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(54) Device for controlling an electric vehicle door lock

(57) A device (4) for controlling an electric lock of a vehicle door (1), having a respective supporting frame (5) fitted directly to the vehicle door (1), a pushbutton switch (13) fitted to the frame (5), and a single elastically deformable elongated body (24) which acts directly on the switch (13); the elongated body (24) being formed in one piece and having end portions (23), each of which is connected to the frame (5) to rotate with respect to the frame (5) about a respective instantaneous axis (29) movable crosswise to itself.

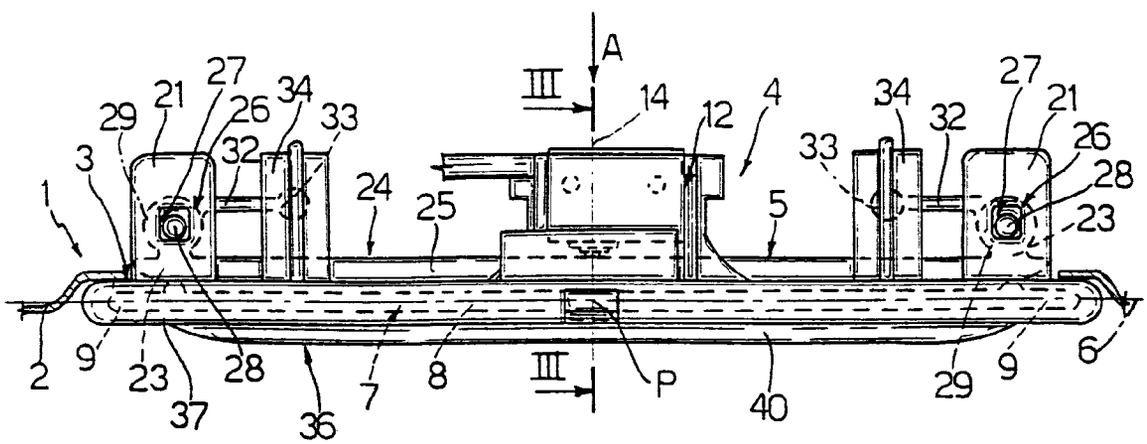

Fig.1

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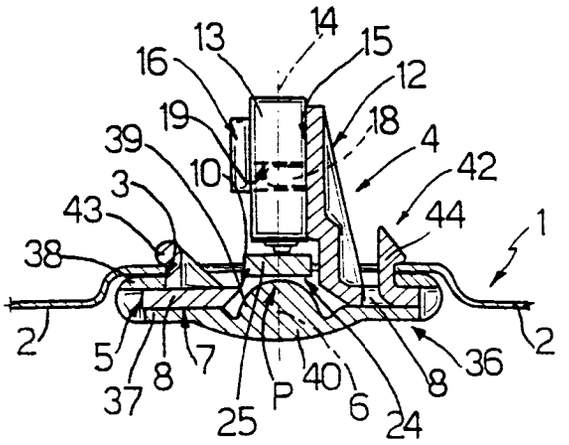
Fig.3



Description

[0001] The present invention relates to a device for controlling an electric vehicle door lock.

[0002] More specifically, the present invention relates to a control device of the type comprising a supporting frame fitted directly to a vehicle door; a pushbutton switch; and means for manually operating the pushbutton switch.

[0003] To operate the pushbutton switches controlling electric locks, various solutions are known, which normally comprise a push element fitted to the supporting frame and which is moved manually by the user into a forward switching position to activate the pushbutton switch; and one or more elastic reaction elements separate from the push element and interposed between the push element and the frame to keep the push element in the rest position.

[0004] Though used, known electric lock operating devices have several drawbacks, foremost of which are the large number of components involved, complex manufacture and assembly, and, consequently, high cost.

[0005] Moreover, some known solutions are only used on a very limited scale, on account of the push element only being movable into the forward switching position by acting on a given point of the device - an inconvenience which is rarely acceptable, especially by more demanding users.

