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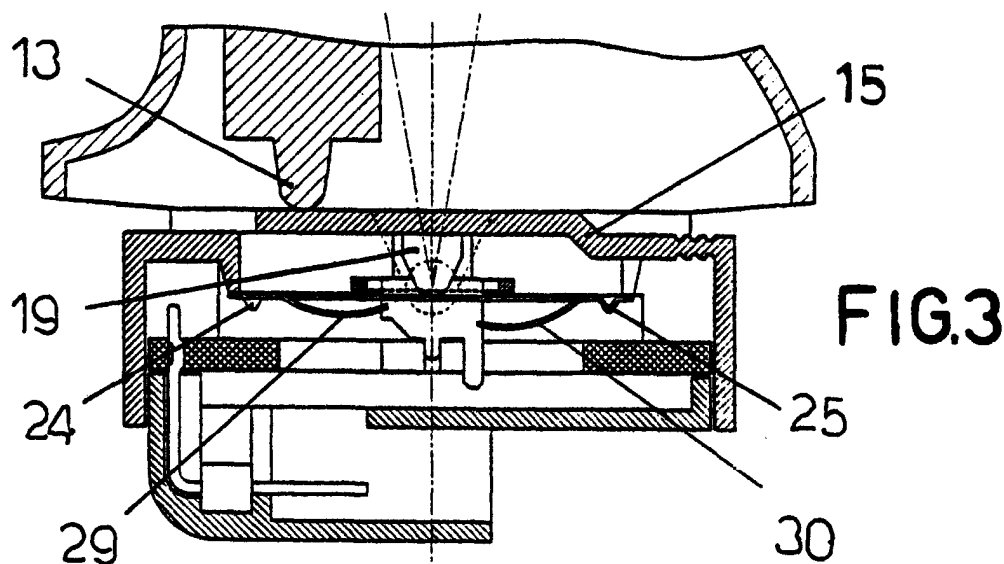
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(54) **Double release plate electrical switch**

(57) Double-release switch to control the electrical motors for the power windows of a motor vehicle, where a minimum of two mobile contacts act (24, 25, 24a, 25a), said mobile contacts being adapted to move so that they can reach two positions with the closing of fixed contacts

on a printed circuit; the mobile contacts are integral part of a metal spring plate (21, 22) provided with a pair of facing bow arms (29, 30) the ends of which are pivoted on a support (27) which is rigidly connected to said printed circuit (7).



Description

[0001] The present invention relates to a double release electrical switch especially designed to control the electrical motors for the power windows of a motor vehicle.

[0002] The present art relates to the switches for the electrical motors of the power windows, and aims to achieve two different type of control, in order to control the opening or the closing of the door windows of a motor vehicle. Of these two type of control, the one is a manual control, that is the operator has to keep the switch button pressed until the door window has reached the desired position, while the other one is an automatic control which, starting from any position of the door window, allows a complete opening or closing of the door window with a single operation on the control button.

[0003] Some devices are already known which, in order to distinguish the manual control from the automatic control, in the previously describe embodiment, take into account the duration of the action on the control button, through the electronic board already present in the motor vehicle. However, this method causes a few problems for the user who has to adjust the duration of his action quite precisely in order to get the desired control.

[0004] Further methods already known in which are intended to distinguish the two ways of operation, consist of using double release switches. These switches allow to separate the two ways of operating more easily.

[0005] It is an object of the present invention to provide a double release switch which is easy to be used and the cost of which is low.

[0006] It is a further object of the present invention to provide a switch the contacts of which slide mutually, in order to prevent the occurrence of possible incrustation and oxidation which could reduce or even stop the power transmission between them.

[0007] The above mentioned objects, as well as additional objects and advantages, are achieved by means of a double-release switch to control the electrical motors for the power windows of a motor vehicle, comprising a button and a containing body where a minimum of two mobile contacts act, said mobile contacts being adapted to move so that they can reach both a first stop position achieving the closing of a first part of the fixed contacts on a printed circuit and a second stop position achieving the closing of a second part of the fixed contacts on a printed circuit; characterised in that the mobile contacts are integral part of at least a spring metal plate provided with at least a pair of bow arms the ends of which are pivoted on a support which is rigidly connected to said printed circuit.

