the underlying openings 52, 42, respectively of the oscillating body 50 and of the support base 40.

[0035] The action of symmetrical thrust exerted by the pins of the plug on the two shutters 60 means that the oscillating body 50 is maintained in a perfectly horizontal position. At the same time said pins acting on the inclined planes 63 of the shutters 60, as the vertical arrow in Figure 5 schematises, produce the backward movement of the shutters, as indicated by the horizontal arrow in Figure 5, in contrast to the action of said springs 61.

[0036] Figures 9 to 12 illustrate schematically different types of plugs, whose phase and neutral pins, differently shaped, determine a proper functioning of the safety device 30 according to the invention, applied to the multi-standard socket 1 illustrated in Figure 1.

[0037] Should an attempt be made to insert a foreign body in only one of the openings 21 formed in the cover 20, as schematically shown by the vertical arrow in the section of Figure 6, the unbalanced force acting on only one of the shutters 60 produces an oscillation of the oscillating body 50, as schematically shown by the curved arrow in Figure 6.

[0038] This oscillation means that a projection 46 provided on the support base 40 penetrates the corresponding hole 56 of the oscillating body, on the side wherein the latter is inclined downwards, going to interfere with the corresponding shutter 60, preventing the backward movement thereof.

[0039] At the same time the other shutter 60, placed on the side wherein the oscillating body is inclined upwards, goes to interfere with the corresponding projection 26 formed inside the cover 20, and is prevented from moving backwards.

[0040] Therefore access to the underlying live terminals of the phase and neutral pins is avoided, should an attempt be made to insert in the holes of the socket objects different from the electrical plugs of the standards which it can accommodate.

[0041] The fact of having provided two separate shutters 60 allows the possibility of having the central area of the socket completely free in order to be able to accommodate earth terminals of plugs of the various standards, ensuring in any case safety thanks to the oscillation of the oscillating body 50 should an attempt be made to insert a foreign body in the holes of the socket.

[0042] From what is disclosed the advantages of the safety device according to the invention appear clear, which however must not be considered limited to the embodiment previously described and illustrated purely by way of an example, the scope of the invention being determined only by the annexed claims.

Claims

1. Safety device (30) for electrical sockets (1), designed to be interposed between a body (10) for containing the electrical contacts of the socket and a cover (20) having at least one pair of openings (21) for access to said phase and neutral electrical contacts of the socket, said safety system (30) comprising shutter elements (60) pushed by elastic means (61) to occlude normally said pair of openings (21) to prevent the access to said electrical contacts and which can be moved away from said pair of openings (21) when the pins of an electrical plug are inserted therein, but not when a foreign body is inserted in only one of said openings (21),
said safety device being **characterised in that** said shutters (60) are separated and unrestrained one in relation to the other, each one normally occluding a respective opening (21), said shutters (60) being placed on a separate oscillating body (50) able to oscillate around an axis X-X when a thrust force is exerted on only one of these shutters through one of said openings (21) of the cover (20), so as to avoid any displacements of said shutters (60) from their position of occlusion of said openings (21), said axis of oscillation X-X of the oscillating body (50) being placed centrally between said shutters (60) and

passing through the midline of an elongated opening (52) provided in said oscillating body (50).

