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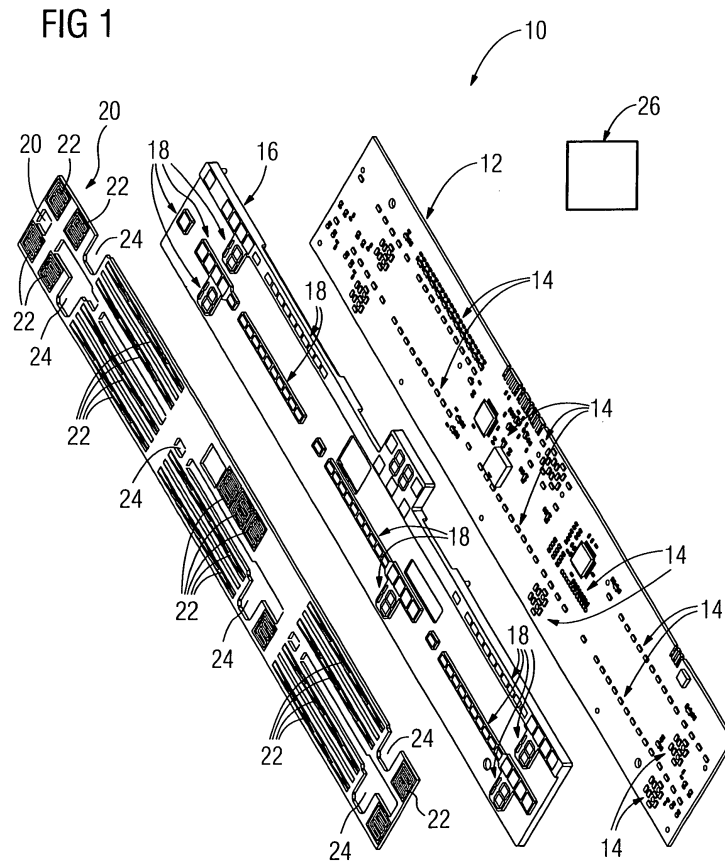
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Remarks:

The references to the non-existing drawing no. 4D are deemed to be deleted.

(54) **A control panel for controlling several different functions of an appliance**

(57) Control panel (10) for controlling several different functions of an appliance and method for manufacturing such a control panel (10).



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**Description****TECHNICAL FIELD**

**[0001]** The present invention relates to a control panel for controlling several different functions of an appliance, in particular of a cooker having a ceramic cooktop.

**BACKGROUND TECHNOLOGY**

**[0002]** Control panels of the above mentioned kind are already known in many different designs. They normally comprise several actuating elements, in particular in form of touch sensitive switches or proximity switches, which can be operated by a user for choosing a function of the appliance. Moreover, the control panels include a controller, which is connected to the actuating elements for controlling the function chosen by the user. In order to indicate current operating conditions of the appliance, several lights, in particular LEDs, are connected to the controller and are arranged in such a manner, that they form several displays, e.g. one display for each controllable unit of the appliance, such as one display for each cooking field of a cooker.

**[0003]** The most common display designs are the seven segment display design and the bargraph display design. Both display designs may be supplemented by further displays, e.g. so-called on/off-displays, which are normally formed by a single LED.

**[0004]** In order to distinguish products of one appliance producer from the ones of others, each producer uses one or more particular control panel designs. Moreover, divers display designs are used to distinguish different type series of appliances of the same producer.

**[0005]** Accordingly, control panel suppliers need to manufacture many different control panels having many different designs. However, this multitude of designs increases the manufacturing costs of control panels. In particular the plurality of different assembly lines for the different control panel designs causes high extra costs.

**[0006]** Starting from the above mentioned prior art technology, it is an object of the present invention to provide control panels of different designs, which are inexpensive to manufacture. Moreover, it is an object of the present invention to provide an inexpensive method for manufacturing control panels of different designs.

**DISCLOSURE OF THE INVENTION**

**[0007]** These objects are solved by providing a control panel according to claim 1 and a method for manufacturing a control panel according to claim 7. The dependent claims refer to individual embodiments of the present invention.

