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54 Push button assembly structure specifically designed for controlling motor vehicle glass raising and lowering devices.

57 The push button assembly comprises a box-like casing adapted for coupling to the electric wiring board or base, supporting operating microswitches, and a membrane adapted to be tightly superimposed on the board and to operate as a return resilient element for the operating push buttons, accessible from the outside of the box-like body and slidingly guided by throughgoing holes formed through the box-like casing.

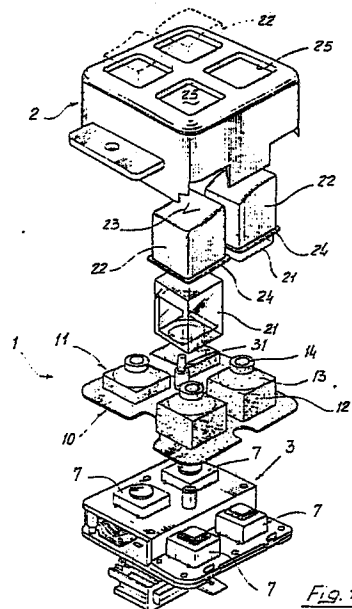


Fig. 1

Description

A PUSH-BUTTON ASSEMBLY STRUCTURE SPECIFICALLY DESIGNED FOR CONTROLLING MOTOR VEHICLE GLASS RAISING AND LOWERING DEVICES

BACKGROUND OF THE INVENTION

The present invention relates to a push button assembly which has been specifically designed for controlling glass raising and lowering devices in motor vehicles.

As is known, motor vehicles provided with electric glass raising and lowering devices usually comprise a push button assembly, including several push buttons, which are operatively coupled to controlling switches, for switching on and off the mentioned devices.

In known push button assembly embodiments power particles, moisture and the like may frequently enter inside the push buttons so as to impair a proper electrical contact of the microswitches.

On the other hand, known push button assemblies in which the electrical wiring section is tightly separated from the other component parts of the assembly, have not been found as completely satisfactory, since these push button assemblies are very complex from the constructional standpoint which negatively affects the reliability of the push button assembly itself.

SUMMARY OF THE INVENTION

Accordingly, the task of the present invention is to overcome the above mentioned drawbacks, by providing a push button assembly structure in which all of the electrical component parts are tightly separated from the outside environment, thereby providing a very high reliability in operation, with a comparatively simple construction.

Within the scope of the above mentioned task, a main object of the present invention is to provide such a push button assembly on the push buttons of which is possible to represent letters, patterns and the like while preventing powder and moisture particles from absolutely penetrating inside said assembly.

Another object of the present invention is to provide such a push button assembly structure which comprises a very reduced number of easily and quickly assemblable component parts.

Yet another object of the present invention is to provide such a push button assembly structure which may be easily made starting from easily commercially available elements and materials and which, moreover, is very competitive from a mere economic standpoint.

According to one aspect of the present invention, the above mentioned task and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by a push button assembly structure, which has been particularly designed for controlling motor vehicle glass raising and lowering devices, comprising a box-like casing adapted for coupling to the electric wiring board, supporting operating microswitches, characterized in that it further comprises a membrane which may

be tightly superimposed on said board and is adapted for operating as a resilient return element for operating push buttons which are accessible from the outside of said box-like casing and slidingly guided by throughgoing holes formed through said box-like casing.

BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the present invention will become more apparent from the following detailed description of a push button assembly structure, particularly designed for operating motor vehicle glass raising and lowering devices according to the present invention, which has been illustrated, by way of an indicative but not limitative example, in the figures of the accompanying schematic drawings in which:

figure 1 is a perspective exploded view illustrating the push button assembly according to the present invention;

figure 2 is a top plan view of the push button assembly;

figure 3 is a cross-sectional view of the push button assembly according to the invention taken along the line III-III of fig.2;

figure 4 is a cross-sectional view of the push button assembly according to the invention, taken along the broken line IV-IV of fig.2; and

figure 5 is another cross-sectional view illustrating a push button assembly according to the present invention provided with a board or base including a spacer element.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to the figures of the accompanying drawings, the push button assembly according to the present invention, which has been overall indicated at the reference number 1, essentially comprises a box-like casing 2, which preferably though not necessarily has a parallelepipedal shape, which may be coupled, at the top thereof, to an electric wiring board which has been indicated overall at the reference number 3 in figure 1.

According to a preferred embodiment, said electric wiring board or base comprises a supporting foldable small plate 4 therewith a flexible printed circuit 5 is associated which is housed inside said foldable small plate 4 as said plate is bent to its final shape.

On said small plate 4 coupling members 6 are provided adapted for receiving the pins of the microswitches 7 for controlling the motor vehicle glass raising and lowering devices, which switches will be directly coupled at the insertion time.

