

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
21 December 2006 (21.12.2006)

PCT

(10) International Publication Number  
**WO 2006/134574 A2**

- (51) International Patent Classification:  
*H01H 13/83* (2006.01)    *H01H 15/02* (2006.01)  
*H01H 13/02* (2006.01)    *H01H 23/02* (2006.01)
- (21) International Application Number:  
PCT/IB2006/051929
- (22) International Filing Date: 15 June 2006 (15.06.2006)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
05105351.0                      17 June 2005 (17.06.2005)    EP
- (71) Applicant (for all designated States except US): **KONINKLIJKE PHILIPS ELECTRONICS N.V.** [NL/NL];  
Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): **CORTEVILLE, Koen** [BE/BE]; C/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).
- (74) Agents: **GROENENDAAL, Antonius, W., M.** et al.;  
Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Declaration under Rule 4.17:**

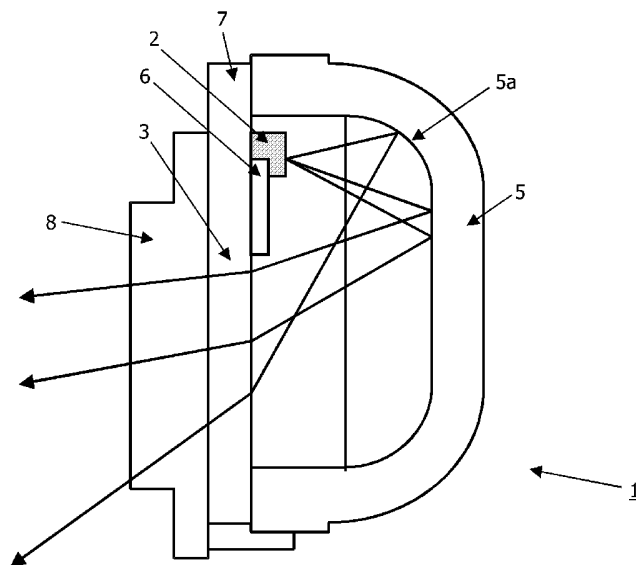
— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

**Published:**

— without international search report and to be republished upon receipt of that report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: CONTROL DEVICE HAVING A CONTROL PANEL WITH BACKLIGHTING ELEMENTS



(57) Abstract: A control device (1) has a control panel (4) and backlighting elements (2) for backlighting control elements (3) on the control panel (4), wherein the backlighting elements (2) are arranged to emit light in a direction away from the control panel (4), and the control device (1) comprises a reflector (5) on its rear side for directing light emitted by the backlighting elements towards the control elements (3) on the control panel (4). The control elements are preferably touch control elements. The backlighting elements are preferably provided on a support (7) which also supports a remote control receiver (10) and/or a daylight sensor (11).

WO 2006/134574 A2

## Control device having a control panel with backlighting elements

### FIELD OF THE INVENTION

The invention relates to a control device having a control panel and backlighting elements for backlighting control elements on the control panel.

Control panels are used e.g. for controlling devices such as DVD players, CD-players, radios  
5 and display devices. The invention also relates to an apparatus, such as an audio and/or video apparatus, comprising a control device for controlling its functions.

### BACKGROUND OF THE INVENTION

A control panel comprises a number of control elements. A user can control a  
10 device by touching or pressing the control elements. The control elements may be provided with numbers or symbols which are indicative of one or more controllable functions such as channel indication, contrast, color, loudness, etc. The control panel is provided with backlighting elements. The backlighting elements illuminate the control elements so that they are more easily recognizable. The conventional control device comprises a large number of  
15 parts, which leads to a rather complex design and thus increases the manufacturing costs of the control panel.

### OBJECT AND SUMMARY OF THE INVENTION

It is an object of the invention to provide an improved design for the control  
20 panel, allowing simplification of the control device and a reduction of cost.

To this end, the control device according to the invention is characterized in that the backlighting elements are arranged to emit light in a direction away from the control elements, and the control device comprises a reflector on its rear side for directing light emitted by the backlighting elements towards the control elements on the control panel.

25

In conventional control devices, the backlighting elements are arranged behind the symbols to be illuminated, wherein each control element is provided with backlighting elements, such as LED-elements. It is important to provide a uniform backlighting so as to ensure that each control element is clearly and easily distinguishable. This requires a

relatively large number of backlighting elements and, in operation, a large energy consumption.

In the control device according to the invention, the backlighting elements emit light in a direction away from the control elements and the light emitted by the  
5 backlighting element is reflected off a reflector at the rear side of the control device towards the control elements. Due to the increased light path between the backlighting element and the control elements, a backlighting element provides a better light distribution at the control elements, without the need for a substantial increase of depth of the control device. This reduces the number of parts of the control device, in particular the number of backlighting  
10 elements, thus reducing costs, complexity of design and power consumption.