2. Safety device according to claim 1, **characterised in that** said oscillating body (50) rests on an underlying base (40), a pair of openings (51), (41) being provided in the oscillating body (50) and in the support base (40) respectively, aligned one with the other and with said openings (21) of the cover (20).
3. Safety device according to claim 2, **characterised in that** on said support base (40) a pair of projections (46) are provided adjacent to said pair of openings (41), aligned with corresponding holes (56) provided in the oscillating body (50), such that when the oscillating body (50) is in an inclined position, one of said projections (46) penetrates a corresponding hole (56) and interferes with the corresponding shutter (60) avoiding the displacement thereof.
4. Safety device according to any one of the preceding claims, **characterised in that** a pair of projections (26) are provided inside said cover (20) adjacent to said openings (21), designed to interfere with a respective shutter (60) preventing displacement thereof, when said oscillating body (50) is inclined in one direction or the other.
5. Safety device according to any one of the preceding claims, wherein said shutters (60) have a wedge body with an inclined upper wall turned towards said openings (21) of the cover (20).
6. Safety device according to any one of the preceding claims, wherein said shutters (60) have a respective stem (62) and said elastic means (61) are springs placed around said stems and acting between the corresponding shutter and a fixed abutment (54) provided with a hole (55) for the sliding of said stem (62).
7. Safety device according to any one of claims 2 to 6, **characterised in that** centrally to said support base (40) between said pair of openings (41), an elongated opening (42) is provided, aligned with said elongated opening (52) provided in the oscillating body (50) and with a corresponding elongated opening (22) provided in the cover (20), shaped in such a way as to be able to receive earth pins of plugs of different standards.
8. Electrical socket (1) provided with a safety device (30) according to any one of the preceding claims.
9. Electrical socket according to claim 8, designed to receive plugs of different standards.

