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(54) Integrated control panel for household appliances

Integriertes Bedienfeld für Haushaltsanwendungen

Panneau de contrôle intégré pour appareils domestiques

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EP 2 012 334 B1

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Description

[0001] The present invention relates to an integrated control panel, particularly of the type normally used to control and survey the working of household appliances as laundry washing or dishwashing machines, refrigerators, etc.

[0002] However this invention is applicable in general to control panels of the type for general purposes, provided they are associated to a printed circuit boards (PCB) with micro-switches that can be operated by the outside; obviously the aesthetical and constructive adjustments, which take care of the functional constraints, are easily imaginable and can be implemented by any man skilled in the art.

[0003] Control panels are widely known, which are provided with outer elastic membranes on which surface portions are defined which constitute the operating area, by their pushing, of the activation devices, which usually are buttons, switches, etc., placed under respective said surface portions.

[0004] Such a technology, even if widely used, however shows the well known constraints that the switches, lying under said outer membrane, are common electric switches implemented as micro-switches, and therefore they keep on requiring constructional costs that are not negligible, and moreover they maintain the typical drawbacks of said components, i. e. they require additional buttons, respective reaction springs which maintain said buttons in protruding position, and specifically dedicated control boards on which said buttons and said springs have to be mounted on.

[0005] From EP 0 858 087 A2 it is known a type of assembled control panel wherein the reaction spring is obtained enbloc with the component (13) acting on the micro-switch; however the outer button is not provided with an own protection membrane, and this fact causes wearing problems in the long run, which are well known.

[0006] From WO 2006/067438 A1 it is known a buttons assembly provided with a common outer protection membrane, and acting on respective PCB's underlying it; a similar solution is shown and discussed even in EP 1 199 736 A1 (WO 01/80263); however said solutions generally cannot employ some micro-switches, which are instead employed in the control panels for household appliances, and mainly the PGB's are firmly connected to said membrane.

[0007] Such circumstance therefore doesn't allow the autonomous production of said PCB's, and moreover the additional operation is required to make said membrane to adhere to said PCB's.

[0008] DE-U-9 205 628 discloses a key arrangement comprising a rectangular circuit board covered by a cover, made of transparent plastic material, whose front wall exhibits a plurality of keys; the keys are integral with the front wall and are connected to the latter at one side by an hinge portion, while the remaining sides of the keys are surrounded by a slot obtained in the front wall. Micro

tapping switches are arranged in the circuit board in such a way to be operated by the keys. The keys are provided at their backs with a rough structure and they are also provided with projections which limit the stroke of the keys. Some light emitting diodes are arranged in the circuit board. A decorative sheet is arranged upon front wall, so as to cover the keys.

[0009] It would therefore be desirable, and is actually a main purpose of the present invention, to provide a type of control panel, particularly for household appliances, which is able of associating a PCB, on which some known micro-switches are mounted, to a plurality of control buttons, provided with respective springs, and mounted on a supporting board, externally protected by a waterproof membrane; according to the instant invention, said springs, said buttons and said board are produced in an absolutely integrated way.

[0010] According to the present invention, these aims are reached through a special type of control panel incorporating the characteristics as recited in the appended claims as described below by mere way of non-limiting example with reference to the accompanying drawings, in which:

- Fig. 1 is a symbolical perspective front view of a control panel according to the invention,
- Fig. 2 is a partially exploded view of the same assembly of fig. 1,
- Fig. 3 shows, in a simplified way, the plan top view of a first and important component of the assembly in fig. 2,
- Fig. 4 shows a transversal sectional view of the first component of fig. 3, taken according the section A - A of it,
- Fig. 5 is a transversal section of the first component of fig. 3, taken according section B - B of it 3,
- Fig. 6 is a transversal section of the first component of fig. 3, taken according section C - C of it,
- Fig. 7 shows the first component of fig. 3, but from the opposite side with respect of the fig. 3 view,
- Fig. 8 shows a perspective view of the same component as represented in fig. 7.