More specifically, the microswitches 7 may be of the single stage type, that is which directly control the glass lowering and raising devices as they are operated, or of the double stage type that is which provide a first operation in which the electrical contact is held for the overall time the push buttons

are pressed and a second operation which is obtained by exerting a greater pressure on the push buttons.

In this latter condition, as the pressure on the push button is released, the glass will be continuously displaced as far as it will reach an end of stroke position.

In this connection, it should be apparent that the type of used microswitch does not modify the invention concept.

The main feature of the present invention is that the push button assembly comprises a resilient membrane, indicated overallly at the reference number 10, which may be superimposed on the electric wiring board or base 3 and is provided with shaped portions 11, at the zone thereat said microswitches are arranged.

More specifically the mentioned shaped portions 11 are provided with a base portion 13, encompassing the respective microswitch, thereon there is superimposed as essentially frustum of cone shaped portion 13 provided for resiliency purposes, as it will be disclosed in a more detailed way hereinafter, and thereon a stiffening cylindrical portion 14 is arranged.

The membrane 10 is firstly provided as a tightness element which practically separates from the outside environment the region thereat there are formed the electrical wirings.

Moreover, the shaped portions 11 are specifically designed to operate as a resilient return element for the microswitch operating push buttons, which are overallly indicated at the reference number 20.

In particular, the push buttons 20 comprise a substantially rigid intermediate body, indicated at 21, which is coupled by contact to the mentioned cylindrical portion 14, on said body there being arranged a cap 22 having at least a translucent or semitransparent portion 23 provided for receiving patterns and the like.

The cap 22 is peripherally provided, at the edge portions thereof, with flanged rims 24 adapted for operating as stop elements for the displacement of the push buttons 20, which are guided by throughgoing holes 25 formed through the top face of the box-like casing 2.

The membrane 10 is advantageously made of a transparent or translucent material, so as to allow for the light of a display lamp 30 to pass through, said lamp being housed in a seat 31 defined by said membrane, preferably at the central region thereof.

Thus, it will be possible to light up the patterns formed on the push buttons 20, while holding the electrical wiring circuits tightly separated from the outside environment.

Moreover the membrane 10 also acts as a resilient return element for the single push-buttons.

In fact the shaped portions 11 are provided, at the tops thereof, with a frustum of cone shaped portions 13, which may be resiliently deformed as the push button 20 is pressed but which is able of recovering to its original shape thereby practically acting as a resilient return element.

Thus the assembling of the push buttons will be greatly simplified, since conventional spring ele-

ments for resiliently recovering the push buttons are completely omitted.

Figure 5 illustrates a push button assembly which is conceptually analogous to the above disclosed push button assembly and which is provided, at the electrical wiring board or base, with a spacer element indicated at 30.

From the above disclosure it should be apparent that the invention fully achieves the intended task and objects.

In particular the fact is to be pointed out that a push button assembly has been made in which the push buttons, which are accessible from the outside, are practically tightly separated from the outside environment and from the electrical wiring components, thereby preventing powder and moisture from absolutely entering the push button assembly casing.

Moreover, the specific shape of the membrane provides the latter with a multioperation characteristic since, in addition to the tightness function proper, said membrane, which is made from a resilient material, also operates as a return element for the single push-buttons.

Another important feature of the invention is the shape of the push buttons, or the patterns formed thereon can be easily modified, since said push buttons are practically formed by a cap which may be easily and quickly changed, thereby changing said patterns.

While the invention has been disclosed and illustrated with reference to a preferred embodiment thereof, it should be apparent that it is susceptible to several variations and modifications, all of which will come within the invention scope.

For example the push buttons may also be made from a soft material.

Claims

1- A push button assembly structure, specifically designed for controlling motor vehicle glass raising and lowering devices, comprising a box-like casing, adapted for coupling to the electric wiring board or base, supporting operating microswitches, characterized in that it further comprises a membrane adapted to be tightly superimposed on said board and to operate as a resilient return element for the operating push buttons, accessible from the outside of said box-like body slidably guided by throughgoing holes formed through said box-like casing.

2- A push button assembly structure according to claim 1, characterized in that said membrane is provided with shaped portions for housing said microswitches.

3- A push button assembly structure according to the preceding claims, characterized in that said shaped portions are provided with a base portion, encompassing said microswitches, a frustum of cone shaped portion above said base portion, adapted to act as a resilient

element and a substantially cylindrical portion above said frustum of cone shaped portion.

4- A push button assembly structure according to one or more of the preceding claims, characterized in that said membrane is made of a translucent material.

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5- A push button assembly structure, according to one or more of the preceding claims, characterized in that said membrane defines a seat for housing an illumination lamp.