In a preferred embodiment, the control elements are touch control elements. Touch control elements allow a reduced depth of the control panel, as compared to buttons.

In a preferred embodiment, the reflector has at least a partially curved surface facing the backlighting elements. A curved reflective surface allows a better distribution of  
15 the light emitted by the backlighting elements towards the control elements.

In a further preferred embodiment, the reflector is formed as a fixation bracket. The reflector provides a double function, namely reflection and fixation. In particular reflectors having a curved surface are preferred in this respect, because the curved surface provides a strong fixation bracket.

20 In another preferred embodiment, the control device comprises a separate backlighting element for or with an on/off symbol. The on/off symbol is often provided with a separate color indication, for instance, red.

In a most preferred embodiment, the backlighting elements are provided on a support which also supports a remote control receiver and/or a daylight sensor.

25 The novel design allows a single support to be used for the backlighting elements as well as for other elements such as a remote control receiver and/or a daylight sensor. This provides a simple and economical, yet effective and esthetically pleasing design.

In preferred embodiments, the backlighting elements are LED elements, most  
30 preferably blue light-emitting LED elements.

## BRIEF DESCRIPTION OF THE DRAWINGS

These and further aspects of the invention will be explained in greater detail by way of example and with reference to the accompanying drawings, in which

Fig. 1 schematically shows a conventional control device.

Fig. 2 schematically shows, in a cross-section, a control device according to the invention.

5 Fig. 3 schematically shows, in a front view, a control device according to the invention.

Figs. 4 and 5 schematically show further examples of a control device according to the invention.

Fig. 6 illustrates an apparatus, in this example a DVD player, with a control device according to the invention.

10 Fig. 7 is an exploded view of a preferred embodiment of a control device according to the invention.

Fig. 8 is an exploded rear view of a preferred embodiment of a control device according to the invention.

15 The Figures are not drawn to scale. Generally, identical components are denoted by the same reference numerals in the Figures.

#### DESCRIPTION OF EMBODIMENTS

Figure 1 schematically shows a conventional control device.

20 The control device 1 comprises backlighting elements 2, such as, for instance, LED elements for backlighting control elements (buttons) 3. The control device further comprises a front part 4 accommodating the buttons to be pressed, a rear part 5 and the usual control circuitry 6. The light paths are schematically indicated by arrows. In this example, the buttons 3 have to be pressed, which is indicated by the double-headed arrow. In this example, the control elements are mechanical elements. A large number of backlighting elements, 25 namely two for each control element has to be used for a proper and uniformly distributed illumination of the control elements 3.

30 Figure 2 schematically shows, in a cross-section, a control device in accordance with an embodiment of the invention. The control device 1 comprises a number of touch control elements 3, a backlighting element 2, a rear part 5 and circuitry 6. The difference with the conventional design is that the backlighting elements 2 shine away from the control elements 3 towards the rear part 5. The rear part 5 reflects the emitted light back towards the touch control elements 3. In preferred embodiments, the reflector 5 has a curved part 5a. Due to the increased light path length and, in this example also due to the use of touch control elements, the illumination at the control elements 3 is substantially improved

without the need for increasing the depth of the touch control device 1, thereby allowing use of a smaller number of backlighting elements (for instance, one per touch control element 3), or of backlighting elements of a lesser quality or strength, resulting in a reduction of the complexity of design, the number of parts and/or the cost of manufacturing or operating the touch control device.

The control elements are preferably touch control elements 3. This allows a further reduction of depth. The touch control elements are preferably touch control PCB elements or form a touch control PCB element. This is preferred because the translucent material of the touch control PCB element provides some extra diffusion of light, thus increasing the uniformity of the light. Also, any problems associated with mechanical knobs, such as alignment of the knobs within the hole, burrs in the hole in which the knobs are fitted, etc. are eliminated by using a touch control PCB element. Each touch control PCB element may be a separate element, or a number of touch control elements can be formed in one touch control PCB element 7. The touch control PCB element is preferably covered with a PC front 8, which is preferably molded in transparent PC. The rear side of the front 8 is printed in a color different from the light of the backlighting elements 2, for instance, in black, except for graphic symbols indicating the function of the relevant touch control element 3. A black (or differently colored) front with transparent graphics is created in this way. The PCB element 7 and the front 8 may be fixed to each other by e.g. double adhesive transparent tape. In a preferred embodiment as shown here, the reflector 5 is formed as a fixation bracket. The reflector 5 provides a double function, namely reflection and fixation. In particular reflectors having a curved surface are preferred in this respect; the curved surface provides a strong fixation bracket.