[0011] With reference to the figures, a control panel according to the invention comprises, from the rear side to the front side, i.e. on user's sight, :

- a printed circuit board (PCB) 1,
- a plurality of switches 2A, 2B, 2C... applied on said PCB, oriented outwards and obviously electrically interconnected to the electrical connexions therein arranged,
- a respective plurality of buttons 3A, 3B, 3C exactly placed in correspondence to said switches, and above them,
- a rigid support 4, showing a basically superficial extension,
- a flexible and continuous membrane 5, arranged by

known means on the outer surface of said rigid support.

[0012] According to the invention, said buttons are obtained as follows: the portions of said rigid support 4, which are arranged in correspondence to respective said switches and which therefore cover them, but at a certain distance, are simply removed, leaving to their place through apertures 6A, 6B, 6C...; in these apertures said buttons 3A, 3B, 3C... are introduced.

[0013] At this point two main requirements for said buttons have to be accomplished:

- the first requirement consists in backing up them inside the respective through apertures, and to allow them to slide up and down in such a way that, in the down position, each of said buttons gets in touch and pushes on a respective of said switches, activating it;
- the second requirement consist in the implementation of said sliding movement in such a way that the button comes elastically back to a respective resting position,

wherein the button itself would not activate the respective switch.

[0014] To this purpose, and with ref. to the figures 3, 4 and 7, one of the main invention features consists in that: said buttons are implemented by defining respective limited portions of said rigid support, and which show sizes and positions such to construct relevant leaning appendixes, which stretch and are oriented in such a way that each of these portions is contained into a respective said through-aperture, without interfering with the relevant walls; and yet each portion is partially movable without touching them, as clearly shown in the figures.

[0015] Basically, and with special ref. to figures 2, 3 and 7, said buttons are realized by defining some delimited portions of said rigid support, and contained inside respective said through-aperture; moreover the elastic operation is assured by the fact that the connection between said buttons and said rigid support is carried out by respective thin and prolonged connections 7A, 7B, 7C to the edges of said through apertures, which are comprised into said rigid support 4.

[0016] Obviously the rigid support 4 is supposed to be rigid when referred to its full size, as said thin and prolonged connections 7A, 7B, 7C, particularly when made of plastic, do offer a suitable elasticity which is intrinsic with the plastic material itself.

[0017] The advantage then is obtained that:

- with the same material of the rigid support 4, properly worked and preferably mould injected,
- and with a sole and simple working operation,

the following three components are obtained, each of which being provided with a distinct and autonomous functionality:

- rigid support 4;
- single buttons 3A, 3B, 3C...;
- elastic connection means 7A, 7B, 7C....

[0018] Once the lower portion of the control panel which is formed by said rigid support 4, by said buttons, by said PCB etc., has been assembled, the control panel itself is being completed by laying on the outer surface of the rigid support 4, with known means, a continuous and partially flexible membrane (see fig. 1, 2 and 4); said membrane shows not only the requested aesthetic and design features, but its flexibility allows that, in correspondence of said through apertures 6A, 6B, 6C, the small areas of said membrane so delimited, and whose rear side are into contact with said buttons, properly shaped to protrude as necessary, become actually the control and command areas to be pushed by the user's fingers.

[0019] Moreover the same elastic membrane may easily be identified and/or mapped in properly selected zones 15 by colours, operating indications/symbols etc., so that each of said zones of said membrane itself may provide suitable information exactly corresponding to the function activated by pushing said corresponding zones.

[0020] The just illustrated solution offers some advantageous improvements: the first one consists in that in said PCB may be mounted some light signalling, and obviously oriented outwards, light sources 8A, 8B.

[0021] In order to allow that the emitted light by said sources may be observed by the user in front of said control panel, said rigid support 4 is being made and shaped so as to show a second group of apertures 9A, 9B, exactly arranged in correspondence of said light sources 8A, 8B.

[0022] Preferably, said flexible membrane too must be produced to be at least partially transparent in correspondence of said second apertures 9A, 9B, so that the light emitted in the inside may be transmitted outwards in said zones 15, and there easily observed by the user (fig. 1).

[0023] Moreover profitably, inside said second apertures 9A, 9B is carried out, preferably still enbloc, a respective plurality of internally through-conduits 10A, 10B, which works as light-guides and which are connected to the inner edges of said second apertures 9A, 9B, and stretch towards said respective light sources 8A, 8B (see fig. 4, 5 and 8).