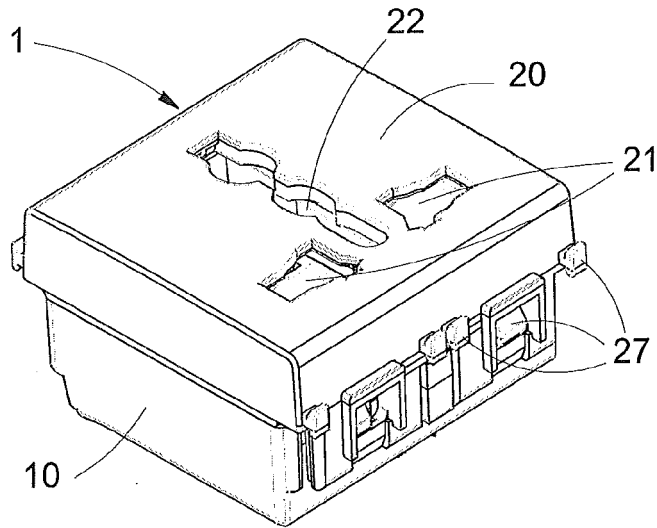


FIG. 1

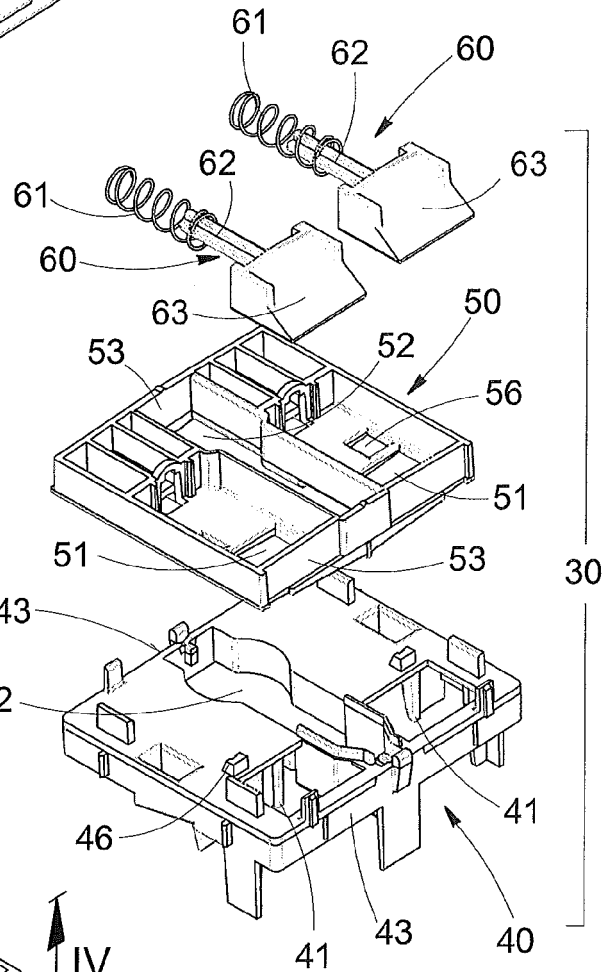


FIG. 2

