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(54) **Switch**

(57) Switch comprising a base element (1), a cover element (2), a button (3) disposed across an opening (20) of said cover (2) and a pusher associated with said button (3), characterized in that the said pusher comprises a coaxially disposed cap (9) free to translate and able to rotate about its longitudinal axis within a tubular housing and guiding element (10), an elastic element

(11) acting coaxially inside said cap (9), and an element (12) integral with the elastic element (11) and intended to maintain two metal terminals (5) in contact with each other within a seat (4) formed in the guide element (10): the said cap (9) and guide element (10) being provided with means for mutual interlock in two different relative positions (FIG.5).

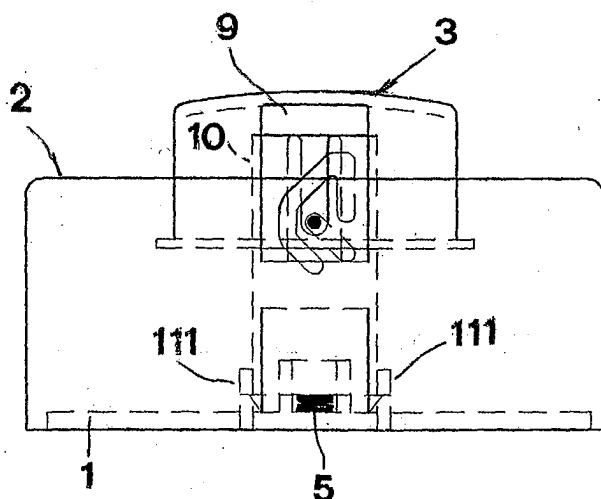


Fig. 5

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Description

[0001] The present invention refers to a switch.

[0002] The present-day switches, especially those pedal-operated, involve, upon the production stage, the assembly of a number of components and the use of items such as, for example, inner snap micro-switches for axial operation, which represent elements of particularly high cost.

[0003] The main object of the present invention is to propose a switch of so-called "pedal" type, as well as "desk" type, which makes it possible to reduce the overall cost for this kind of device, without reducing in any way its reliability in terms of functionality and safety.

[0004] This result has been achieved, according to the invention, by adopting the idea of making an apparatus having the features disclosed in the claim 1. Further characteristics being set forth in the dependent claims.

[0005] A switch according to the invention is easy to make, cost-effective and reliable, also after a prolonged service life, both under the operation and safety points of view.

[0006] These and other advantages and characteristics of the present invention will be best understood by anyone skilled in the art from a reading of the following description in conjunction with the attached drawings given as a practical exemplification of the invention, but not to be considered in a limitative sense, wherein:

- Fig. 1 is a schematic view in vertical section of the cover element of a pedal switch according to the invention;
- Fig. 2 is a schematic lateral view of the element of Fig. 1;
- Fig. 3 is an inner plan view of the base element of a switch according to the invention;
- Fig. 4 is a schematic lateral view in transparency of a switch according to the invention, in off position;
- Fig. 5 is a view similar to that of Fig. 4, but with the switch in on position;
- Figs. 6 and 7 are schematic lateral views of the inner parts of the switch of the invention shown in the disposition of Fig. 4 and of Fig. 5 respectively, and in which the first element of the switch isn't shown for sake of simplicity;
- Fig. 8 is a schematic exploded view of the switch of the present invention, in which the said cover element isn't shown;
- Fig. 9 is an inner partial schematic perspective view of the cover element;
- Figs. 10-12 show schematically the movement of the nose (90) upon closing and opening switch operations;

[0007] Fig. 13 is a schematic lateral view of the terminals (5).

[0008] Reduced to its basic structure, and reference

being made to the figures of the attached drawings, a pedal switch according to the present invention comprises a box-shaped body with a circular base (1) and a cover element (2), on which a pusher (3) going therethrough is located according to the central axis of symmetry of element (2). To this end, the latter is provided with a central opening (20). In addition, the cover (2) has two openings in diametrically opposite positions (21) for the electrical leads. The said base (1) exhibits, on the side facing the cover element (2), a seat (4) with rectangular plan for receiving two metal terminals (5) each of which forms the end of an electric lead associated with the switch. As shown in Fig. 13, one of the two terminals (5) is longer than the other and exhibits a bump (50); when no pressure is applied on the bump (50), the two terminals result spaced apart. The base itself (1) is also provided, on the same side of said seat (4), with four tubular appendixes (6) parallel to each other and running orthogonally to the base (1) to provide corresponding seats for the ends of four appendixes (7) of the cover element (2). On the same diameter of base (1), along which the said seat (4) is disposed, two reliefs (8) are provided which, in cooperation with two corresponding appendixes (80) of cover (2), act as cable-grip means when the same cover (2) is associated with the base (1). The said reliefs (8) are on diametrically opposite sides.