Figure 3 schematically shows, in a front view, a touch control device according to the invention. The on-off symbol may have its own backlighting element which is colored differently from the other backlighting elements.

The invention may be embodied in several variations. Figs. 4 and 5 show two such variations. In Figure 4, backlighting elements are provided at opposite sides of the touch control elements 3. This allows a further improvement of the uniformity of illumination. Figure 4 also shows a design in which a backlighting element 2 is provided in between two rows of touch control elements 3, reducing yet again the number of backlighting elements per touch control element.

Figure 5 illustrates an embodiment in which the number of backlighting elements per touch control element is further reduced. The backlighting elements are

provided in a middle part of the touch control device, and the light is reflected to two sides, illuminating touch control elements above and below the backlighting element. As is schematically shown in Figure 5, the rear part may have a form suited for such a purpose.

Figure 6 illustrates an apparatus comprising a control device according to the invention, in this example a DVD device 9, comprising a touch control device 1. The dotted elements are not visible to the user, but indicate elements behind the visible touch panel. The slot in the DVD device illustrates the insert for a DVD.

Figs. 7 and 8 are front and rear views, respectively, of a preferred embodiment of the invention. Since the light-emitting elements shine backwards, the distance between the light-emitting elements and the front of the control device is considerably reduced. This allows a design in which the light-emitting elements and further elements, such as a remote control receiver 10 and a daylight sensor 11, are provided on a single support element, in this case a PCB element 7. This integration of the remote control receiver and the daylight sensor as well as the LED elements in a single support, preferably covered by a single front 8, leads to a cost reduction as compared with conventional designs in which this is impossible. The resulting control device is simple, easy to manufacture, has a relatively low power consumption, a sleek design (i.e. having a small depth) and yet is esthetically very pleasing.

In summary, the invention can be described as follows.

A control device 1 has a control panel 4 and backlighting elements 2 for backlighting control elements 3 on the control panel 4, wherein the backlighting elements 2 are arranged to emit light in a direction away from the control panel 4, and the control device 1 comprises a reflector 5 on its rear side for directing light emitted by the backlighting elements towards the control elements 3 on the control panel 4. The control elements are preferably touch control elements. The backlighting elements are preferably provided on a support 7 which also supports a remote control receiver 10 and/or a daylight sensor 11.

It will be appreciated by persons skilled in the art that the present invention is not limited by what has been particularly shown and described hereinbefore. The invention resides in each and every novel characteristic feature and each and every combination of characteristic features. Reference numerals in the claims do not limit their protective scope. Use of the verb "comprise" and its conjugations does not exclude the presence of elements other than those stated in the claims. Use of the article "a" or "an" preceding an element does not exclude the presence of a plurality of such elements.

The present invention has been described in terms of specific embodiments, which are illustrative of the invention and should not be construed as limiting, although such embodiments may be preferred embodiments.

## CLAIMS:

1. A control device (1) having a control panel (4) and backlighting elements (2) for backlighting control elements (3) on the control panel (4), wherein the backlighting elements (2) are arranged to emit light in a direction away from the control elements (3), and the control device (1) comprises a reflector (5) on its rear side for directing light emitted by  
5 the backlighting elements (2) towards the control elements (3) on the control panel (4).
2. A control device as claimed in claim 1, wherein the control elements are touch control elements.
- 10 3. A control device as claimed in claim 1, wherein the reflector (5) has at least a partially curved surface (5a) facing the backlighting elements (2).
4. A control device as claimed in claim 1, wherein the reflector (5) is formed as a fixation bracket.  
15
5. A control device as claimed in claim 1, wherein the control device comprises a separate backlighting element for or with an on/off symbol.
6. A control device as claimed in claim 1, wherein the backlighting elements are  
20 LED elements.
7. A control device as claimed in claim 1, wherein the backlighting elements (2) are provided on a support (7) which also supports a remote control receiver (10) and/or a daylight sensor (11).  
25
8. An apparatus (9) comprising a control device (1) having a control panel (4) and backlighting elements (2) for backlighting control elements (3) on the control panel (4), wherein the backlighting elements (2) are arranged to emit light in a direction away from the control elements (3), and the control device (1) comprises a reflector (5) on its rear side for

8

directing light emitted by the backlighting elements towards the control elements (3) on the control panel (4).

9. An apparatus as claimed in claim 8, wherein the control elements are touch  
5 control elements.

10. An apparatus as claimed in claim 8, wherein the backlighting elements (2) are provided on a support (7) which also supports a remote control receiver (10) and/or a daylight sensor (11).