[0006] It is an object of the present invention to provide a device for controlling an electric vehicle door lock, designed to eliminate the aforementioned drawbacks, and which, in particular, is straightforward and cheap to produce and provides for a high degree of reliability and efficiency.

[0007] According to the present invention, there is provided a device for controlling an electric lock of a vehicle door, the device comprising a respective supporting frame fitted directly to a vehicle door, a pushbutton switch fitted to the frame, and manual operating means for manually operating the pushbutton switch; characterized in that said manual operating means comprise a single elongated body at least partially deformable elastically and which acts directly on said pushbutton switch; relatively-movable means being provided to fit said elongated body to said frame.

[0008] A non-limiting embodiment of the invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a side view of a preferred embodiment of the control device according to the present invention, as fitted to a partially illustrated vehicle door;

Figure 2 shows a view, with parts removed for clarity, in the direction of arrow A in Figure 1;

Figure 3 shows a section, with parts removed for clarity, along line III-III in Figure 1.

[0009] Number 1 in Figures 1 and 3 indicates as a whole a vehicle door, the body 2 of which comprises an opening 3 through which extends a device 4 for operating an electric lock (not shown) of door 1.

[0010] Device 4 comprises a respective elongated frame 5 having a respective longitudinal axis 6 and in turn comprising an elongated annular plate 7. Plate 7 comprises two longitudinal portions 8 facing each other and parallel to axis 6; and two transverse portions 9 facing each other, extending perpendicular to axis 6, and defining, together with longitudinal portions 8, a rectangular opening 10 extending along axis 6 (Figures 2 and 3).

[0011] Frame 5 also comprises- a bracket 12 for supporting a known pushbutton switch 13, which is oriented with an axis 14 coincident with an activating direction of switch 13, perpendicular to axis 6, and intersecting axis 6 at a point P substantially equidistant from transverse portions 9 and from longitudinal portions 8. More specifically, bracket 12 defines a click-in seat 15 for switch 13, which is clicked into seat 15 through a lateral opening 16. Inside seat 15, switch 13 is maintained in a fixed position by a pair of pins 18, which extend inside seat 15 perpendicularly to axes 6 and 14, and each engage a respective through hole 19 in switch 13.

[0012] With reference to Figures 1 and 2, frame 5 also comprises, for each transverse portion 9, a pair of facing elastic walls 21 integral with respective portion 9 and extending parallel to and on opposite sides of a plane containing axes 6 and 14.

[0013] Walls 21 in each pair define a respective seat 22 for a respective end portion 23 of an elongated body 24 made of plastic material and also comprising an elongated intermediate portion 25, which extends at opening 10 and in a raised position with respect to plate 7, and which, in use, cooperates directly with, to operate or activate, switch 13.

[0014] Each portion 23 of body 24 is connected to the respective pair of walls 21 by a respective click-in connecting assembly 26 comprising, for each respective wall 21, a slot 27 parallel to axis 14 and facing the slot 27 in the other wall 21 in the same pair. The slots 27 formed in walls 21 in the same pair are engaged by respective pins 28, which are integral with respective portion 23, extend coaxially with a common axis 29 perpendicular to axes 6 and 14, and engage respective slots 27 in sliding manner in directions parallel to axis 14 and in rotary manner about common axis 29 to define, together with the respective walls, a hinge with a hinge axis movable crosswise to itself. Each pin 28 is defined axially by a respective inclined front surface 30, which, when fitting body 24 to frame 5, cooperates in sliding manner with a respective inclined lead-in surface internally defining respective wall 21, to enable pin 28 to click into and remain inside slot 27.