[0009] A switch according to the present invention also comprises a pusher made up of two elements (9, 10) coaxial to each other, with the first element (9) shaped as a cap and mounted for sliding and freely rotating within the second element (10) which has tubular shape. The cap (9) is associated with an elastic member (11), for example, a spring made of metal wire: the said spring (11) being positioned coaxially to, and inside the cap (9) and tubular element (10), with one end in contact with the inner surface of the head of cap (9), and with the other end engaged with a plate or dish (12) having an appendix (120) intended, as described later on, for coming in contact with one of the associated terminals (5) within the seat (4) of base (1). The said cap (9) is provided with a radial appendix or nose (90) to be engaged, as described below, within one of two slots (100, 101) of the tubular element (10), under closed or open switch conditions. The tubular element (10) exhibits two lower appendixes (102) suitably shaped for hooking up to the base (1) via two corresponding hooking openings (110) located on the two sides of said seat (4) and laterally delimited by two corresponding rectangular reliefs (111) and a cradle wall which delimits the same seat (4).

[0010] For the assembly of the switch, the terminals (5) are disposed within the seat (4), the pusher (9, 10, 11, 12) are hooked up to the base (1) via the appendixes (120) which are snap-fitted into the openings (110) and, after having positioned the button (3) through the opening (20) of cover (2), the latter is made to engage with the base (1) so that the appendixes (7) of cover (2) will result inserted all the way in inside the bushes (6) of base (1). The pusher (9, 10, 11, 12) results thus under

the button (3) which is hollow and encircles it.

[0011] When the switch is open, the nose (90) of the pusher (9, 10, 11, 12) is in the position of Fig. 10, that is, at the highest point (A) of slot (100) where it is brought by the spring (11) which pushes the cap (9) upwards. Under this condition, since the spring (11) is elongated, that is, is not compressed, the dish (12) does not apply any pressure onto the bump (50) of the underlying terminal (5) and, accordingly, no contact exists between the two terminals disposed inside the seat (4) of base (1). By pressing the button (3), the cap (9) is pushed downwards, thereby compressing the spring (11) and determining the displacement of nose (90) as illustrated in Fig. 11: the nose moves along the vertical length (100a) of slot (100) and, as it results on a flexible portion (91) of cap (9) - which portion is separated from the rest of the cap's material by a "U" shaped discontinuity - the same nose disengages from such length of slot (100) inasmuch as the position (91) of the cap (9) bends inwardly and becomes engaged within the slot (101). By releasing the button (3), the nose (90) moves on inside the slot (101) by reaching the point (B) thereof. During this step, the cap (9) is lifted, as it is pushed upwards by spring (11) while rotating about its longitudinal axis. In this configuration, the switch is closed, inasmuch as the appendix (120) of dish (12) pushes the bump (50) of the underlying terminal (5) in contact with the other terminal being housed within the seat (4) of base (1). By pressing once again the button (3), the nose (90) of cap (9) disengages from the slot (101) to be engaged afterwards - likewise in the previous case - within the inclined length (100b) of slot (100).

[0012] Thereafter, the same nose is pushed upwards by the spring (11) and made to move along the second vertical length (100c) and second inclined length (100d), thereby reaching the starting position (A) as illustrated in Fig. 12. Again in this step, the cap (9) rotates about its longitudinal axis while translating upwards.

[0013] Referring to the diagrams of Figs. 10-12, the inclined lengths (100b, 100d) of the slot (100) are oriented left upwards and right upwards respectively and are connected between themselves by the vertical length (100c). The vertical length (100a) of the slot (100) begins in correspondence of the end of the second inclined length (100d) in a point opposite in respect to the point in which terminates the vertical length (100c). The slot (101) is oriented upwards from left to right.

[0014] Save for the spring (11) and terminals (5), all the above described elements are moulded from plastics material.

[0015] It is understood that the above described and illustrated switch can also be advantageously used as a desk switch, with the switch's base (1) being made to rest on the plane of a table or desk or the like, instead of on the ground.