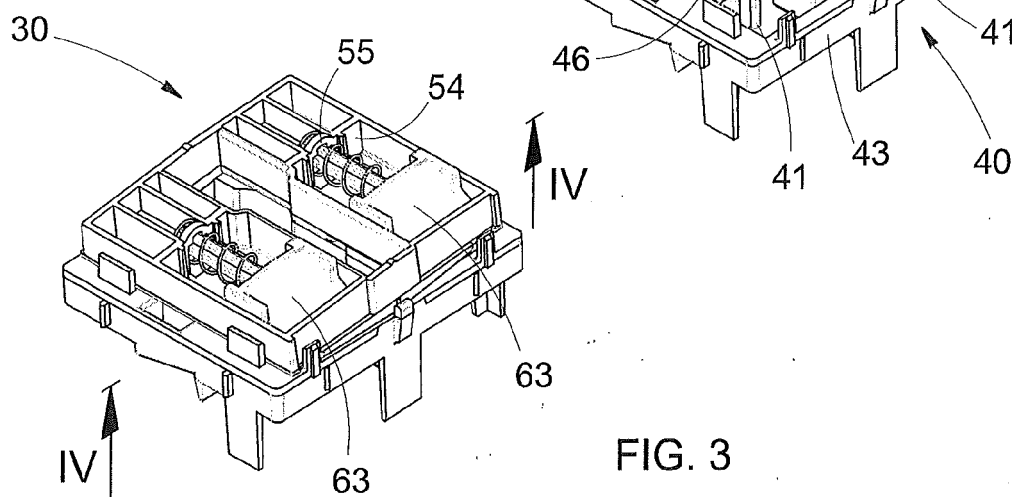


FIG. 3

FIG. 4

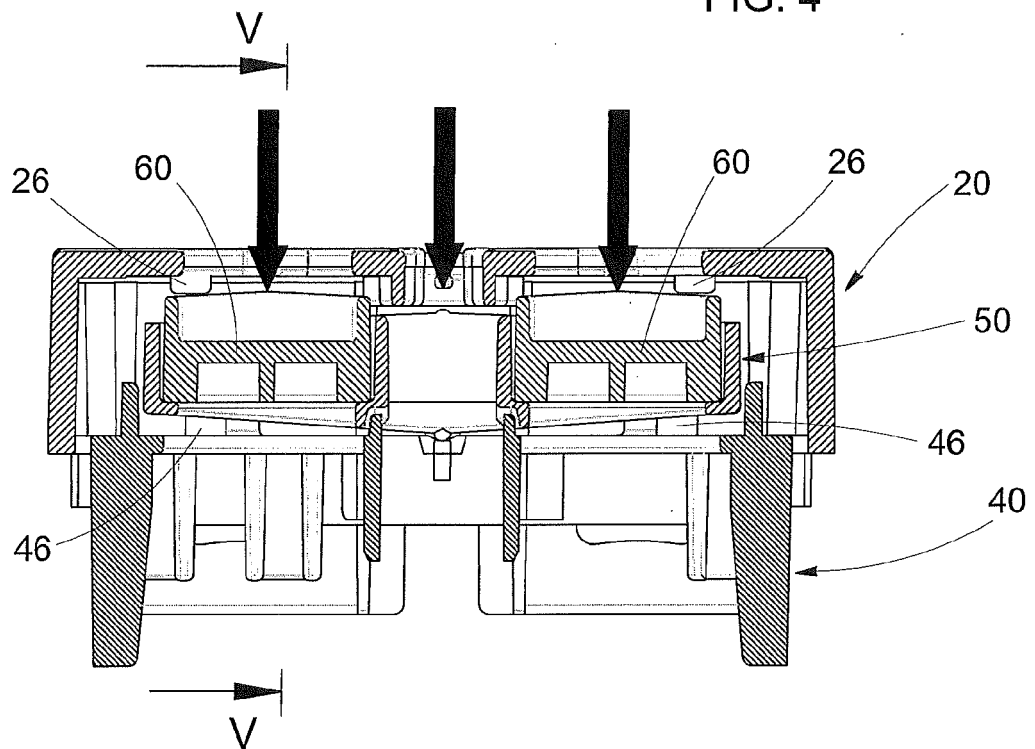
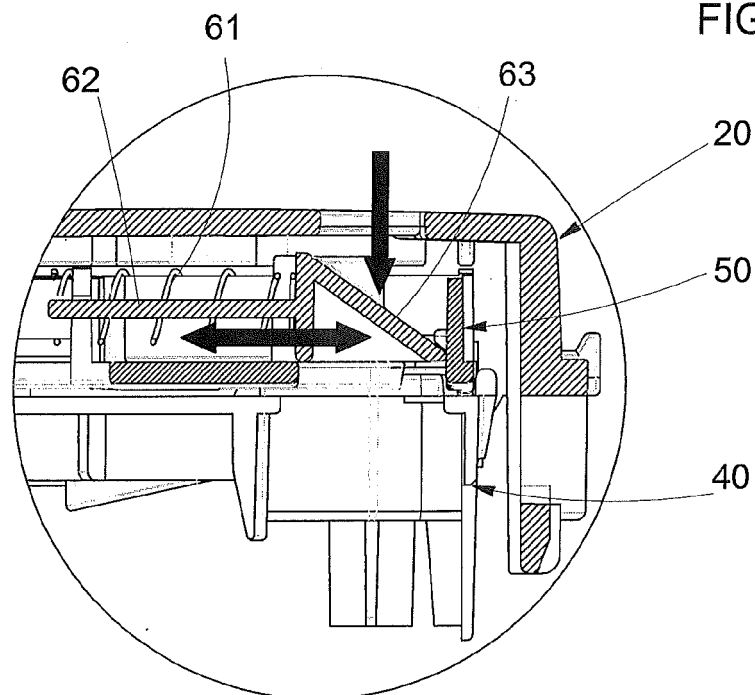


