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(54) **An anti-vandal hermetically sealed push-button panel.**

(57) An anti-vandal hermetically sealed push-button panel, comprises a plurality of push-buttons for actuating corresponding actuators (26) of a printed circuit (25). The push-buttons (10) are divided in two separate bodies, an outer body (10a) and an inner body (10b) operationally facing one of the actuators (26). The outer push-button bodies (10a) is assembled within a superficial metallic escutcheon plate (16) level with the uppermost surfaces (21) of the push-buttons. An elastic sealing membrane (12) is pressed between the bodies (10a,10b) and integral therewith.

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The present invention relates to an anti-vandal hermetically sealed push-button panel, particularly suitable for application on public equipments such as vending machines, ticket and bank note distributors, telephones, lifts, hoists, and generally all equipments requiring push-button panels with particular mechanical resistance features.

As known, push-button panels of the aforementioned equipments, and particularly those ones installed in hostile environments, are likely to suffer from damages by blunt instruments, fire and corrosive substances. Other damage may derive from penetration of liquid and dust in the interstices between the push-buttons and the panel's escutcheon plate.

Some kinds of actual push-button panels are commonly made of plastic material, so they are rather vulnerable with respect to the above cited damages. In certain cases panels have push-buttons that are raised or anyway offer several points where they can be damaged by keyes or blades.

It is an object of this invention to provide a hermetically sealed push-button panel capable of overcoming the above inconveniences.

It is another object of this invention to provide a push-button panel having no considerable external asperity, in which accessible parts are difficult to be removed and offer high resistance to blunt instrument strikes.

It is a further object of this invention to provide a push-button panel hermetically sealed with respect to infiltration of water and particles that may adversely affect correct operation of the panel.

Another object of the invention is to provide a panel in which a heating optional system may be fitted for panels bound to be installed in zones where the winter climate is rigorous.

These and further objects and advantages, which will be more apparent hereinafter, are attained according to the invention by an anti-vandal hermetically sealed push-button panel, comprising a plurality of push-buttons for actuating corresponding actuators of a printed circuit, characterised in that the push-buttons are divided in two separate bodies, an outer body and an inner body operationally facing one of said actuators; the outer push-button bodies being assembled within a superficial metallic escutcheon plate substantially level with the uppermost surfaces of the push-buttons; at least one elastic sealing membrane being pressed between said bodies and integral therewith.

A preferred but not-limiting embodiment of the panel according to the invention is described hereinafter with reference to the accompanying drawing, that is a cross section of the panel, in which only one push-button is illustrated for simplicity.

Referring to the drawing, an anti-vandal hermetically sealed push-button panel according to the invention is shown, wherein the scale has been intentionally altered for facilitating the description. Moreover, it is intended that the panel according to the invention comprises a plurality of push-buttons that are identical to the one that is shown and distributed systematically.

Each push-button, that is indicated as a whole by numeral 10, is divided in two separate bodies, an upper or outer body 10a and an inferior or inner body 10b. Both bodies are preferably obtained out of nylon or other pressed material. An elastic membrane 12, made of rubber, caoutchouc or special plastic material, is pressed between the two parts 10a and 10b forming the push-button and forms a whole unit therewith. The efficiency of the mechanical assembly is attained by means of special gain joint 15a and 15b respectively obtained in the faces 13a and 13b that contact the mambrane 12. Hermetic seal is provided through ultrasonic sealing. The function of the membrane 12 is that of guaranteeing watertight seal with respect to possible infiltration of water, dust or other pulluting agents which could penetrate in the intersticies 14 between the bodies 10a of adjacent push-buttons.

The panel comprises a superficial metallic escutcheon plate 16, preferably made of steel or pressure casted and painted alluminium, that surrounds externally the plurality of push-button bodies 10a. The escutcheon plate 16 is inserted within a corresponding opening or seat 17 obtained in a panel 19 being integral with the outer casing of the equipment on which the panel of this invention is fitted.

For equipments destined to places having a rigorous winter climate, a heating flat resistor 20 can be inserted between the escutcheon plate 16 and the membrane 12 so as to prevent ice from forming near the bush-button bodies 10a and therefore blocking them and render the whole panel inactive.