[0015] With reference to Figures 1 and 2, each portion 23 carries a respective integral elastic blade 32, which projects towards switch 13, is positioned facing and par-

allel to portion 25, and is separated transversely from portion 25 on the same side as switch 13. Each blade 32 has a respective cylindrical end portion 33 contacting a respective stop surface internally defining one arm of a respective L-shaped bracket 34, the other arm of which is integral with plate 7, and extends perpendicularly to plate 7 on the same side as walls 21.

[0016] As shown in Figures 2 and 3, plate 7 of frame 5 is covered partly by a hood-type seal 36 comprising an intermediate portion 37 covering the surface of plate 7 facing outwards in use, and a peripheral annular portion 38. More specifically, intermediate portion 37 extends on the opposite side of plate 7 to body 24, and comprises a pair of opposite elongated longitudinal projections 39 and 40 (Figure 3); projection 39 projects inwards of seal 36 through opening 10, loosely engages opening 10, and, in use, directly contacts portion 25 of body 24; while projection 40 projects outwards, and is defined by a cylindrical lateral surface acted on by the user to open the lock (not shown).

[0017] Annular portion 38 of seal 36 extends between plate 7 and body 2, and is gripped between plate 7 and body 2 by means of an assembly 42 for clicking frame 5 onto body 2 (Figure 3).

[0018] As shown particularly in Figure 3, assembly 42 comprises an elongated anchoring element 43, which is integral with plate 7, extends parallel to axis 6 through opening 3 in body 2, and is anchored to body 2; and a click-on appendix 44, which is also integral with plate 7, extends through opening 3 on the opposite side of body 24 to anchoring element 43, and terminates with a tooth clicked onto body 2.

[0019] In actual use, when projection 40 is pressed, as of the rest condition shown in Figures 1 and 3, seal 36 is deformed to move projection 39 gradually towards portion 25 of body 24 through opening 10. As soon as projection 39 contacts portion 25, elastic blades 32 are deformed to enable portions 23 to move with respect to respective walls 21, and portion 25 to activate switch 13. And as soon as the pressure applied by the user on projection 40 is released, blades 32 restore body 24 to the rest position.

[0020] As compared with known solutions, device 4 as described is therefore extremely straightforward to produce and quick to assemble. This is mainly due to switch 13 of device 4 being activated by a single body 24 made in one piece from plastic material and supporting integral elastic reaction elements, and by sliding body 24 along axis 6 and parallel to plate 7, so that portions 23 of body 24 slide between respective walls 21, and pins 28 click inside respective slots 27.

[0021] Unlike known solutions, the design characteristics of body 24 and the particular way in which body 24 is connected to frame 5 also enable switch 13 to be activated by pressing any portion of projection 40. That is, if pressure is applied by the user at point P, portion 25 of body 24 simply translates parallel to itself along axis 14, by both blades 32 being subjected to the same bending moment. Conversely, if pressure is applied on or close to one of hinge axes 29, portion 25 practically only rotates about the other hinge axis 29. In all the other intermediate conditions, portion 25 rotates and translates towards switch 13.

[0022] Being extremely straightforward in design, device 4 as described is therefore also highly reliable, which is further enhanced by the particular design of seal 36 and by permanent sealing of the frame-body connection.

Claims

1. A device (4) for controlling an electric lock of a vehicle door (1), the device (4) comprising a respective supporting frame (5) fitted directly to a vehicle door, a pushbutton switch (13) fitted to the frame (5), and manual operating means (24, 36) for manually operating the pushbutton switch (13); characterized in that said manual operating means (24, 36) comprise a single elongated body (24) at least partially deformable elastically and which acts directly on said pushbutton switch (13); relatively-movable means (26, 32) being provided to fit said elongated body (24) to said frame (5).

2. A device is claimed in Claim 1, characterized in that said elongated body (24) is formed in one piece from plastic material.

3. A device as claimed in Claim 1 or 2, characterized in that said elongated body (24) comprises an intermediate portion (25) facing said pushbutton switch (13) and acting, in use, directly on the pushbutton switch (13); and two lateral portions (23) located on opposite longitudinal sides of said intermediate portion (25) and each connected to said frame (5) by said relatively-movable means (26).