FIG. 5



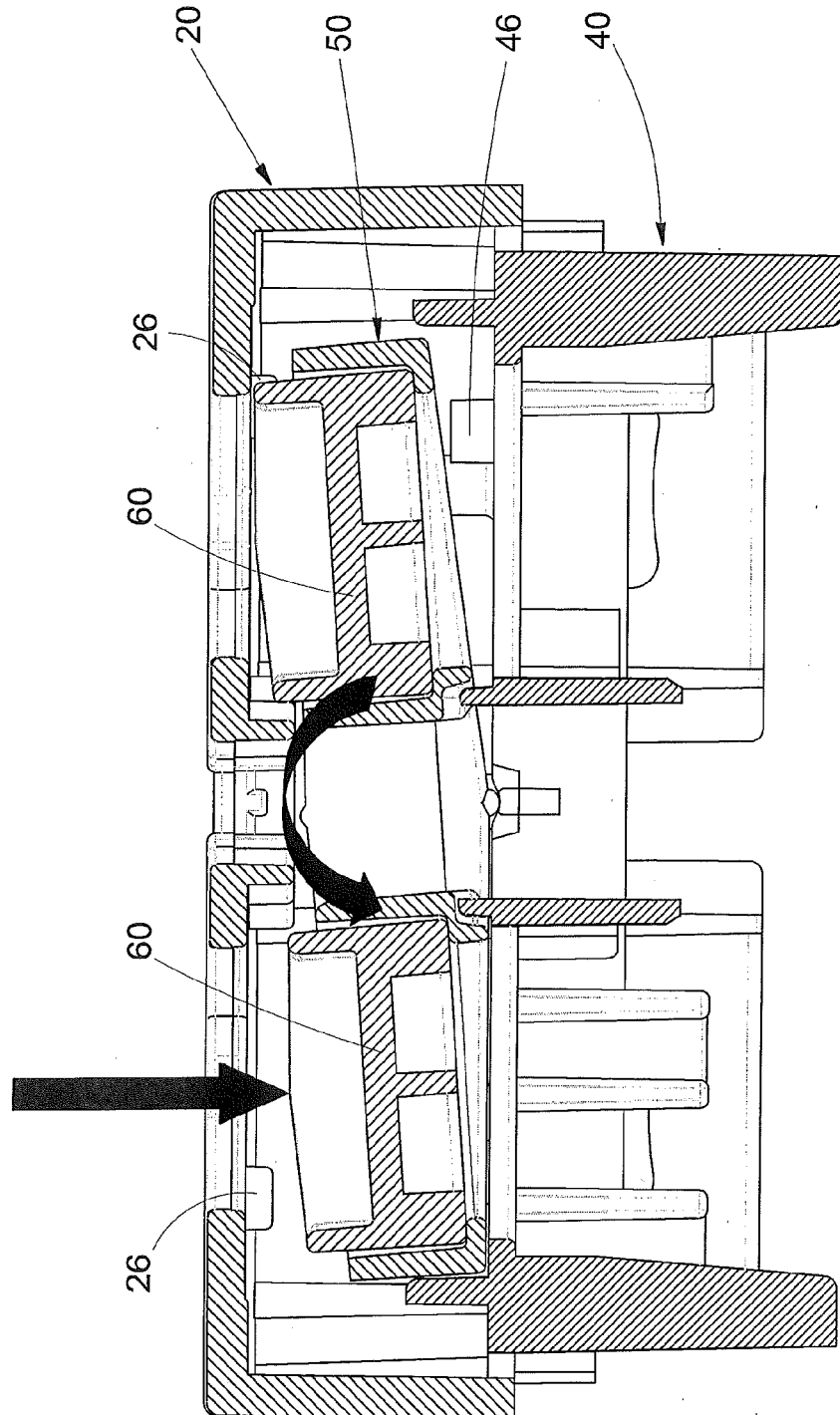
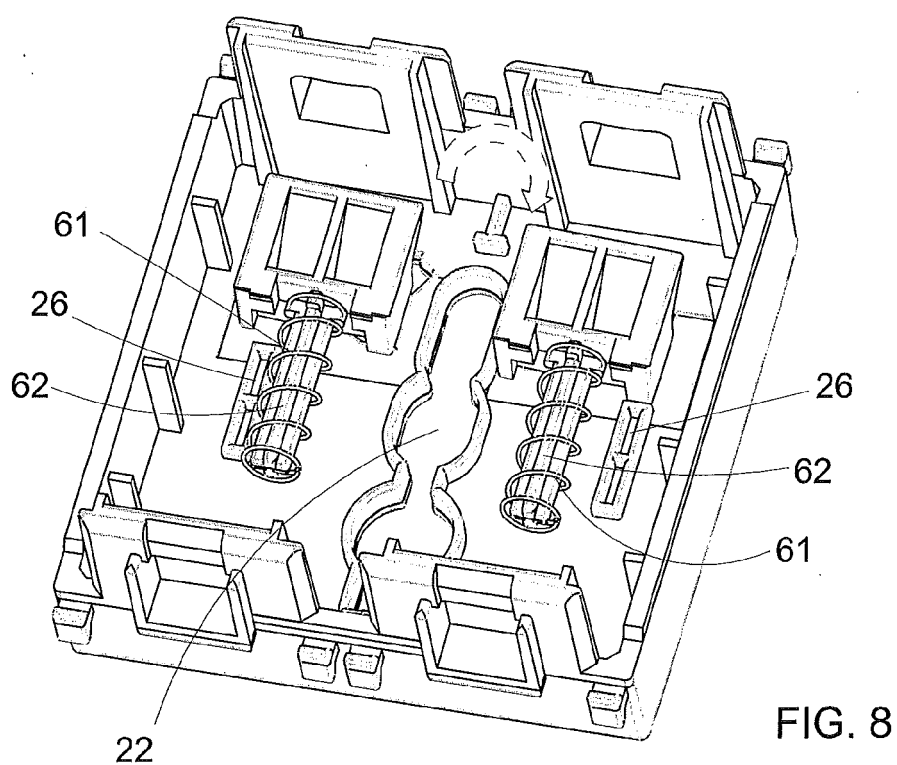
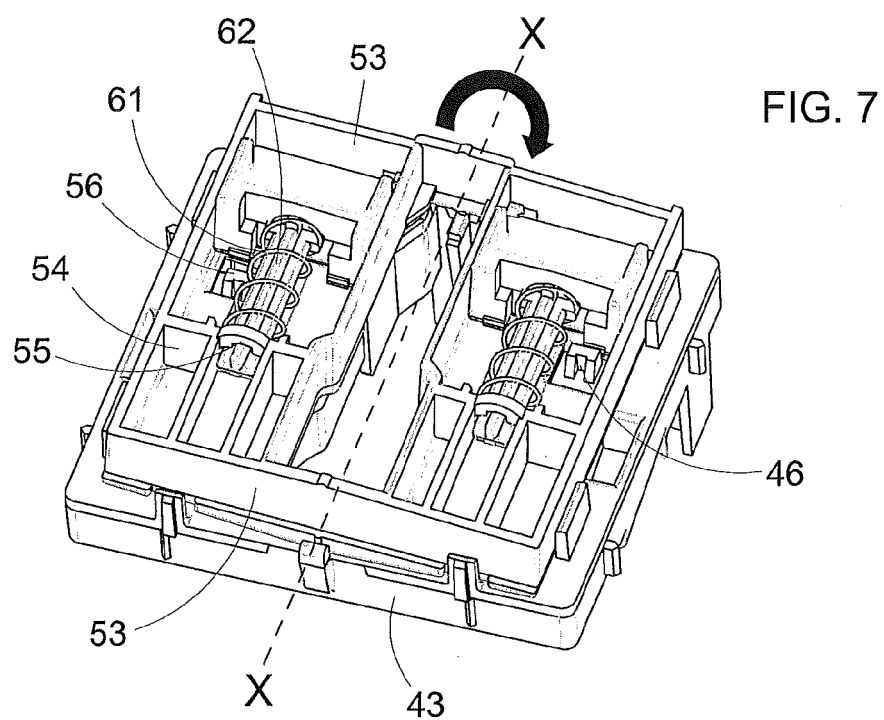