**[0008]** The present invention provides a control panel for controlling several different functions of an appliance, such as a cooker having a ceramic cooktop. The control panel comprises at least one actuating element, in par-

particular a touch sensitive switch or a proximity switch, which can be operated by a user for choosing a function of the appliance; a controller, which is connected to the at least one actuating element for controlling the function chosen by the user; and a plurality of lights, in particular LEDs, which are connected to the controller and which are arranged in such a manner, that they form at least a first display and a second display, in particular a seven segment display and a bargraph display, for indicating current operating conditions of the appliance. According to the present invention, the controller is preadjusted in such a manner that it controls either exclusively the first display or exclusively the second display. In other words, although two different displays are available, only one of these displays is put into operation, whereas the other display is not used at all. The decision, which display is used an which one is put out of operation, comes with the setting of the controller. The setting of the controller can be performed by the manufacturer of the control panel or by the producer of the appliance. If the control panel comprises more than two displays, at least one of the displays is set out of operation by means of the setting of the controller.

**[0009]** In this manner it is possible to choose between different displays and thus between different appearances of the control panel on the basis of one and the same basic arrangement of the control panel. Accordingly, neither the production nor the assembly have to be changed over in order to produce control panel of at least two divers designs. Merely the settings of the controller need to be adapted to the chosen design. Thus, even though some of the LEDs of the control panel are finally not put into operation and are therefore dispensable, the manufacturing costs of the control panels can be decreased.

**[0010]** Preferably, the control panel comprises a first circuit board, on which the plurality of lights is mounted. Moreover, a number of other electronic components may be arranged on said first circuit board. Moreover, the control panel comprises a mask layer, which is arranged above the circuit board and comprises a plurality of throughholes allowing the light emitted from the lights of the underlying first circuit board to pass.

**[0011]** Furthermore, a second circuit board is provided, which is arranged above the mask layer and on which the at least one actuating element is mounted. In addition, the control panel comprises a cover layer, which is arranged on the second circuit board, whereas the cover layer is at least partially translucent and serves as a user interface. The cover layer may be, e.g., the ceramic field of a cooker having a ceramic cooktop.

**[0012]** Preferably, icons symbolizing current operating conditions or functions of the appliance, which can be chosen by the user, are arranged on the cover layer, e.g. by means of a printing technique or the like, in order to inform the user about the kind of operating condition or function.

**[0013]** Alternatively or in addition, such icons may be provided in the mask layer in the form of specially de-

signed throughholes, which are lighted by lights arranged on the first circuit board.

**[0014]** Preferably, at least some of the lights form a part of the first display as well as a part of the second display. In this manner, the number of lights which is put out of operation by means of the setting of the controller, can be decreased. Accordingly, the production costs can be reduced.

**[0015]** Moreover, the present invention provides a domestic appliance comprising a control panel of the above mentioned kind. The domestic appliance may be a cooker, an oven, a dishwasher, a washing machine, a dryer, etc.

**[0016]** Furthermore, the present invention provides a method for manufacturing a control panel for controlling functions of an appliance. The method comprises the steps of providing at least one actuating element, which can be operated by a user for choosing the function of the appliance; providing at least one controller for controlling the function chosen by the user; providing a plurality of lights, in particular LEDs, and arranging them in such a manner that they form at least a first display and a second display, in particular a seven segment display and a bargraph display, for indicating a current operating condition of the appliance; connecting the at least one actuating element and the plurality of lights with the controller; and preadjusting the controller in such a manner, that it controls either exclusively the first display or exclusively the second display.

**[0017]** Preferably, the method further comprises the steps of mounting the plurality of lights on a first circuit board; arranging a mask layer above the first circuit board, said mask layer having a plurality of throughholes allowing the light emitted from the lights to pass; arranging a second circuit board above the mask layer, said second circuit board comprising actuating elements, in particular touch sensitive switches or proximity switches, for choosing different functions of the appliance; and arranging a cover layer above the second circuit board, said cover layer is at least partially translucent and serves as a user interface.

**[0018]** Preferably, the lights form several seven segment displays and several bargraph displays, whereas the controller is set in such a manner, that only the seven segment displays or only the bargraph displays are controllable by the controller.

### BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

**[0019]** The detailed configuration, features and advantages of the present invention will become apparent in the course of the following description with reference to the accompanying drawings.