4. A device as claimed in Claim 3, characterized in that said elongated body (24) also comprises, for each said lateral portion (23), elastic blade means (32) integral with the respective lateral portion (23) and contacting a respective fixed stop (33) on said frame (5) to push said intermediate portion (25) into a rest position detached from said pushbutton switch (13).

5. A device as claimed in Claim 3 or 4, characterized in that saidrelatively-movable means (26) comprise click-in connecting means.

6. A device as claimed in any one of Claims 3 to 5, characterized in that said relatively-movable means (26) comprise, for each said lateral portion (23), a guide-slide assembly (27, 28), which, in use, enables the respective lateral portion (23) to move in a

direction substantially parallel to an activating direction (14) of the pushbutton switch (13).

7. A device as claimed in Claim 6, characterized in that said relatively-movable means (26) also comprise, for each said lateral portion (23), hinge means (27, 28) enabling the respective lateral portion (23) to rotate with respect to said frame (5) about a respective hinge axis (29) substantially perpendicular to said activating direction (14).

8. A device as claimed in Claim 7, characterized in that said relatively-movable means (26) comprise, for each said lateral portion (23), at least one elongated seat (27) extending parallel to said activating direction (14) and carried by either one of said frame (5) or the respective said lateral portion (23); and at least one pin (28) carried by the other of said frame (5) or the respective said lateral portion (23) and engaging the respective said elongated seat (27) in axially-sliding manner and in rotary manner about the respective said hinge axis (29).

9. A device as claimed in Claim 8, characterized in that each said pin (28) clicks into the respective said elongated seat (27).

10. A device as claimed in any one of Claims 6 to 9, characterized by comprising connecting means (18, 19) for connecting said pushbutton switch (13) to said frame (5); said connecting means (18, 19) comprising at least one seat (19) carried by either one of said frame (5) or said pushbutton switch (13); and at least one projection (18) carried by the other of said frame (5) or said pushbutton switch (13) and positively engaging said seat (19) to prevent said pushbutton switch (13) from moving with respect to said frame (5) in a direction parallel to said activating direction (14); click-in retaining means (12) being provided to retain said projection (18) inside said seat (19).

11. A device as claimed in any one of the foregoing Claims, characterized by comprising a flexible hood-type seal (36) partially surrounding said frame (5), and which comprises an intermediate portion (39) directly contacting, in use, said elongated body (24), and a peripheral portion (38) extending between said frame (5) and a body (2) of said door (1); click-on gripping means (43, 44) carried by said frame (5) being provided to grip said peripheral portion (38) between said body (2) of the door and said frame (5).