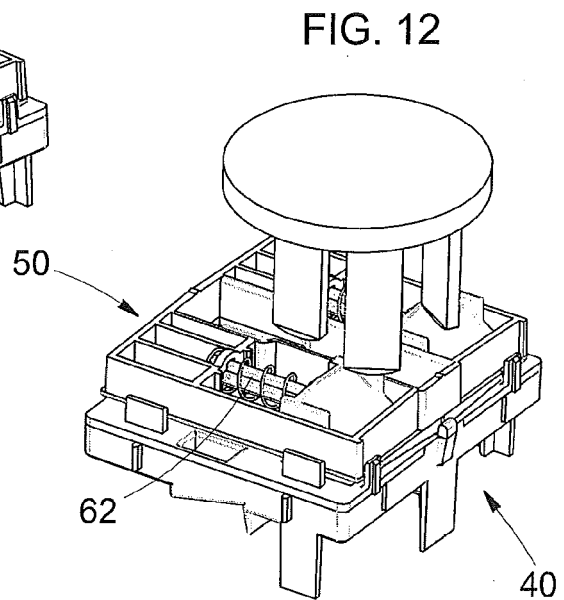
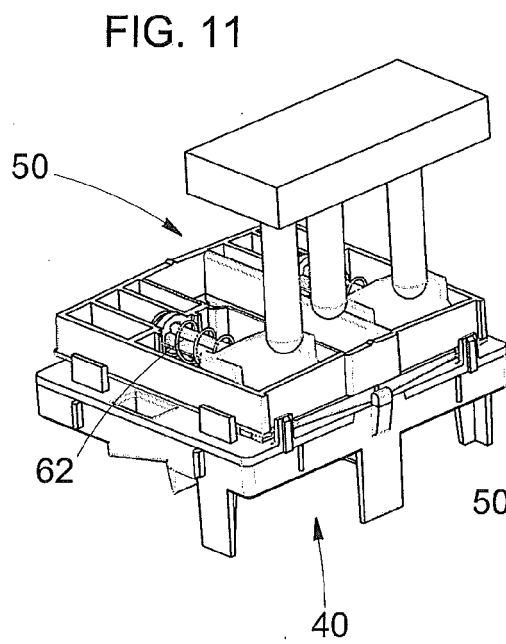
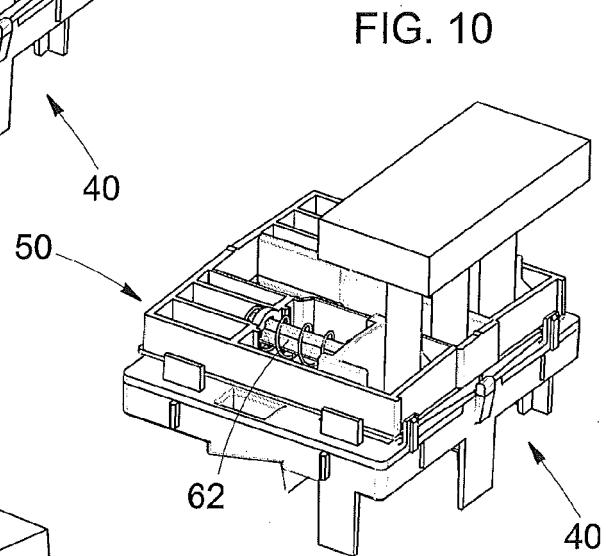
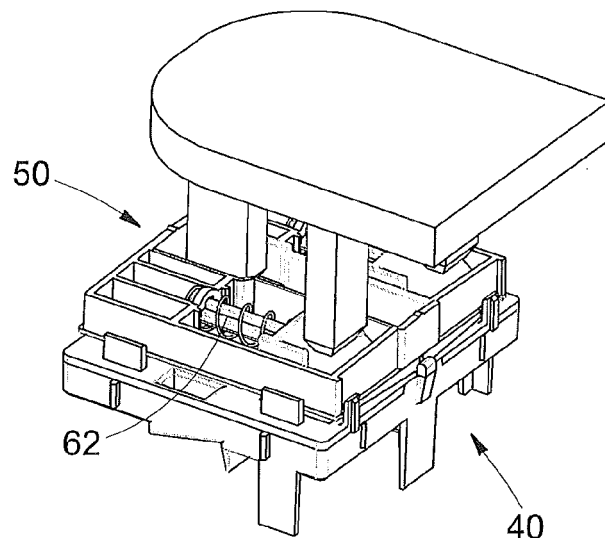