Figure 1 is a perspective exploded top view of a control panel according to an embodiment of the present invention

Figure 2 is a perspective exploded bottom view of the control panel shown in figure 1;

Figure 3A is a top view of the mask layer of the control panel according to figures 1 and 2 and shows all LEDs, which are mounted on the first circuit board of the control panel;

Figure 3B is a top view of the mask layer according to figure 3B and shows only the LEDs that are put into operation for creating a control panel having a bargraph design;

Figure 3C is a top view of the mask layer according to figure 3B and shows only the LEDs that are put into operation for creating a control panel having a seven segment design;

Figure 4A is a top view of the cover layer of the control panel according to the bargraph design;

Figure 4B is an enlarged view of the detail B in figure 4A;

Figure 4C is an enlarged view of the detail C in figure 4A;

Figure 4D is an enlarged view of the detail D in figure 4A;

Figure 5A is a top view of the cover layer of the control panel according to the seven segment design;

Figure 5B is an enlarged view of the detail B in figure 5A;

Figure 5C is an enlarged view of the detail C in figure 5A;

Figure 5D is an enlarged view of the detail D in figure 5A;

Figure 5E is an enlarged view of the detail E in figure 5A;

Figure 5F is an enlarged view of the detail F in figure 5A;

Figure 5G is an enlarged view of the detail G in figure 5A and shows a possible indication of the seven segment display; and

Figure 5H is an enlarged view of the detail G in figure 5A and shows another possible indication of the seven segment display.

## BEST MODE FOR CARRYING OUT THE INVENTION

**[0020]** Below, one embodiment of the present invention will be described with reference to the figures. In the figures, like parts or portions are denoted by like reference numerals, and redundant descriptions will be omitted.

**[0021]** Figures 1 and 2 show a control panel 10 according to an embodiment of the present invention. The control panel 10 comprises a first circuit board 12, on which several electronic components are mounted, amongst others a plurality of LEDs 14, which are arranged solitary or in accumulations in order to form several displays as it will be described in more detail below. Moreover, the control panel 10 comprises a mask layer 16, which is arranged above the first circuit board 12 and comprises a plurality of throughholes 18, each being arranged congruent with one or more LEDs 14 of the underlying first circuit board 12. Accordingly, the light emitted from the LEDs 14 can pass the mask layer 16 through the throughholes 18. Above the mask layer 16, a second circuit board 20 is provided, on which a plurality of square and line shaped actuating elements 22 is mounted, e.g. in form of touch sensitive switches, proximity switches etc. Moreover, cutouts 24 are formed in the second circuit board 20, each cutout 24 being arranged congruent with one or more throughholes 18 in order to let the light emitted from the LEDs pass therethrough.

**[0022]** The control panel 10 is used for controlling functions of a cooker having a ceramic cooktop, which is not illustrated in the figures. A portion of the ceramic cooktop forms a cover layer 26 of the control panel 10, which is arranged on the second circuit board 20 and serves as a user interface. Due to the translucent material of the ceramic cook top, the light, which is emitted from the LEDs 14 and passes through the throughholes 18 of the mask layer 16 and the cut outs 24 of the second circuit board 20, is visible when regarding the ceramic cook top.

**[0023]** Moreover, a controller 26 is provided, which is connected to the actuation elements 22 for controlling the function chosen by the user, as well as to the plurality of LEDs 14 in order to indicate the current operating condition of the appliance. The controller may be arranged on the first circuit board 12 or elsewhere.

**[0024]** Starting from the arrangement of the control panel 10 shown in figures 1 and 2, i.e. from the first circuit board 12, the mask layer 16 and the second circuit board 20, two control panel designs having a totally different outer appearance can be manufactured, namely a control panel 10 having a bargraph design as shown in figure 4A or a control panel 10 having a seven segment design as shown in figure 5A, what will be explained in detail below.

**[0025]** Figure 3A shows all LEDs 14 that are necessary to create the bargraph design according to figure 4A as well as the seven segment design according to figure 5A. In figure 3B, all LEDs 14 are left out that are not necessary in order to create the bargraph display design. In contrast,

figure 3C only shows the LEDs that are necessary for creating the seven segment display design.