[0024] Therefore a further useful improvement is achieved, consisting in the fact that the light conveying means, from the light sources on the PCB, can be made with simplified working operations and without really producing or mounting new components.

[0025] Finally, with ref. to the same figures, it must be observed that said buttons 3A, 3B, etc. are provided with suitable respective extensions 13A, 13B oriented inwards, i. e. towards the respective switches 2A, 2B, 2C...; it allows of using a rigid support 4 which is really very thin, as a function of the existing further constraints, and

of making said buttons as respective portions of said rigid support 4, and co-planar with it.-
In the same time it will be possible to assure a preferred distance "d" between said support 4 and said PCB 1, without compromising the functionality of the control means of the control board.

Claims

1. Control panel, especially for household appliances, comprising:

- a printed circuit board (PCB) (1),
- a plurality of switches (2A, 2B, 2C) arranged on said PCB, and whose activation devices involve respective buttons (3A, 3B, 3C) oriented outwards and accessible even through elastic means, wherein said control panel also comprises:
- a plastic support (4), placed above said PCB on the outer side of said control panel, said plastic support (4) being provided with a plurality of through apertures (6A, 6B, 6C) arranged in correspondence to respective said buttons (3A, 3B, 3C),
- a flexible membrane (5) laid on the outer face of said plastic support (4), wherein said buttons (3A, 3B, 3C) are made enbloc with said plastic support (4), and are shaped as thin appendixes protruding out from the inner edges of said through apertures towards the respective inner central zone,

wherein said PCB shows one or more light sources (8A, 8B), preferably LED's, on the same side of said buttons (3A, 3B, 3C),

characterized in that a plurality of second through-apertures (9A, 9B, 9C) is provided on said plastic support (4), and arranged in correspondence to respective said light sources (8A, 8B),

and in that a plurality of hollow conduits (10A, 10B, 10C), obtained enbloc with said plastic support (4), is arranged among the inner edges of said second through apertures (9A, 9B) and corresponding respective light sources, said conduits being able of working as light conveying means from said light sources (8A, 8B) to respective said second through-apertures (9A, 9B).

2. Control panel according to claim 1, **characterized in that** said protruding appendixes are connected to the edges of said through-apertures by respective and essentially elastic connections (7A, 7B, 7C).
3. Control panel according to claim 1, **characterized in that** said membrane is placed in a continuous way on said through apertures (6A, 6B, 6C) as well.

4. Control panel according to one or more of the previous claims, **characterized in that** said flexible membrane shows at least partial transparency features at least on the face portions corresponding to said second through apertures (9A, 9B).

5. Control panel according to one of claims from 2 on, **characterized in that** said buttons are provided with respective extensions (13A, 13B, 13C) oriented inwards and protruding towards respective said switches (2A, 2B, 2C), said extensions being able to go into contact with said switches only when said buttons are properly pushed.

Patentansprüche

1. Bedienfeld, insbesondere für Haushaltsgeräte, umfassend:

- eine Leiterplatte (PCB) (1),
- eine Vielzahl von Schaltern (2A, 2B, 2C), die auf der Leiterplatte angeordnet sind und deren Aktivierungsvorrichtungen jeweilige Knöpfe (3A, 3B, 3C) umfassen, die nach außen gerichtet sind und auch über elastische Mittel zugänglich sind, wobei das Bedienfeld auch Folgendes umfasst:
- eine Kunststoffhalterung (4), die über der Leiterplatte an der Außenseite des Bedienfelds angeordnet ist, wobei die Kunststoffhalterung (4) mit einer Vielzahl von Durchgangsöffnungen (6A, 6B, 6C) versehen ist, die in Übereinstimmung mit den jeweiligen Knöpfen (3A, 3B, 3C) vorgesehen sind,
- eine flexible Membran (5), die an der Außenseite der Kunststoffhalterung (4) vorgesehen ist,