1/8

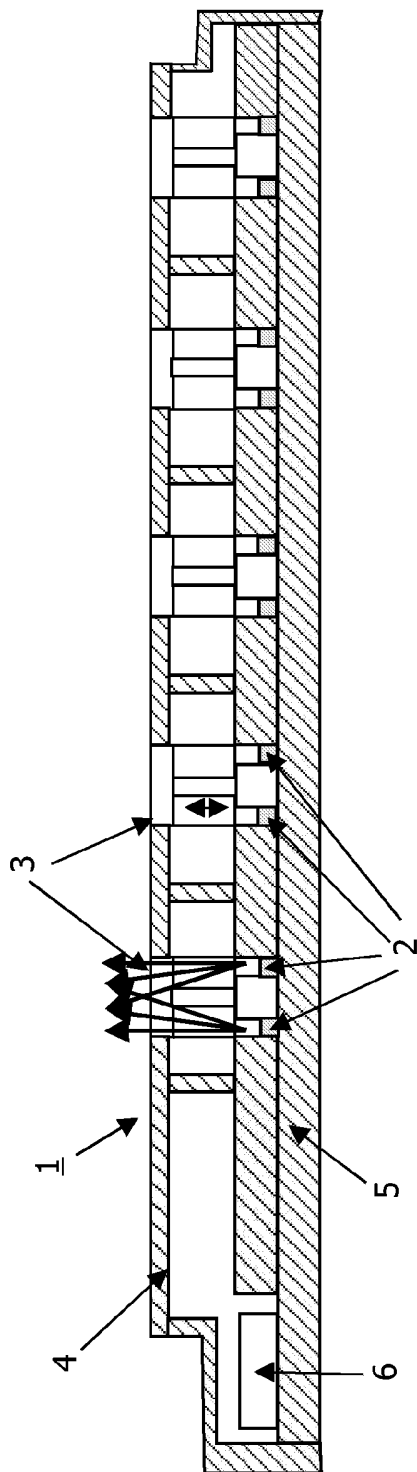


FIG.1

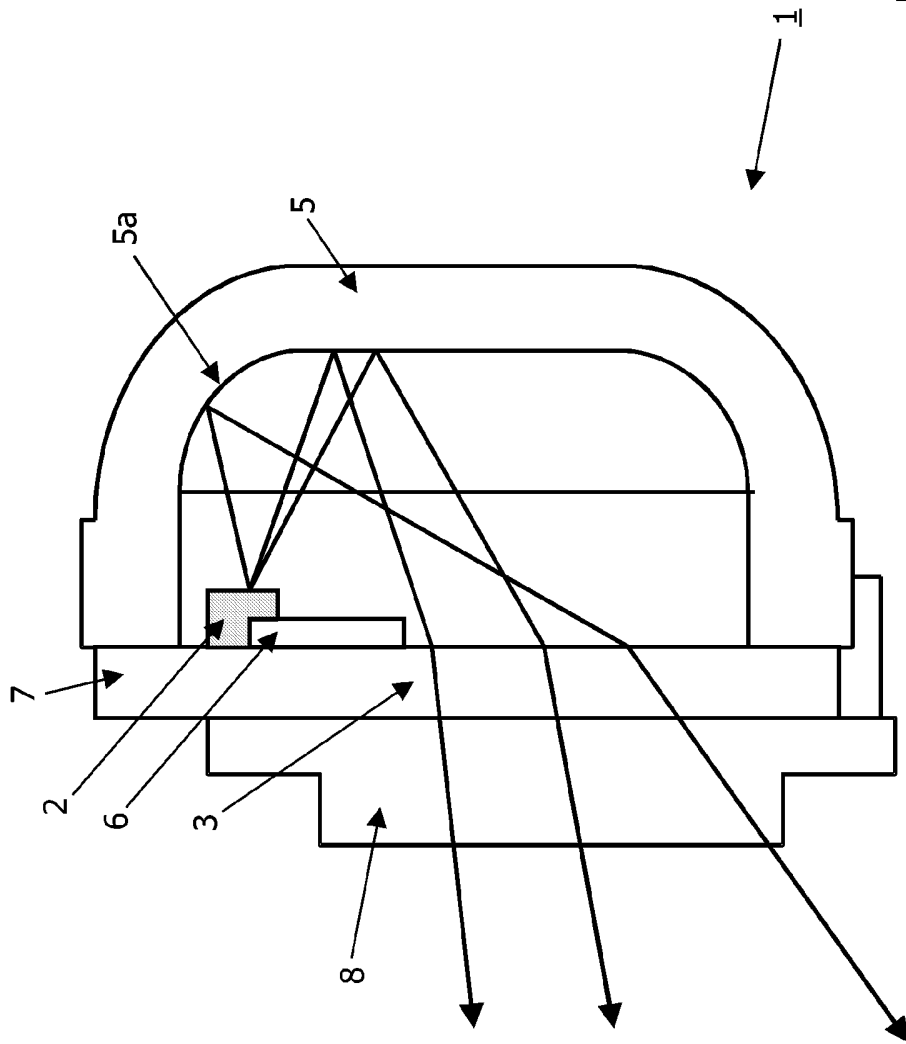