FIG. 6







EUROPEAN SEARCH REPORT

Application Number
EP 13 18 3762

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	US 7 857 640 B1 (LEE CHIU-SAN [TW] ET AL) 28 December 2010 (2010-12-28) * the whole document *	1,4-6,8,9	INV. H01R13/453 H01R24/78
Y	FR 2 784 807 A1 (LEGRAND SA [FR]) 21 April 2000 (2000-04-21) * the whole document *	1,4-6,8,9	ADD. H01R27/02 H01R103/00
Y	JP 2009 218194 A (PANASONIC ELEC WORKS CO LTD) 24 September 2009 (2009-09-24) * paragraph [0036]; figures 1-13 *	4	
A		1	
A	GB 2 454 953 A (NOVAR ED & S LTD [GB]) 27 May 2009 (2009-05-27) * abstract; figure 1 *	1-9	
			TECHNICAL FIELDS SEARCHED (IPC)
			H01R
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 28 November 2013	Examiner Vautrin, Florent
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 13 18 3762

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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28-11-2013

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 7857640	B1	28-12-2010	NONE	
FR 2784807	A1	21-04-2000	NONE	
JP 2009218194	A	24-09-2009	CN 101521331 A	02-09-2009
			JP 4535168 B2	01-09-2010
			JP 2009218194 A	24-09-2009
GB 2454953	A	27-05-2009	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- FR 2826787 A1 [0007]