Claims

1. Switch comprising a base element (1), a cover element (2), a button (3) disposed across an opening (20) of said cover (2) and a pusher associated with said button (3), **characterized in that** the said pusher comprises a coaxially disposed cap (9) free to translate and able to rotate about its longitudinal axis within a tubular housing and guiding element (10), an elastic element (11) acting coaxially inside said cap (9), and an element (12) integral with the elastic element (11) and intended to maintain two metal terminals (5) in contact with each other within a seat (4) formed in the guide element (10): the said cap (9) and guide element (10) being provided with means for mutual interlock in two different relative positions.
2. Switch according to claim 1, **characterized in that** the said guide element (10) is provided with appendices (102) allowing it to be snap-connected to said base element (1) in correspondence of two openings (110) provided on the two sides of said seat (4).
3. Switch according to claim 1, **characterized in that** the said interlocking means comprise an appendix or nose (90) in correspondence of a flexible portion (91) of said cap (9), and two slots (100, 101) in correspondence of said tubular guiding element (10) wherein the said nose (90) is made to fit alternately and to slide with respect to the mutual position of cap (9) and guide element (10).

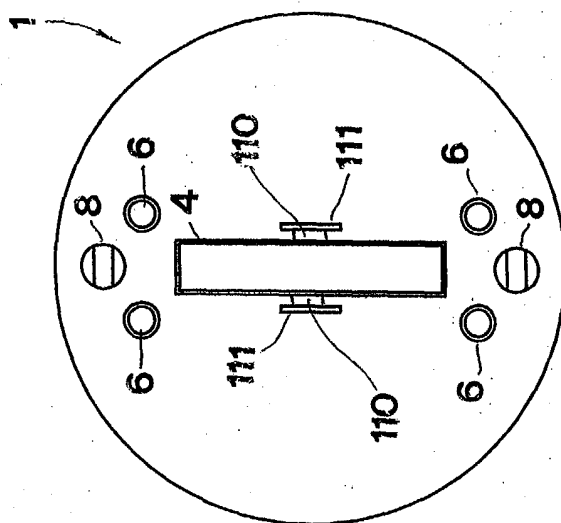


Fig. 3

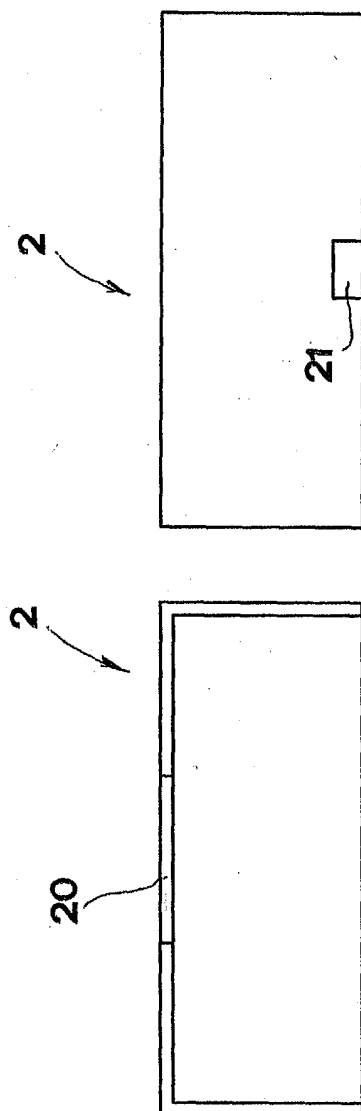


Fig. 2

Fig. 1

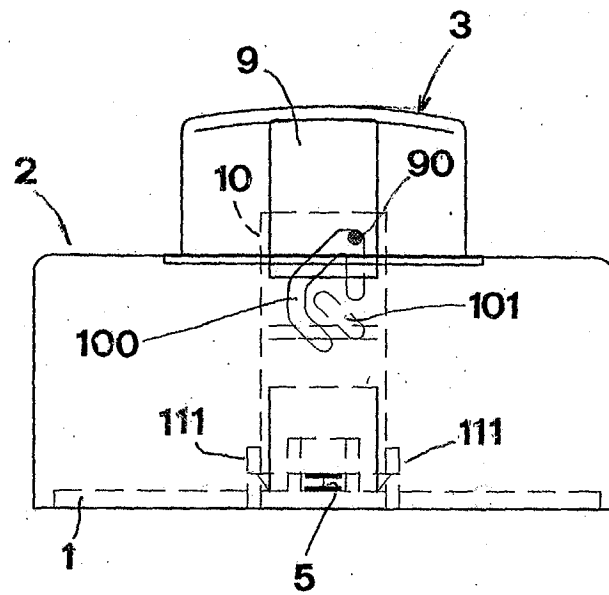


Fig. 4

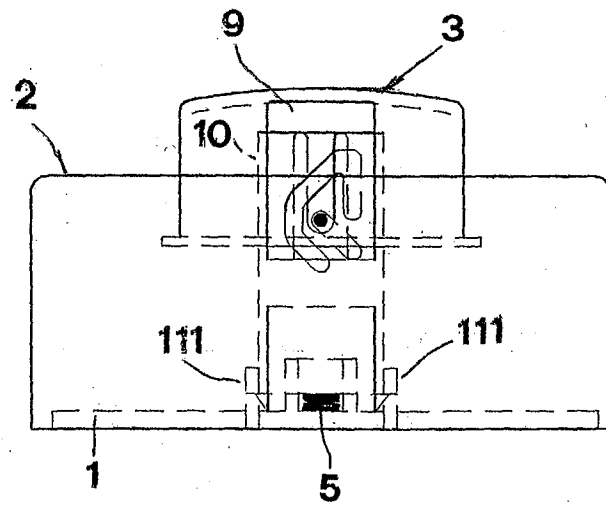


Fig. 5

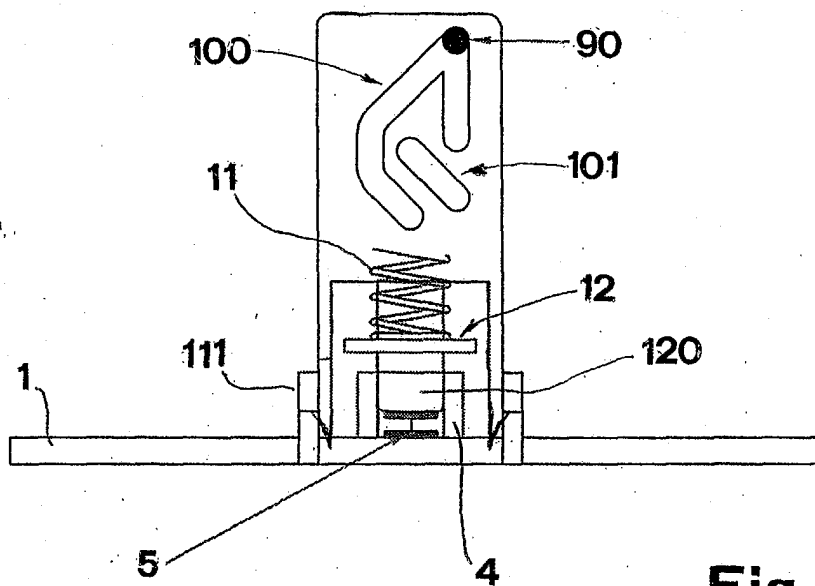


Fig. 6

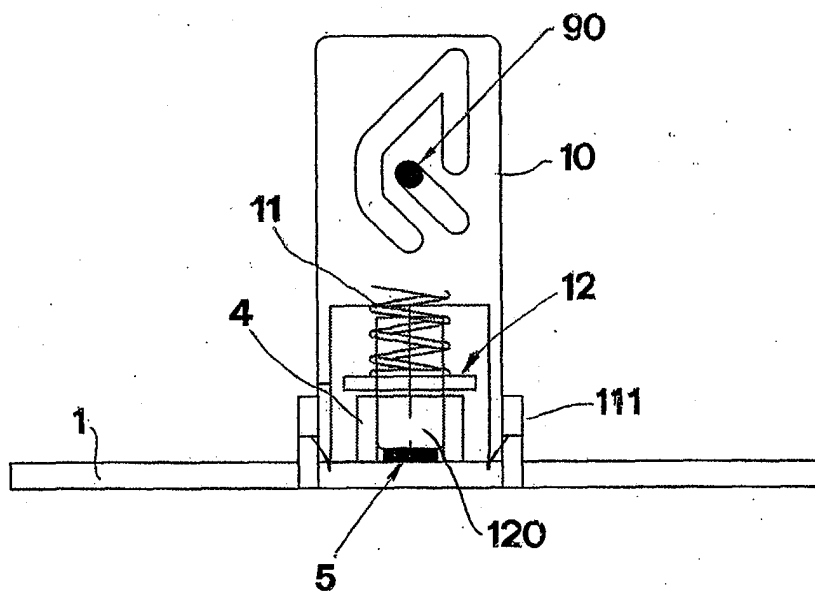


Fig. 7

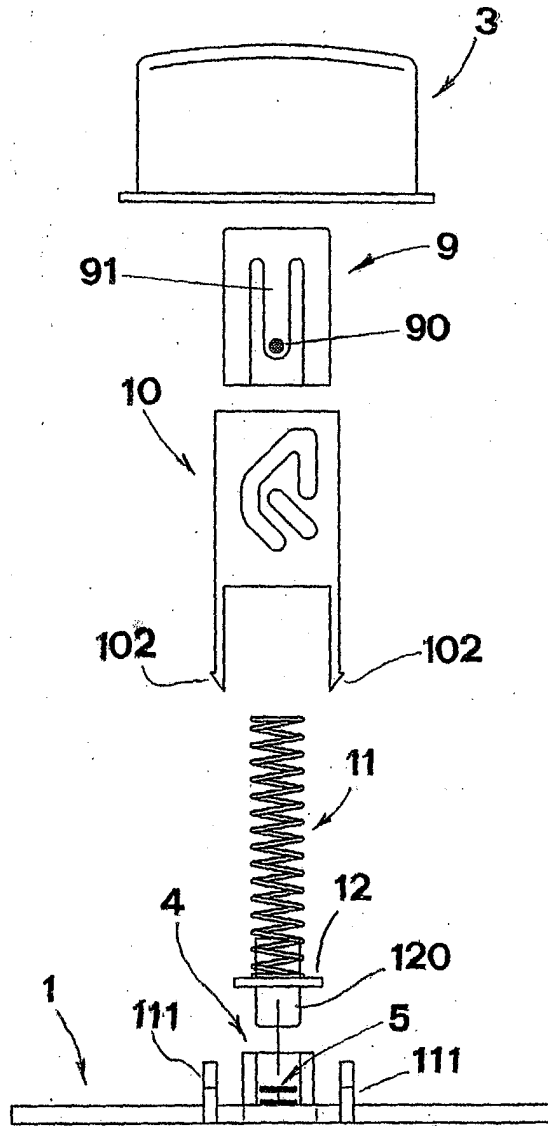


Fig. 8

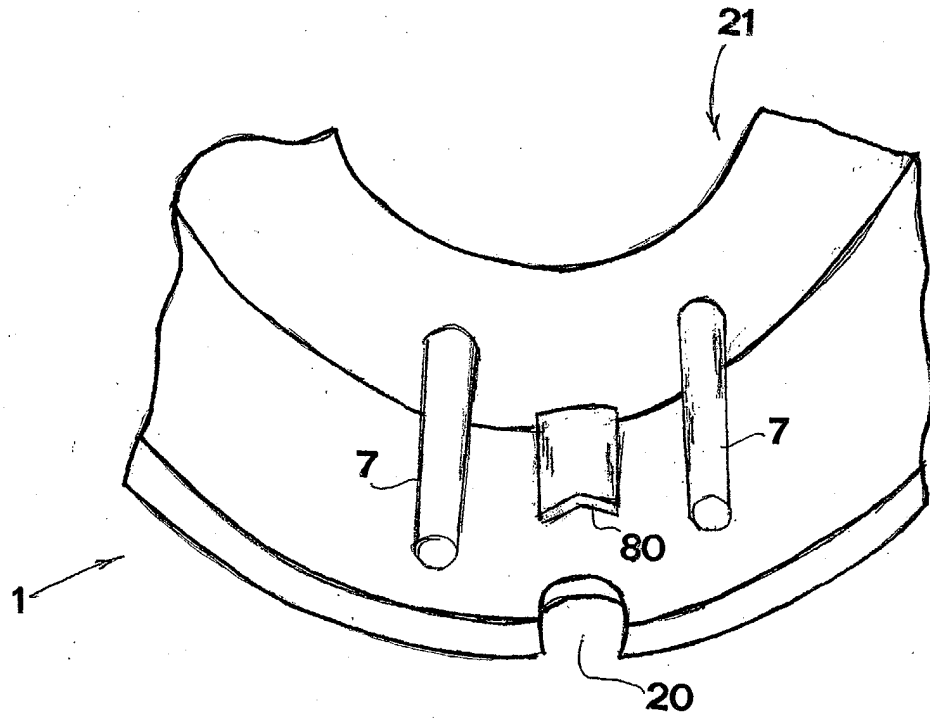


Fig. 9

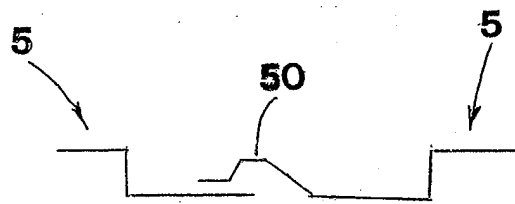


Fig. 13

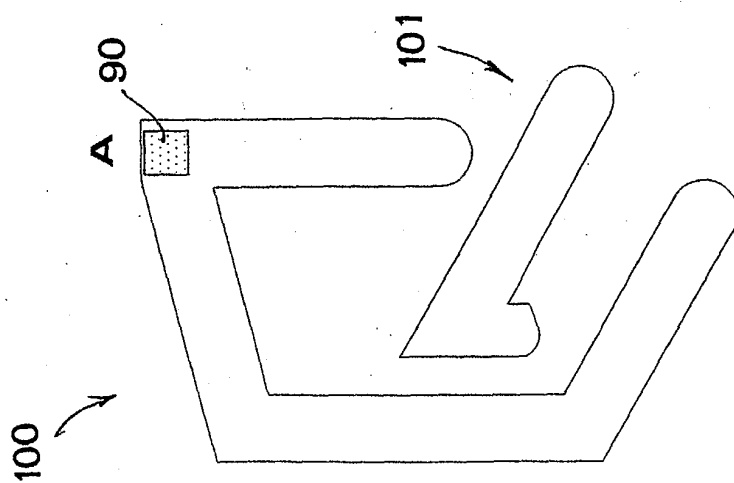