wobei die Knöpfe (3A, 3B, 3C) in einem Block mit der Kunststoffhalterung (4) gebildet sind und als dünne Fortsätze geformt sind, die von den Innenrändern der Durchgangsöffnungen in Richtung auf den jeweiligen inneren mittleren Bereich vorragen, wobei die Leiterplatte eine oder mehrere Lichtquellen (8A, 8B), vorzugsweise LEDs, auf der gleichen Seite wie die Knöpfe (3A, 3B, 3C) aufweist,

dadurch gekennzeichnet, dass eine Vielzahl von zweiten Durchgangsöffnungen (9A, 9B, 9C) in der Kunststoffhalterung (4) vorgesehen sind und in Übereinstimmung mit den jeweiligen Lichtquellen (8A, 8B) angeordnet sind, und dass eine Vielzahl von hohlen Kanälen (10A, 10B, 10C), die in einem Block mit der Kunststoffhalterung (4) gebildet wurden, zwischen den Innenrändern der zweiten Durchgangsöffnungen (9A, 9B) und den jeweiligen Lichtquellen angeordnet sind, wobei die Kanäle dafür ausgelegt sind, als Lichttransportmittel von den Lichtquellen (8A, 8B) zu den

jeweiligen zweiten Durchgangsöffnungen (9A, 9B) zu fungieren.

2. Bedienfeld nach Anspruch 1, **dadurch gekennzeichnet, dass** die vorragenden Fortsätze durch jeweilige und im Wesentlichen elastische Anschlüsse (7A, 7B, 7C) mit den Rändern der Durchgangsöffnungen verbunden sind. 5
3. Bedienfeld nach Anspruch 1, **dadurch gekennzeichnet, dass** die Membran auf durchgehende Weise auch auf den Durchgangsöffnungen (6A, 6B, 6C) angeordnet ist. 10
4. Bedienfeld nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die flexible Membran wenigstens an den Oberflächenbereichen, die den zweiten Durchgangsöffnungen (9A, 9B) entsprechen, wenigstens teilweise transparente Merkmale aufweist. 15 20
5. Bedienfeld nach einem der Ansprüche ab Anspruch 2, **dadurch gekennzeichnet, dass** die Knöpfe mit jeweiligen Verlängerungen (13A, 13B, 13C) versehen sind, die nach innen gerichtet sind und in Richtung auf die jeweiligen Schalter (2A, 2B, 2C) vorragen, wobei die Verlängerungen dafür ausgelegt sind, nur dann in Kontakt mit den Schaltern zu gelangen, wenn die Knöpfe ordnungsgemäß gedrückt werden. 25 30

Revendications

1. Tableau de commande, en particulier pour des appareils électroménagers, comprenant : 35
 - une carte de circuit imprimé (PCB) (1),
 - une pluralité de commutateurs (2A, 2B, 2C) agencés sur ladite PCB, et dont des dispositifs d'activation impliquent des boutons (3A, 3B, 3C) respectifs orientés vers l'extérieur et accessibles même à travers des moyens élastiques, dans lequel ledit tableau de commande comprend également : 40
 - un support en plastique (4), placé au-dessus de ladite PCB sur le côté externe dudit tableau de commande, ledit support en plastique (4) étant pourvu d'une pluralité d'ouvertures traversantes (6A, 6B, 6C) agencées en correspondance par rapport auxdits boutons (3A, 3B, 3C) respectifs, 50
 - une membrane flexible (5) posée sur la face externe dudit support en plastique (4), dans lequel lesdits boutons (3A, 3B, 3C) sont réalisés en bloc avec ledit support en plastique (4), et sont formés comme de fins appendices dépassant des bords internes desdites ouvertures tra-

versantes vers la zone centrale interne respective,

dans lequel ladite PCB présente un ou plusieurs sources de lumière (8A, 8B), de préférence des DEL, sur le même côté que lesdits boutons (3A, 3B, 3C), **caractérisé en ce qu'**une pluralité de secondes ouvertures traversantes (9A, 9B, 9C) sont fournies sur ledit support en plastique (4), et agencées en correspondance par rapport auxdites sources de lumière (8A, 8B) respectives, et **en ce qu'**une pluralité de conduits creux (10A, 10B, 10C), obtenus en bloc avec ledit support en plastique (4), sont agencés parmi les bords internes desdites secondes ouvertures traversantes (9A, 9B) et les sources de lumière respectives correspondantes, lesdits conduits étant capables de fonctionner comme des moyens d'acheminement de la lumière depuis lesdites sources de lumière (8A, 8B) vers lesdites secondes ouvertures traversantes (9A, 9B) respectives.