FIG.2

3/8

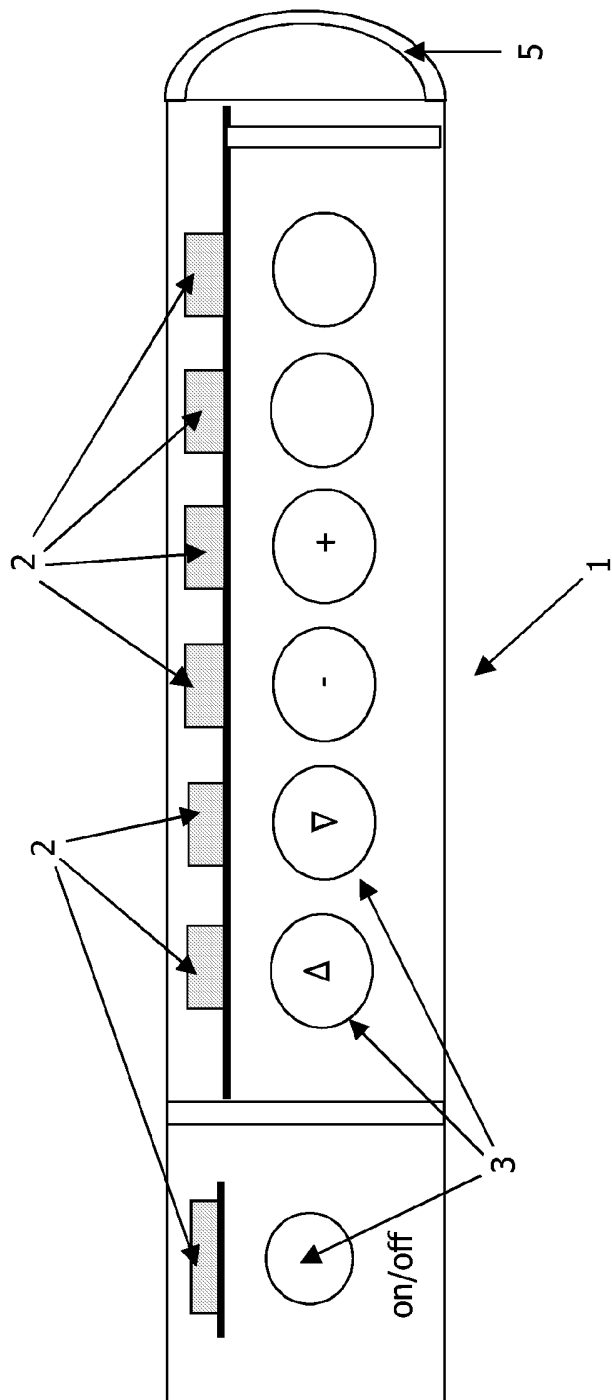


FIG.3

4/8