The outer push-button body 10a and the inner one 10b are both advantageously made of nylon or other pressed material. Moreover, a push-button cover plate 21 is fixed on top of each one of the outer bodies 10a. The plates 21 covering the upper surface of the push-buttons and copying the shape thereof are preferably made of stainless steel and have a symbol (number, letter or special symbol) obtained by chemical etching on their upper side.

An antisinking layer 22, also made of nylon or other pressed material, is located under the membrane 12. The layer 22 is suitably perforated and shaped so as to contain the inner push-button bodies 10b and form supporting seats 23 for the inferior bases 10c thereof.

The layer 22 forms an inferior rectangular hollow 24 surrounding and partially containing a printed circuit 25. The latter comprises a plurality of upper steel convex portions 26, each one located proximate to a push-button 10b and working as actuators for the push-buttons. These actuators, of the type normally used for tactile effect push-buttons are not described herinafter as being well known to a person skilled in the art.

A peripheral groove 27 is obtained on the upper edge of the layer 22 for containing a peripheral gasket 29, preferably made of rubber or other suitable material. The gasket 29 is pressed between the layer 22 and the outer panel 19, surrounding the membrane 12 and sealing the push-button panel.

In addition, to offer good rejection to electromagnetical disturbances due to internal sources of the equipment and external radio frequency interferences, the printed circuit 25 and the actuators 26 can be superiorly covered by at least one insulating layer 30 of polyester with emi/RFI shielding.

In an alternative embodiment which is suitable for equipments located in dark environments, the push-buttons 10 may have inner lights 31 for lightening the symbols from underneath. This possibility can also be used for lightening a single push-button to indicate that it has been selected.

As it can be appreciated, the push-button panel according to this invention appears with an outer flat surface, completely metallic and with no considerable asperity or possible hooking points. Besides having the required mechanical resistance, the panel guarantees a good hermetic sealing for the inner parts, avoiding water infiltration and encrustations forming due to dust or mud. In addition, the outer surface can resist common cleansing products and is easily washable being substantially smooth.

The invention is not limited to the aforegoing description, which is to be considered purely as an illustration of the best method of implementing the panel, and modifications are possible in the terms of the shape, dimensions and arrangements of the parts and of the constructional and operational details. The invention includes all modifications which fall within its scope, as defined by the following claims.

Claims

1. An anti-vandal hermetically sealed push-button panel, comprising a plurality of push-buttons for actuating corresponding actuators (26) of a printed circuit (25), characterised in that the push-buttons (10) are divided in two separate bodies, an outer body (10a) and an inner body (10b) operationally facing one of said actuators (26); the outer push-button bodies (10a) being assembled within a superficial metallic escutcheon plate (16) substantially level with the uppermost surfaces (21) of the push-buttons; at least one elastic sealing membrane (12) being pressed between said bodies (10a,10b) and integral therewith.

2. A panel according to claim 1, characterised in that said membrane (12) is further interposed between the plate (16) and an inner layer (22) of antisinking material, said layer (22) being suitably perforated and shaped so as to operationally seat the inner push-button bodies (10b).

3. A panel according to claims 1 and 2, characterised in that the top of said layer (22) is provided with a peripheral groove (27) for holding a peripheral gasket (29) surrounding the membrane (12).

4. A panel according to claim 1, characterised in that the outer push-button bodies (10a) are covered by metal plates (21), preferably made of steel, having a shape congruent to the shape of the push-button.