2. Tableau de commande selon la revendication 1, **caractérisé en ce que** lesdits appendices protubérants sont raccordés aux bords desdites ouvertures traversantes par des raccords essentiellement élastiques (7A, 7B, 7C) respectifs.
3. Tableau de commande selon la revendication 1, **caractérisé en ce que** ladite membrane est également placée de manière continue sur lesdites ouvertures traversantes (6A, 6B, 6C).
4. Tableau de commande selon une plusieurs des revendications précédentes, **caractérisé en ce que** ladite membrane présente des particularités de transparence au moins partielles au moins sur les portions de face correspondant auxdites secondes ouvertures traversantes (9A, 9B).
5. Tableau de commande selon l'une des revendications 2 à suivantes, **caractérisé en ce que** lesdits boutons sont pourvus d'extensions (13A, 13B, 13C) respectives orientées vers l'intérieur et dépassant vers lesdits commutateurs (2A, 2B, 2C) respectifs, lesdites extensions étant capables de venir en contact avec lesdits commutateurs uniquement lorsque lesdits boutons sont enfoncés correctement.

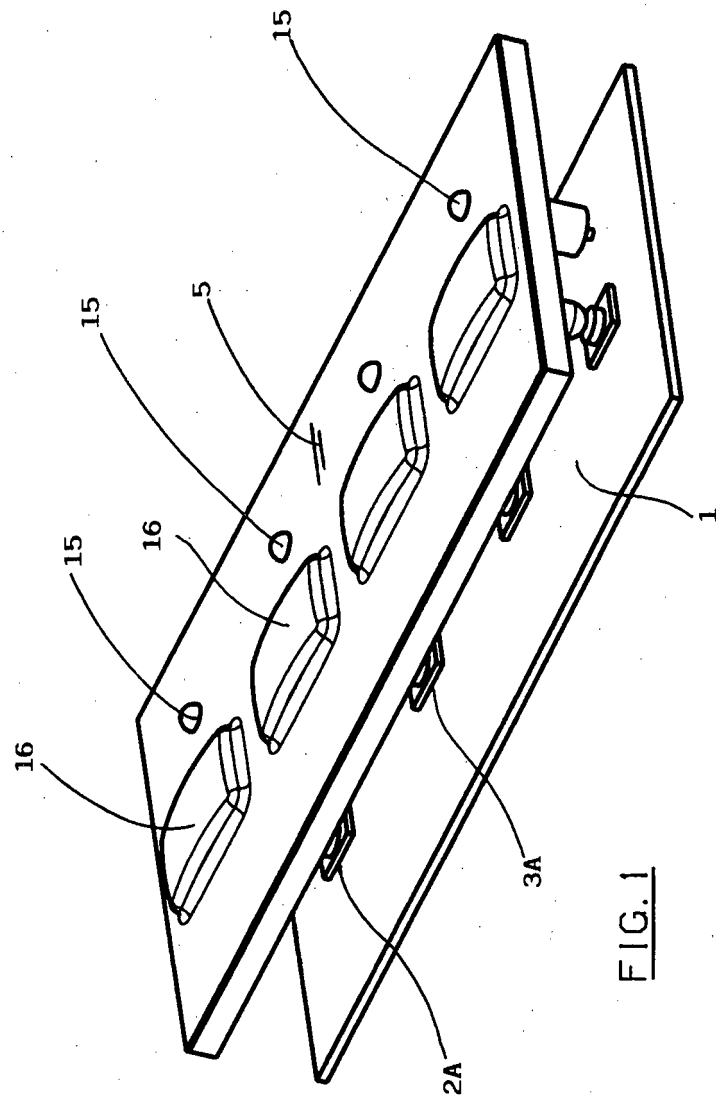


FIG. 1

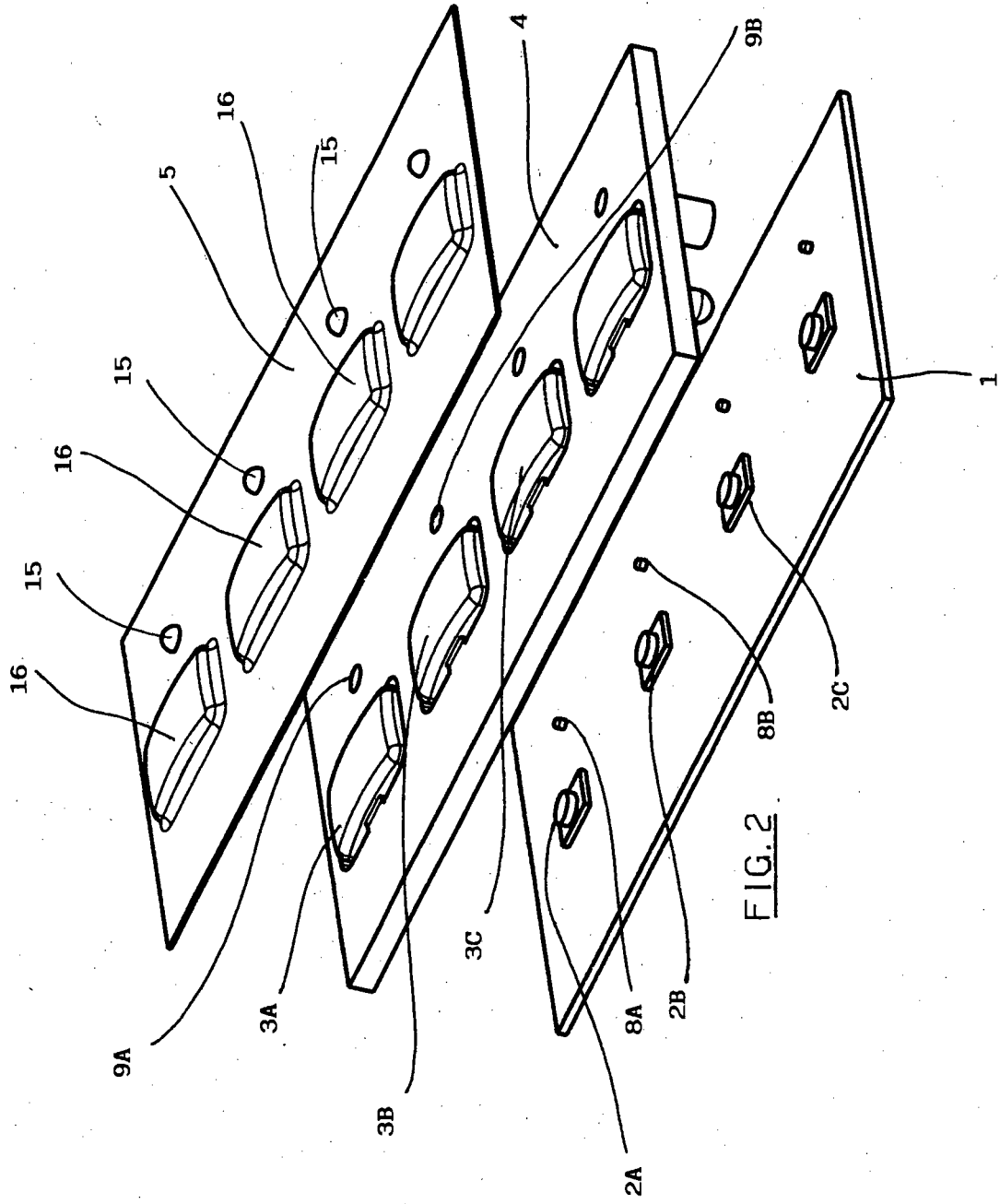
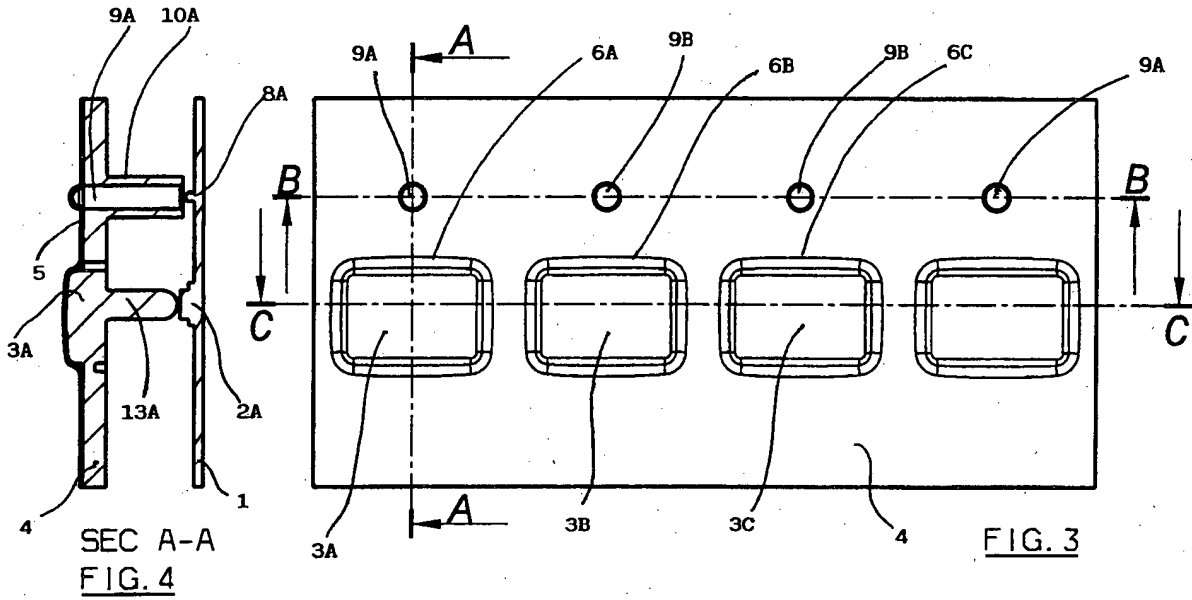
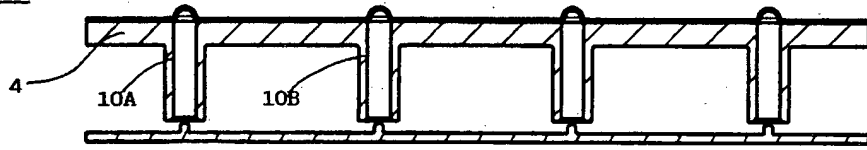