[0008] In the following the structural and functional characteristics of a non restrictive preferred embodiment of the switch according to the invention will be described, with reference to the appended drawings in which:

figure 1 is an elevational side view of a switch according to the invention;

figure 2 is a section view of the switch in figure 1; figures from 3 to 5 are longitudinal section view of the switch in figure 1 in three different operational positions of its mobile contact, and

figure 6 is a plan view of the internal contacts and of the underlying printed circuit according to the invention.

[0009] With reference to the figures, reference number 3 indicates the external body of a switch intended to operate the motors of the power windows, provided with a swinging control button 3 snapped on an internal part 4 of the passenger compartment of a motor vehicle (not shown). The button 3 is mobile, in the position indicated by section lining in the figure, in order to control the closing or the opening of the power windows (glasses) of the motor vehicle.

[0010] The body of the switch consists of a basis 5 on which there are the printed circuit 7 and the connectors 8 for its connection to the electrical system and of an intermediate ring body 10 acting also as a support element for the control button 3 snap pivoted at 11.

[0011] Inside the button 3 there are two transversal projections which are not aligned on the longitudinal axis of the button itself, being the one a front projection 13 adapted to lower the power window and the other a rear projection 14 (marked by section lining in figures 4 and 5) adapted to lift the power window. The position of the projections may be modified in order to vary the stroke and the operation strength on the button, as it will become more clear from the following description. Due to the swinging of the button 3 around the fulcrum 11, said projections press alternatively on the one or the other of the two adjacent levers 15 and 16, which are part of the ring body 10 and free to swing in relationship to it, by means of a film hinge 17, moulded in the plastic of said body (figures 3 to 5 show the first right lever 15 only).

[0012] The two levers 15 and 16 are provided with two projections 19 and 20 respectively which, when being used, are adapted to push sideways on the respective central part of two spring plates 21 and 22, the one with the contacts 24 and 25 intended to close the part of the circuit that controls the lowering of the power window, and the other with the contact 24a and 25a intended to close the part of the circuit which controls the lifting of the power window (fig.6). The spring plates are implemented on a rigid sheet support 27, which is made integral with the printed circuit 7 by means of welding. The spring plates are hanging from said support 27 by the facing ends of two bows 29 and 30 which are integral with each plate 21 and 22. The ends of the bows are pivoted at different heights on the support 27 so that they are located at different distances from the spring plate when it is in its rest position, as shown in figure 3. In this way, different reaction will occur at different times when some pressure is applied to the centre of the plates. It

is obvious that the height at which there are the points where the bows 29, 30 are engaged to the second spring plate will be inverted in relationship to the one of the first plate.

[0013] The switch according to the present invention works as follows.

[0014] When a pressure or a traction is applied on the button 3, thus making it rotate around the pivot 13, a pressure is anyway applied on the central portion of one of the two plates, a pressure is applied on the central portion of one of the two plates 21 or 22, through the projections 13 or 14, the levers 15 or 16 and the projections 19 or 20. In the case which has been described with reference to the figures 3 to 5, the plate on which the pressure is applied moves downwards, starting from its resting position (fig. 3). When it reaches a point which is beyond the first balance point, that is the point where the bow which is nearer the plate, is engaged, then a first release occurs (fig. 4), so that the first contact 24 lays on the printed circuit 7 and closes the control circuit of the manual option for the opening/closing of the power window. As the action on the button goes on, the plate 21 is further pressed so that it reaches the second balance point thus determining the occurrence of the second release which makes the second contact 25 close, on the printed circuit, the control circuit of the automatic option for the opening/closing of the power window.

[0015] Besides, due to the shape of the plates, the contacts 24, 25, 24a and 25a are made to slide against the printed circuit 7, in particular at the first release downwards and at the first release upwards.

plate (21, 22).

4. Switch as claimed in claim 1, characterised in that the containing body consists of a base (5) supporting said printed circuit (7) to which there is snapped a ring body (10) on which the button is pivoted (3).
5. Switch as claimed in claim 1, characterised in that the button (3) presents internal projections (13, 14) adapted to press alternatively on at least one of two adjacent levers (15, 16), made on said ring body (10).
6. Switch as claimed in claim 1 and 4, characterised in that the levers (15, 16) are provided with projections adapted to press on the central part of the respective plate (21, 22) as a consequence of a pressure or traction applied on the button (3) and transmitted by the projections (13, 14).
7. Switch as claimed in claim 4, characterised in that the levers (15, 16) are connected to the ring body (10) by means of a film hinge (17).