Fig. 10

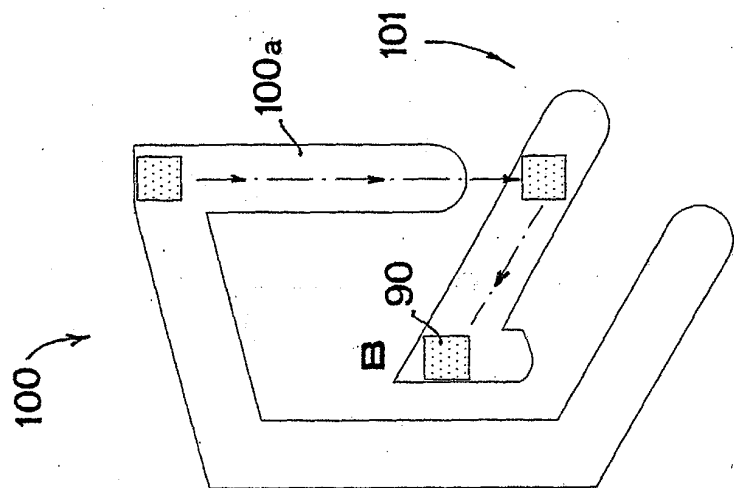


Fig. 11

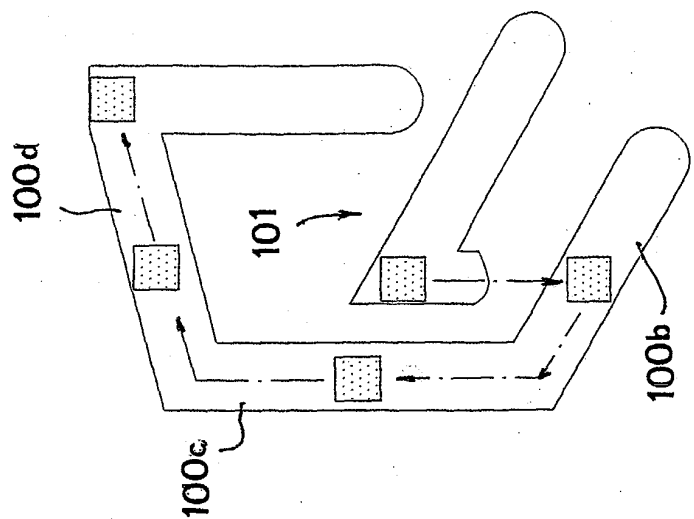


Fig. 12



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EUROPEAN SEARCH REPORT

Application Number
EP 04 42 5395

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.7)
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 25 August 2004	Examiner Mäki-Mantila, M
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 04 42 5395

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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25-08-2004

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