FIG. 2

SEC B-B
FIG. 5



SEC C-C
FIG. 6

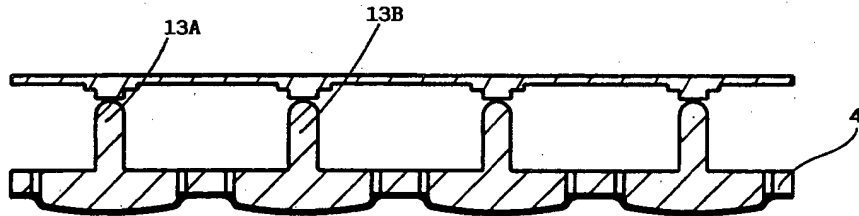
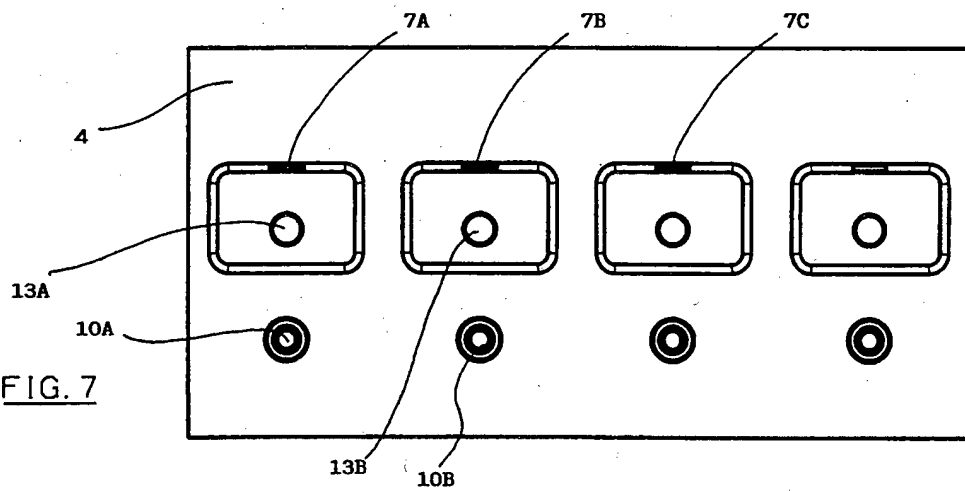