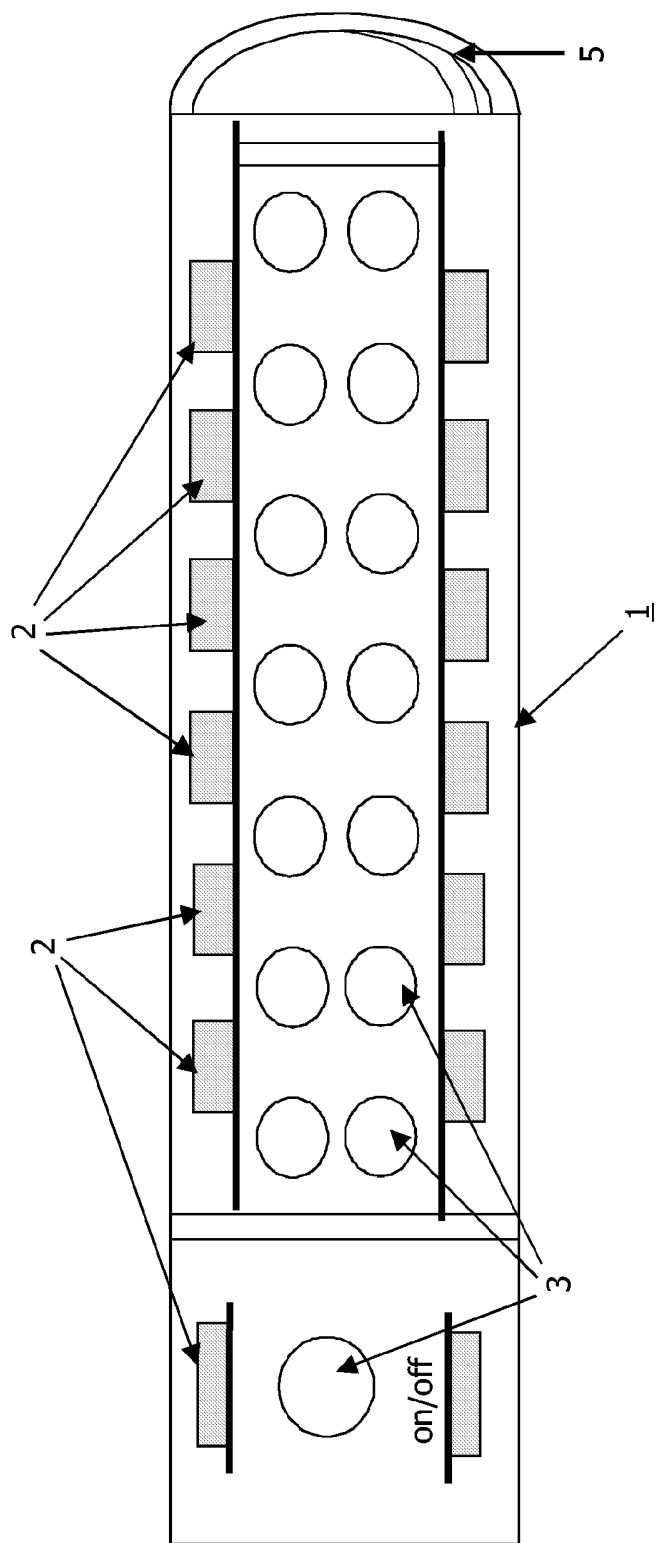


FIG.4

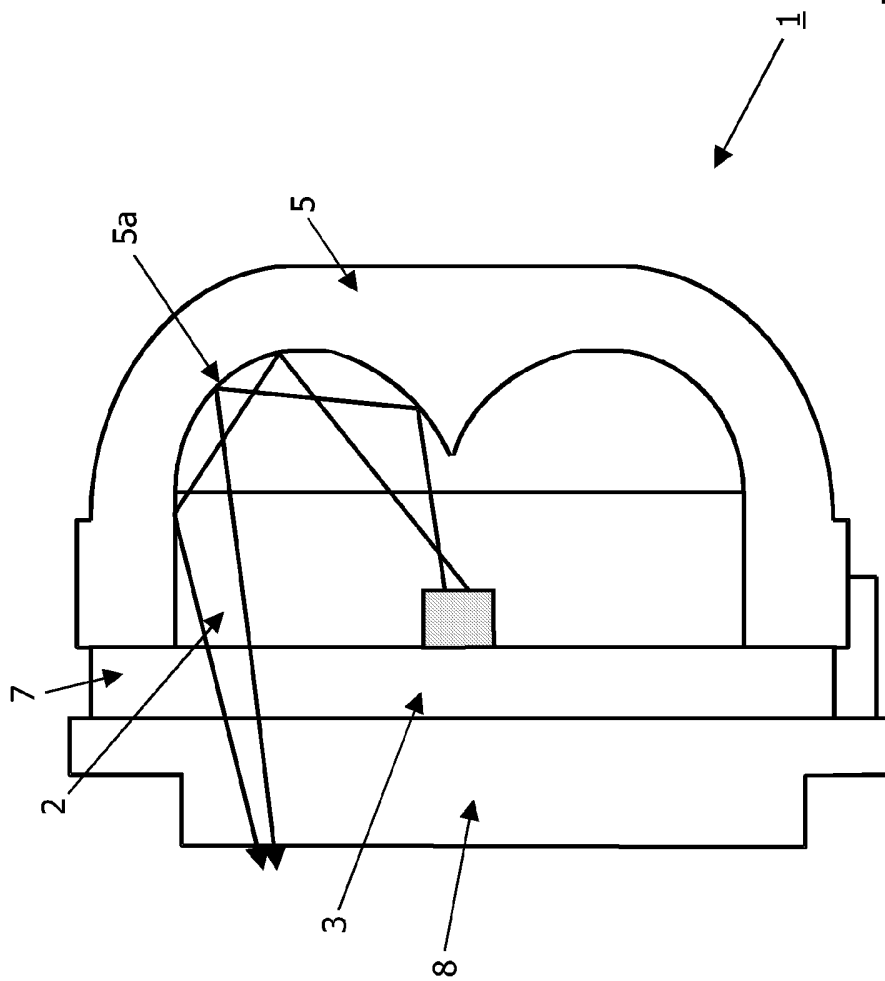