**[0026]** Even though always all LEDs 14 shown in figure 3A are mounted on the first circuit layer 12 during the production of the first circuit board layer 12, some of the LEDs 14 are put out of operation at a later date by means of the setting of the controller 26 in such a manner that only the LEDs shown in figure 3B are active LEDs, which are controllable by the controller 26, in order to create the bargraph design according to figure 4A, or that only the LEDs shown in figure 3C are active LEDs, which are controllable by the controller 26, in order to create the seven segment design according to figure 5A. In this manner, the basic arrangement shown in figures 1 and 2 does not have to be changed in order to vary the design of the control panel 10. Accordingly, the production costs for manufacturing control panels 10 of two different designs are reduced compared to the ones of conventional manufacturing methods, where it is necessary to also modify the structures of the circuit boards 12, 20 and the mask layer 16 in order to create different designs. Only the symbols printed on the cover layer 26 are partly changed to create a different outer appearance, as one can see when comparing figures 4A and 5A.

**[0027]** The cover layer 26 of the control panel 10 according to the bar graph design shown in figure 4A comprises five bar graph displays 28, one bar graph display for each ceramic cooking field of the ceramic cooktop of the cooker, in order to indicate the current power level of the ceramic field chosen by the user.

**[0028]** An adjustment of the power level can be performed by touching the line shaped actuating elements 22, which are arranged underneath each bar graph display 28. Icons 29 in the form of the numbers from 0 to 9 are printed on the cover layer 26 underneath each bar graph display 28 in order to visualise the possible power levels chooseable by the user. The LEDs 14 of each bar graph display 28 are controlled by the controller 26 in such a manner, that the first three LEDs 14 are lighted, when the third power level is chosen, the first four LEDs are lighted, when the fourth power level is chosen, etc.

**[0029]** In addition to the bar graph displays 28 several other displays are provided in order to allow further individual adjustments. For example, the display 30 shown in figure 4B in enlarged scale allows the user to additionally switch on a roasting zone by pressing the actuating element 22 with the corresponding icon 33, which is located underneath the display 30. As soon as the roasting zone is activated, an LED 14 of the display 30 is lighted in order to illuminate the icon 32 of the display 30. The display 40 according to figure 4C allows a user to switch on circles of the cooking field one after another by pushing the actuating element 22 with the corresponding icon 41, which is arranged underneath the display 40. Depending on the number of circles switched on by the user, the LED 14 underneath the symbol 42 or the LED 14 underneath the symbol 44 is switched on.

**[0030]** The control panel 10 according to the seven

segment display design shown in figure 5A comprises five seven segment displays 50, one seven segment display 50 for each cooking field, in order to indicate the power level of the corresponding cooking field to the user. In order to adjust the cooking level of a cooking field, the user must manipulate the corresponding line shaped actuating element 24 arranged right next to each seven segment display 50. Icons 51 in the form of a scale from zero to twelve are printed on the cover layer 26 above each actuating element 22 in order to visualise the power levels, which are adjustable by the user. In addition to the seven segment display 50, further displays are provided, which allow further individual adjustments of the user. For example, the display 60 shown in figure 5B comprises two LEDs 14 for indicating whether or not the roasting zone is activated or not by pressing the actuating element 22 below the icon 61. The display 70 shown in figure 5C comprises three LEDs 14, which represent the three circles of the cooking zone, which can be switched on one after another by pressing the actuating element 22 below the icon 71. The displays 80, 90 and 100 each comprise one single LED, which is lighted, when the designed function is activated by pressing the corresponding actuating element 22 arranged below each icon 81, 91, 101. For example, the actuating element 22 underneath the display 80 serves for switching the cooker on and of.

**[0031]** The seven segment displays 50 are not only capable of indicating numbers but are also capable of indicating different letters, such as "H" as shown in figure 5G or "F" as shown in figure 5H. The letter "H" may serve as a warning symbol for symbolising a hot cooking field. The letter "F" may serve as a warning symbol for indicating an error.

## Claims

1. Control panel (10) for controlling several different functions of an appliance, said control panel (10) comprising

- at least one actuating element (22), in particular a touch sensitive switch or a proximity switch, which can be operated by a user for choosing a function of the appliance;
- a controller (26), which is connected to the at least one actuating element (22) for controlling the function chosen by the user; and
- a plurality of lights (14), in particular LEDs, which are connected to the controller (26) and which are arranged to form at least a first display (28) and a second display (50), in particular a seven segment display and a bargraph display, for indicating the chosen function and/or an operating condition of the appliance;

**characterized in that** the controller (26) is pread-

justed in such a manner that it controls either exclusively the first display (28) or exclusively the second display (50).