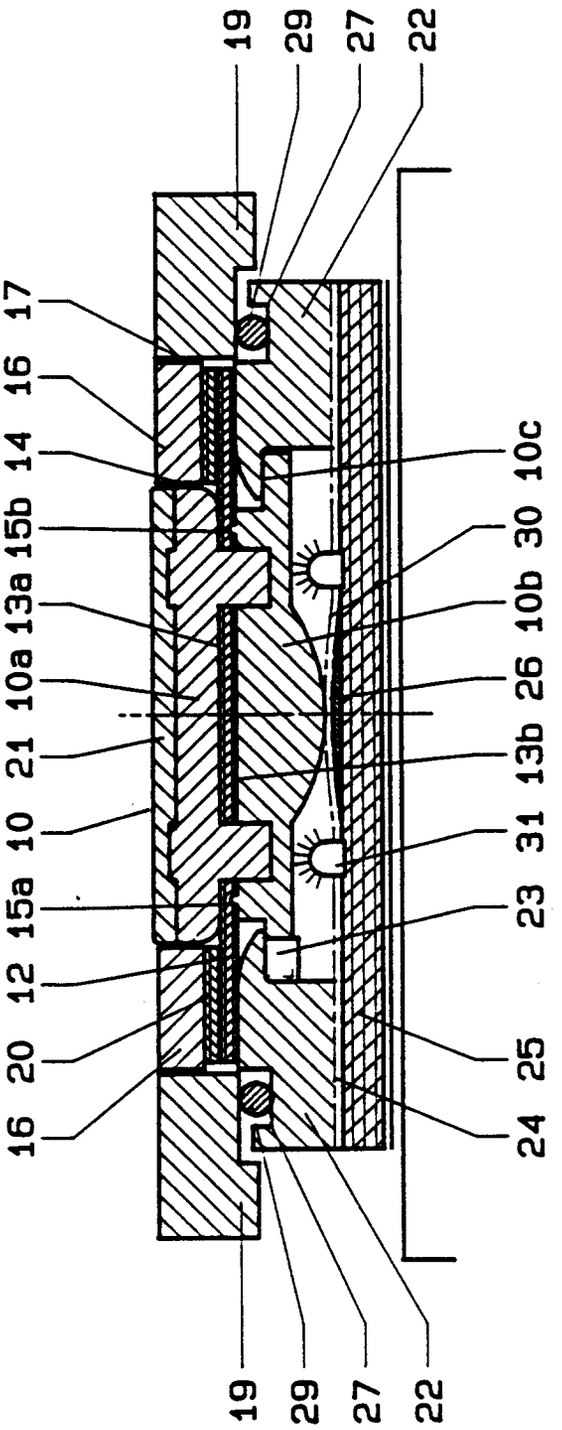
5. A panel according to claim 1, characterised in that it is fitted within an opening (17) of the casing of the equipment which the panel is to control; the upper surfaces (16,21) being all metallic and substantially level with said casing.

6. A panel according to claim 1, characterised in that said push-button bodies (10a,10b), preferably made of nylon or other pressed material, are assembled to the membrane (12) by means of respective special gain joints (15a,15b).

7. A panel according to claim 6, characterised in that the junction between the bodies (10a,10b) is effected by ultrasonic sealing.

8. A panel according to claim 1, characterised in that a flat heating resistor (20) is located between the membrane (12) and the escutcheon plate (16).

9. A panel according to claim 1, characterised in that it comprises means (31) for lightening the push-buttons from underneath.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EUROPEAN SEARCH REPORT

Application Number

EP 93 10 8328

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	DE-A-3 228 290 (RAFI GMBH & CO ELEKTROTECHNISCHE SPEZIALFABRIK) * the whole document *	1,4,5,9	H01H13/70 H01H13/06 H01H3/12
Y	DE-A-3 245 372 (MAATSCHAPPIJ VAN BERKEL'S, PATENT N.V.) * page 7, line 30 - page 9, line 15; figure 5 *	1,4,5,9	
A	GB-A-2 046 524 (INVADER KEABOARDS) * the whole document *	1	
A	EP-A-0 444 914 (LUCAS INDUSTRIES) * column 5, line 2 - column 6, line 53; figures 1-3 *	1,8	
A	EP-A-0 074 315 (TELEMECANIQUE) * page 6, line 32 - page 8, line 29 * * page 9, line 33 - page 10, line 2; figures 5,9 *	1,9	
A	DE-U-9 110 444 (WERNER TURCK) * page 1, paragraph 2 - page 4, paragraph 1 * * page 5, last paragraph - page 7, paragraph 1; figure 1 *	1	TECHNICAL FIELDS SEARCHED (Int. Cl.5) H01H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	30 NOVEMBER 1993	NIELSEN K.G.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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