FIG.5

6/8

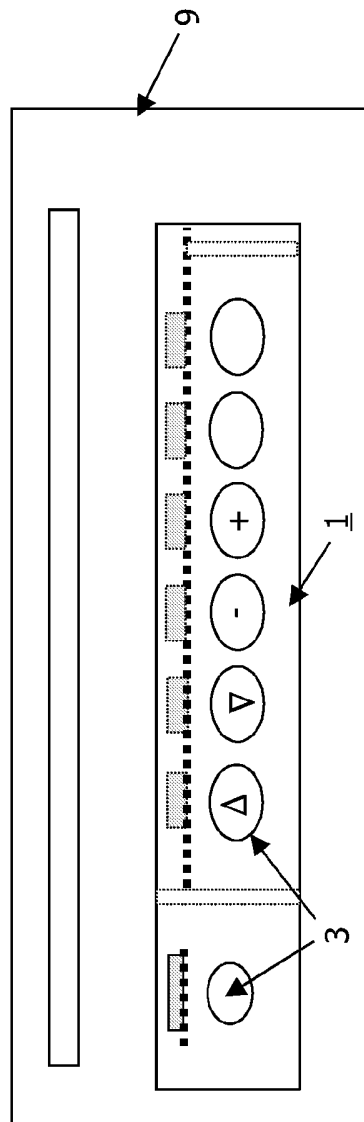


FIG.6