2. Control panel (10) according to claim 1, **characterized in that** it comprises

- a first circuit board (12), on which the plurality of lights (14) is mounted;
- a mask layer (16), which is arranged above the circuit board (12) and comprises a plurality of through holes (18) allowing the light emitted from the lights (14) to pass;
- a second circuit board (20), which is arranged above the mask layer (16) and on which the at least one actuating element (22) is mounted; and
- a cover layer (26), which is arranged on the second circuit board (20), whereas the cover layer (26) is at least partially translucent and serves as a user interface.

3. Control panel (10) according to claim 2, **characterized in that** icons (29, 32, 42, 44, 51, 61, 71, 81, 91, 101) symbolizing current operating conditions or functions, which can be chosen by the user, are provided on the cover layer.

4. Control panel (10) according to claim 2 or 3, **characterized in that** icons symbolizing current operating conditions or functions, which can be chosen by the user, are provided in the mask layer in the form of specially designed through holes, which are lighted by lights arranged on the first circuit board.

5. Control panel (10) according to one of the foregoing claims, **characterized in that** at least some of the lights (14) form a part of the first display (28) as well as a part of the second display (50).

6. Domestic appliance comprising a control panel (10) according to one of the foregoing claims.

7. Method for manufacturing a control panel (10) for controlling functions of an appliance, said method comprising the steps:

- providing at least one actuating element (22), which can be operated by a user for choosing a function of the appliance;
- providing at least one controller (26) for controlling the function chosen by the user;
- providing a plurality of lights (14), in particular LEDs, and arranging them in such a manner, that they form at least a first display (28) and a second display (50), in particular a seven segment display and a bargraph display, for indicating a chosen function and/or a current operating

condition of the appliance;

- connecting the at least one actuating element (22) and the plurality of lights (14) to the controller (26); and

- preadjusting the controller (26) in such a manner that it controls either exclusively the first display (28) or exclusively the second display (50). 5

8. Method according to claim 7, comprising the steps of: 10

- mounting the plurality of lights (14) on a first circuit board;

- arranging a mask layer (16) above the first circuit board (12), said mask layer (16) having a plurality of through holes (18) for allowing the light emitted from the lights to pass; 15

- arranging a second circuit board (20) above the mask layer (16), said second circuit board (20) comprising touch sensitive electronic keys (22) for choosing different functions of the appliance; and 20

- arranging a cover layer (26) above the second circuit board (20), said cover layer (26) is at least partially translucent and serves as user interface. 25

9. Method according to claim 7 or 8, **characterized in that** the lights (14) form several seven segment displays (50) and several bargraph displays (28), whereas the controller (26) is set in such a manner, that only the seven segment displays (50) or only the bargraph displays (28) are controllable by the controller (26). 30