FIG. 7



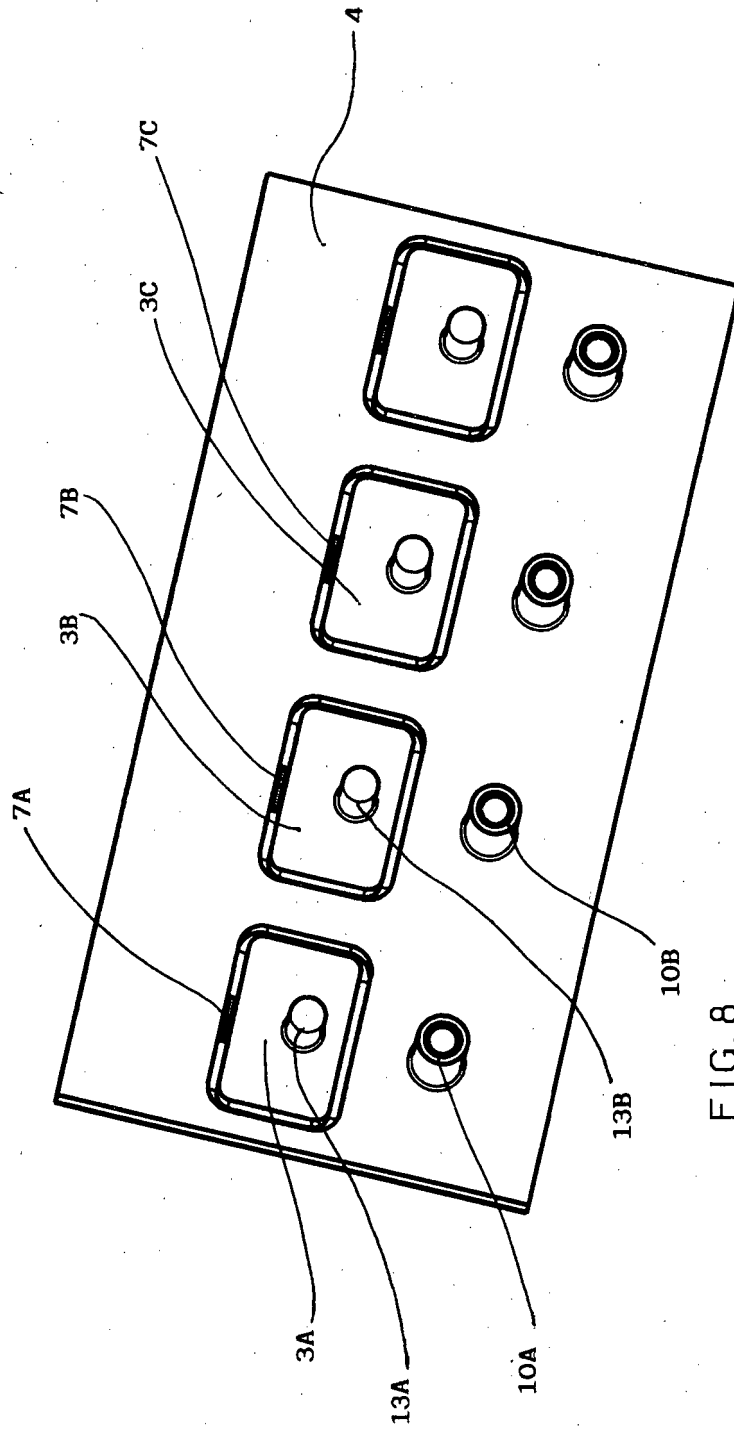


FIG. 8

REFERENCES CITED IN THE DESCRIPTION

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