Claims

1. Double-release switch to control the electrical motors for the power windows of a motor vehicle, comprising a button (3) and a containing body (5, 10) where a minimum of two mobile contacts act (24, 25, 24a, 25a), said mobile contacts being adapted to move so that they can reach both a first stop position with the closing of a first part of the fixed contacts on a printed circuit (7) and a second stop position with the closing of a second part of the fixed contacts on said printed circuit; characterised in that the mobile contacts are integral part of at least a metal spring plate (21, 22) provided with at least a pair of facing bow arms (29, 30) the ends of which are pivoted on a support (27) which is rigidly connected to said printed circuit (7).
2. Switch as claimed in claim 1, characterised in that the metal spring plates are two (21, 22) and are located inside the switch body.
3. Switch as claimed in claim 1, characterised in that the arms of a pair of bow arms (29, 30) are pivoted at different distances from the respective resting

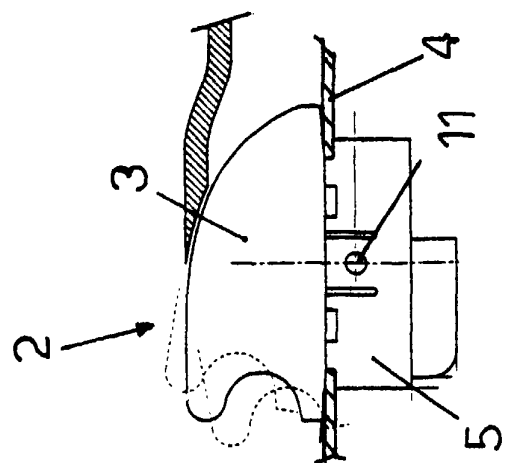


FIG.1

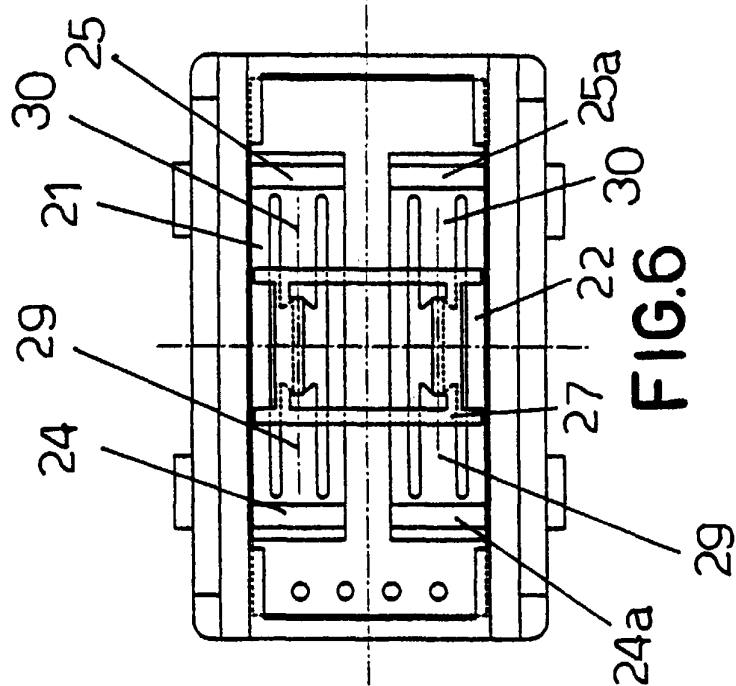


FIG.6

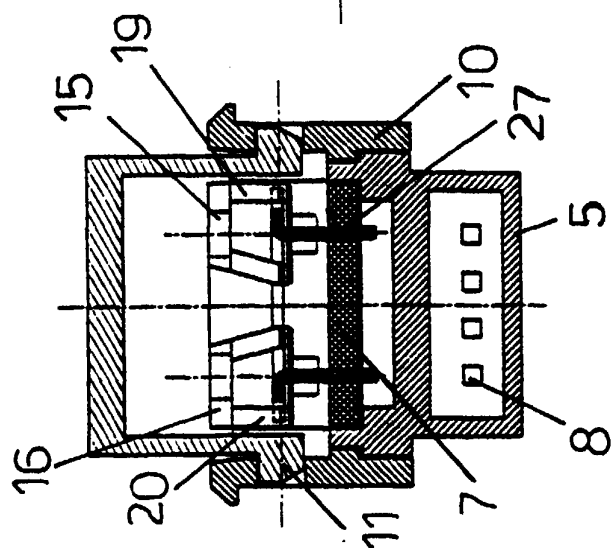


FIG.2