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FIG 1

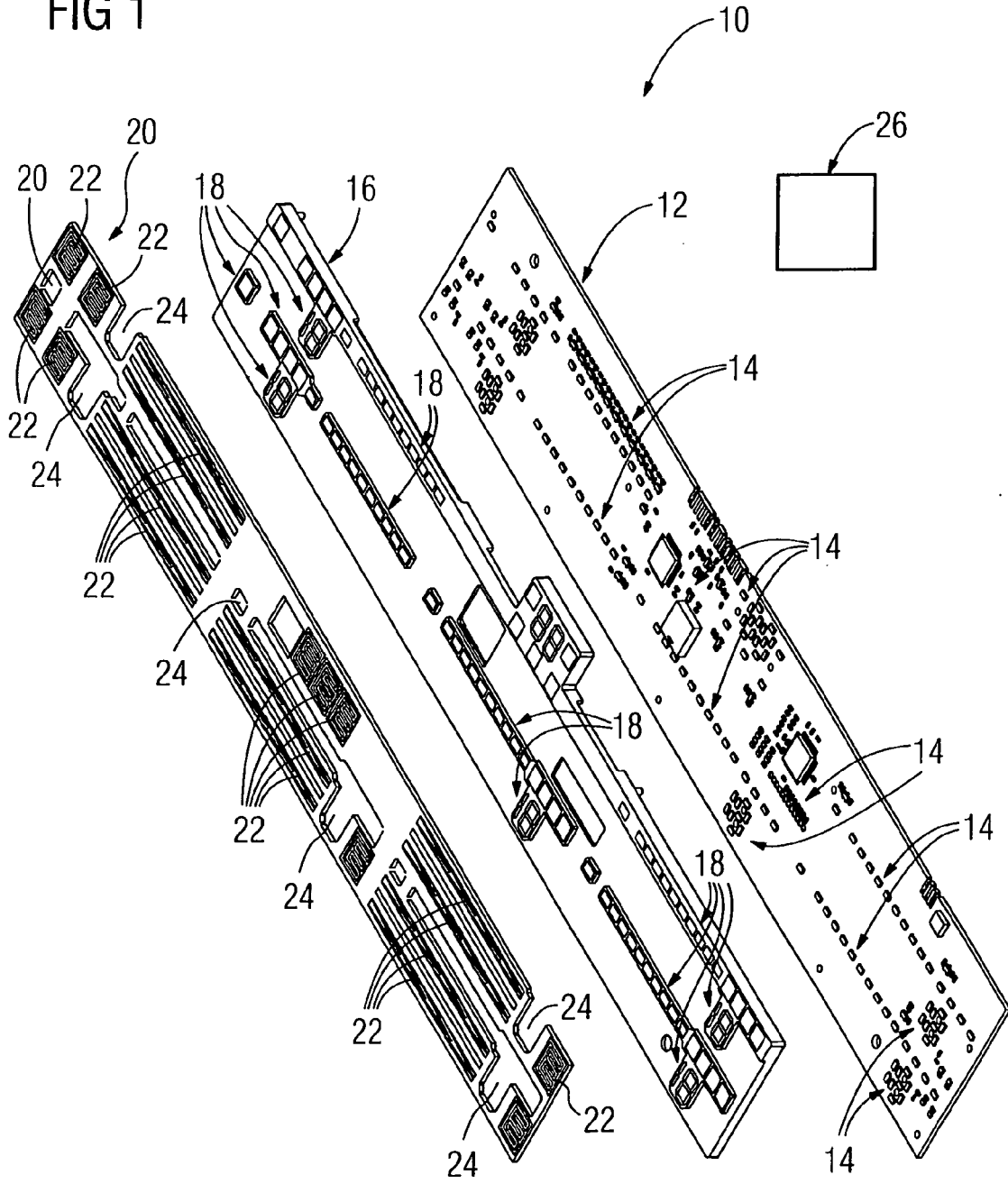


FIG 2