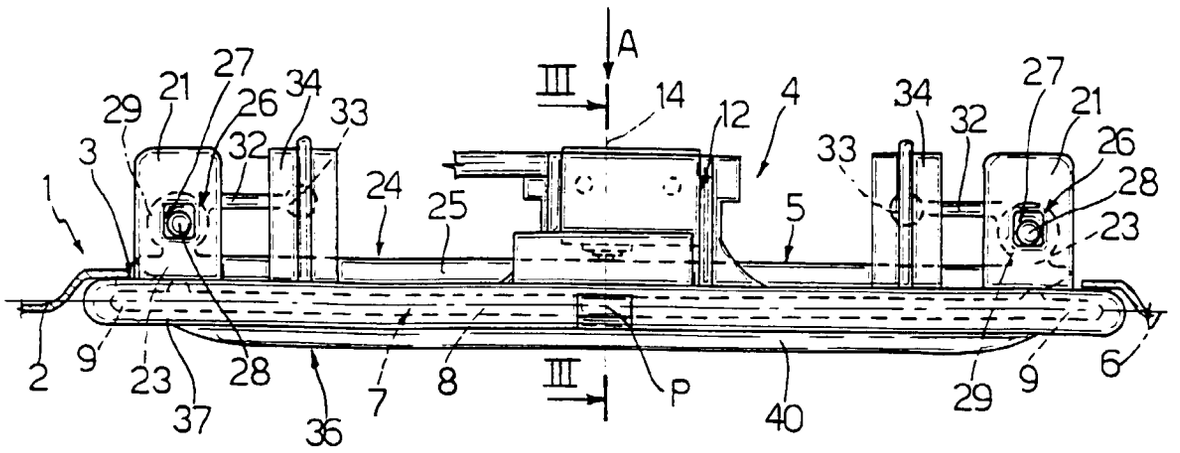


Fig.1

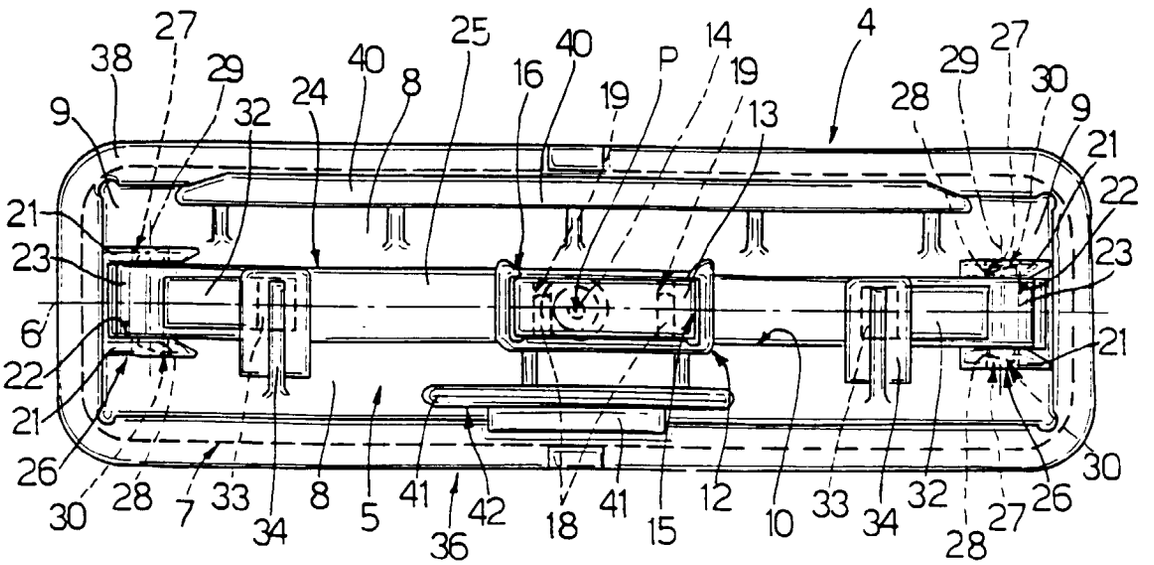


Fig. 2

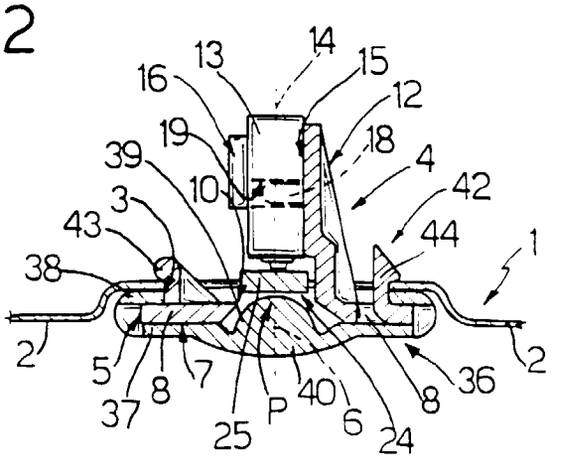


Fig.3