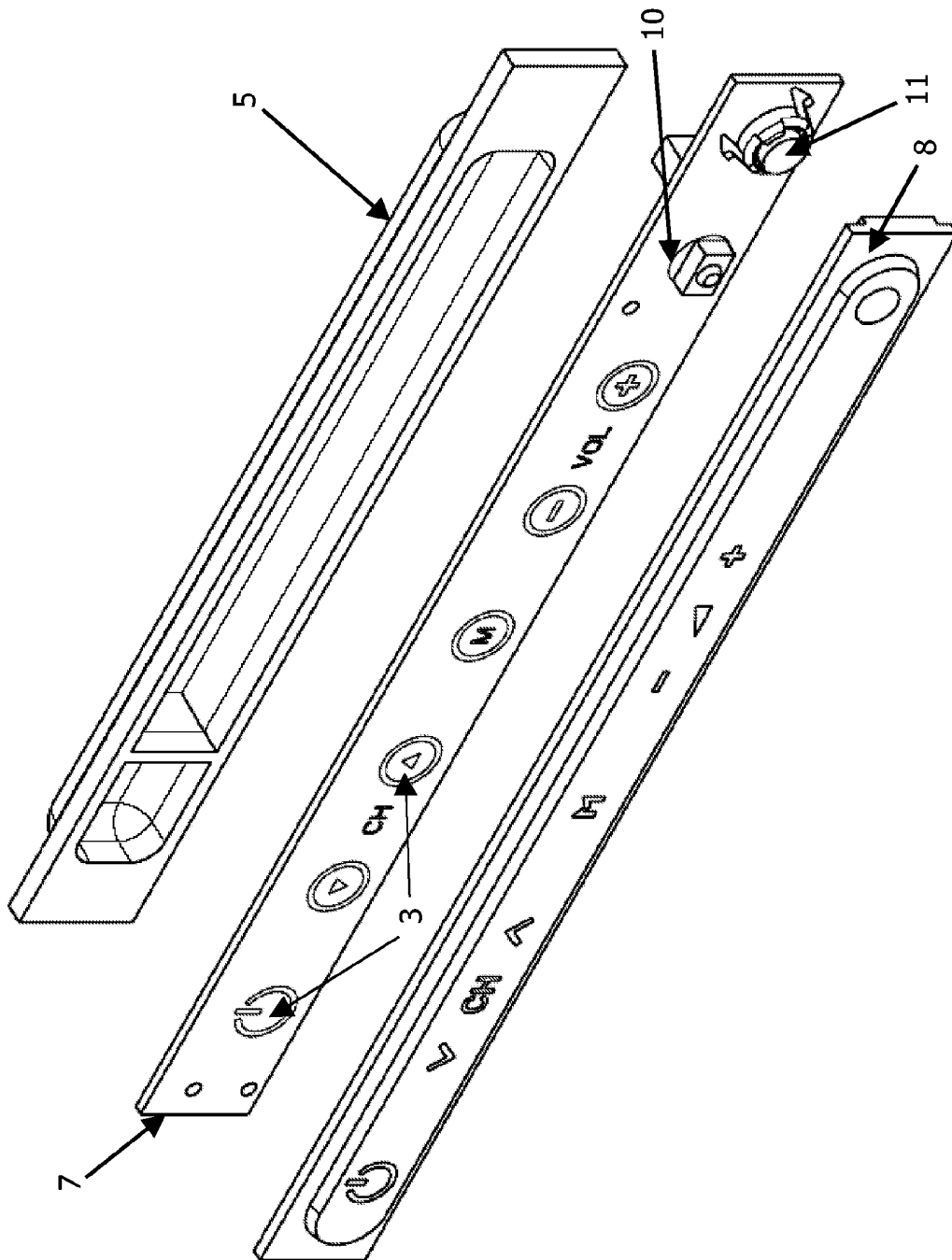


FIG.7

8/8

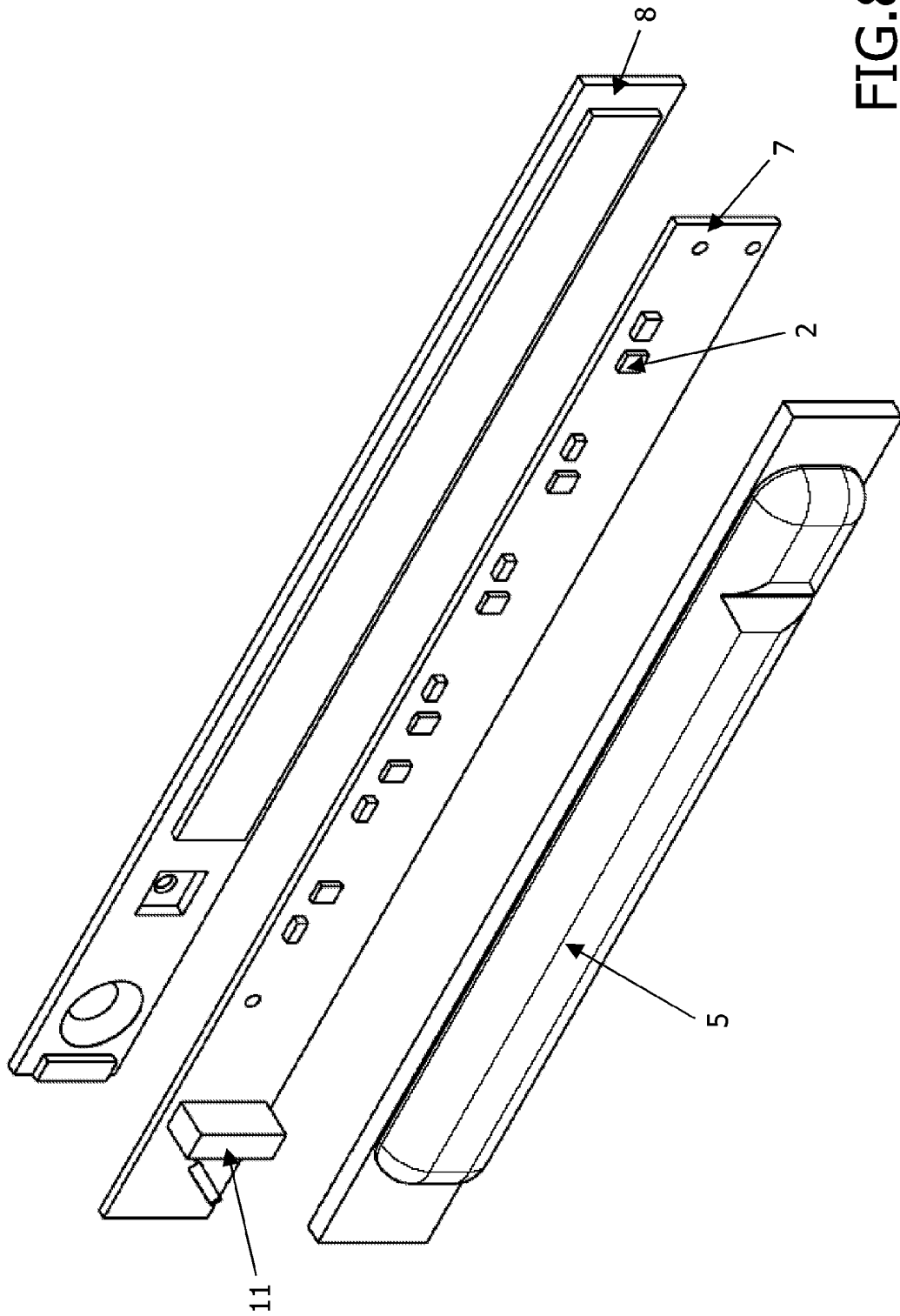


FIG.8