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6- A push button assembly structure according to one or more of the preceding claims, characterized in that said push buttons are provided with an intermediate essentially rigid body, or optically transparent material, adapted to be coupled by contact to said cylindrical portion of said shaped portions and supporting a cap accessible from the outside of said box-like casing.

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7- A push button assembly structure according to one or more of the preceding claims, characterized in that said cap is provided with at least a translucent portion.

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8- A push button assembly according to one or more of the preceding claims, characterized in that said cap is provided with patterns or the like for identifying the function of the corresponding push button.

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9- A push button assembly according to one or more of the preceding claims, characterized in that said electric wiring board consists of a foldable plate thereto there is coupled a flexible printed circuit, adapted to be housed inside the zone encompassed by said plate in its folded condition.

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10- A push button assembly structure according to one or more of the preceding claim, characterized in that it comprises, under said electric wiring board, a spacer element.

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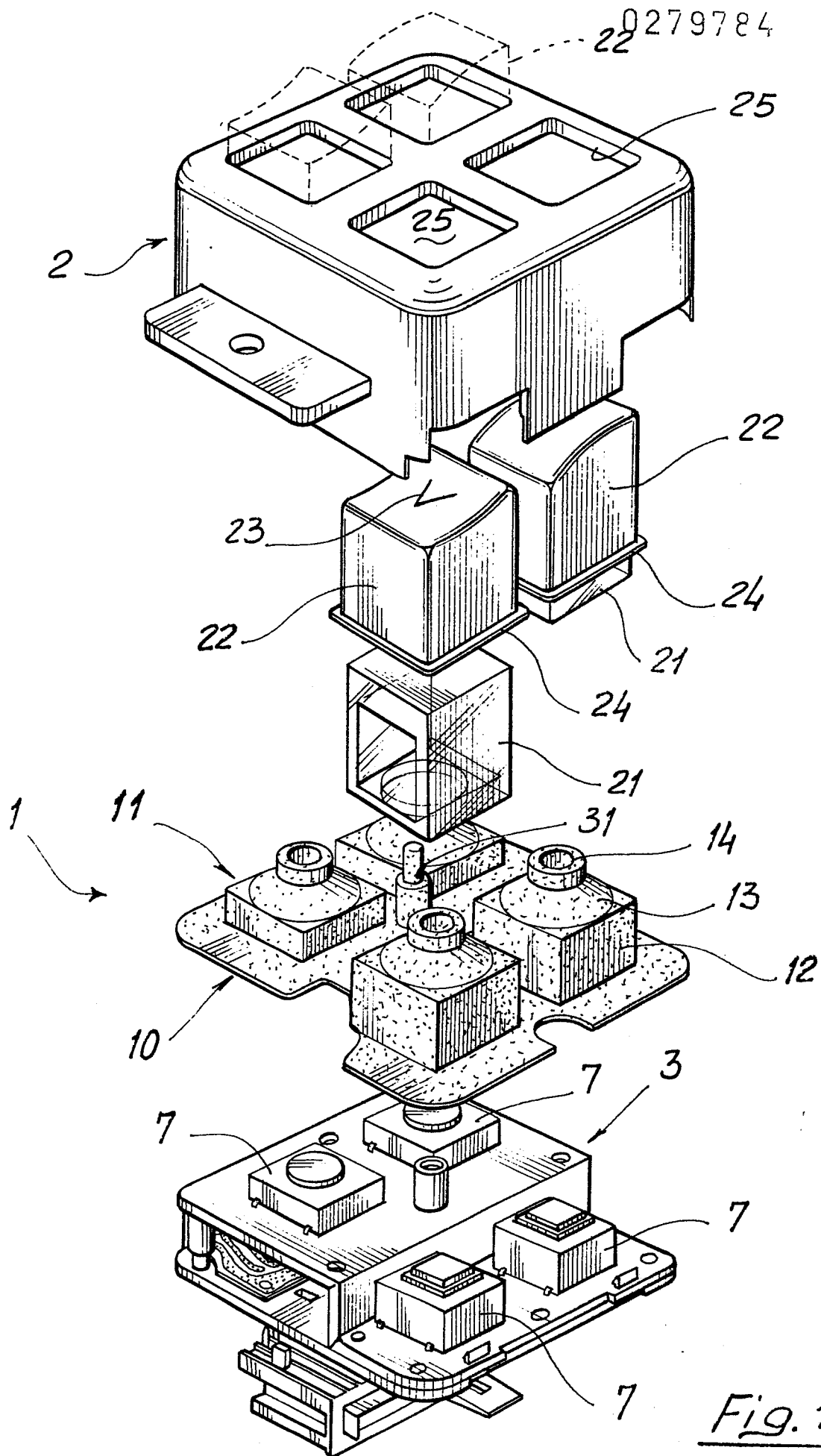


Fig. 1