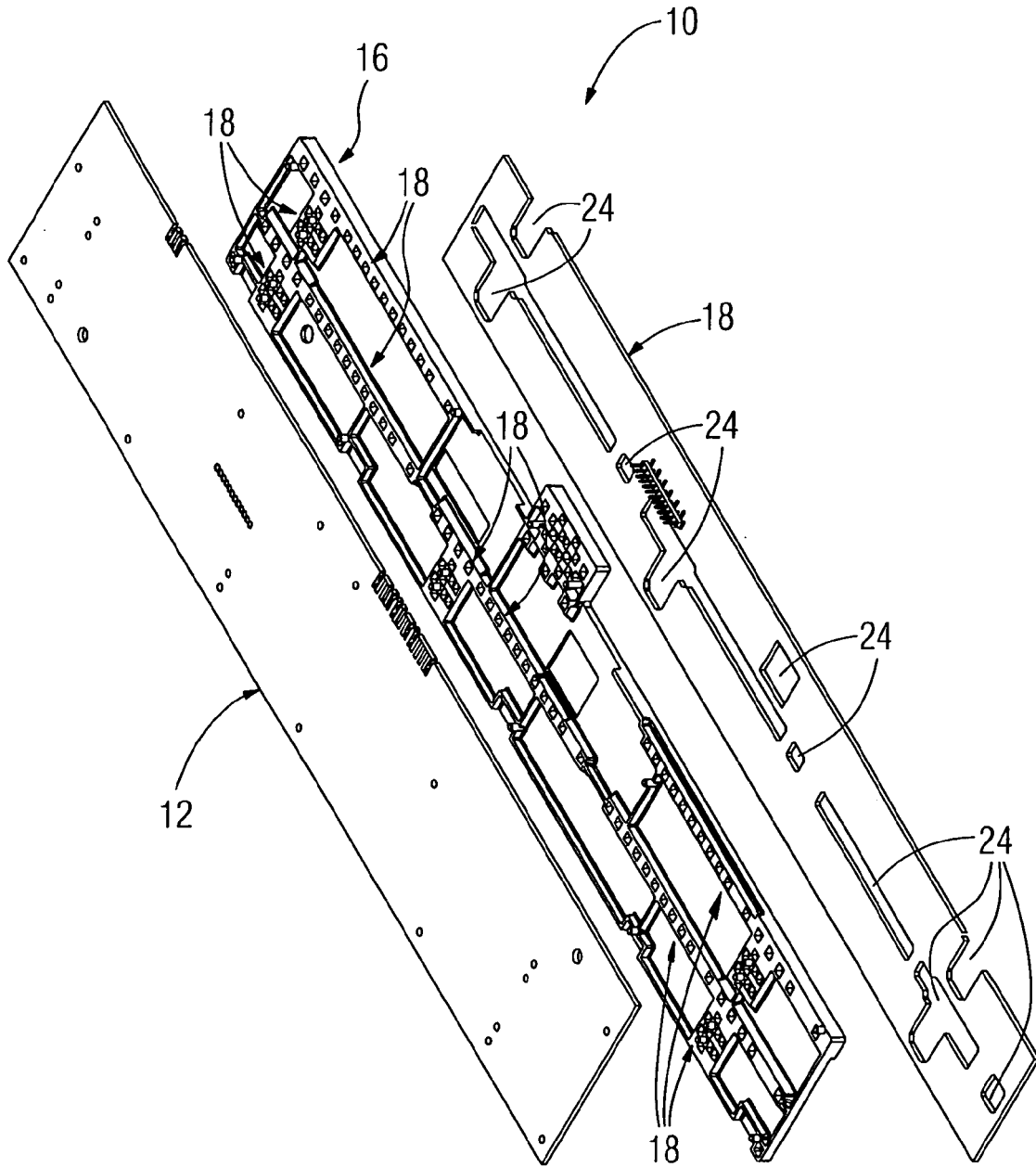




FIG 3A

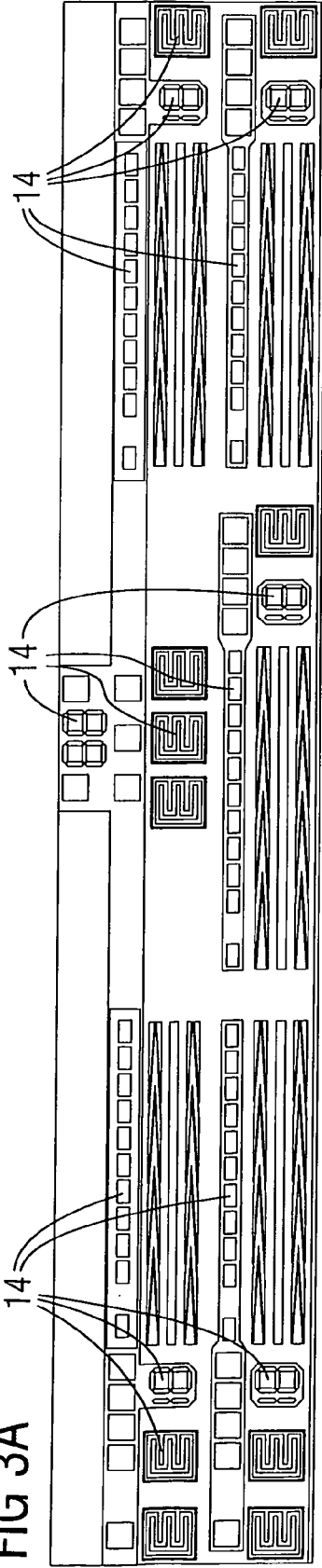


FIG 3B

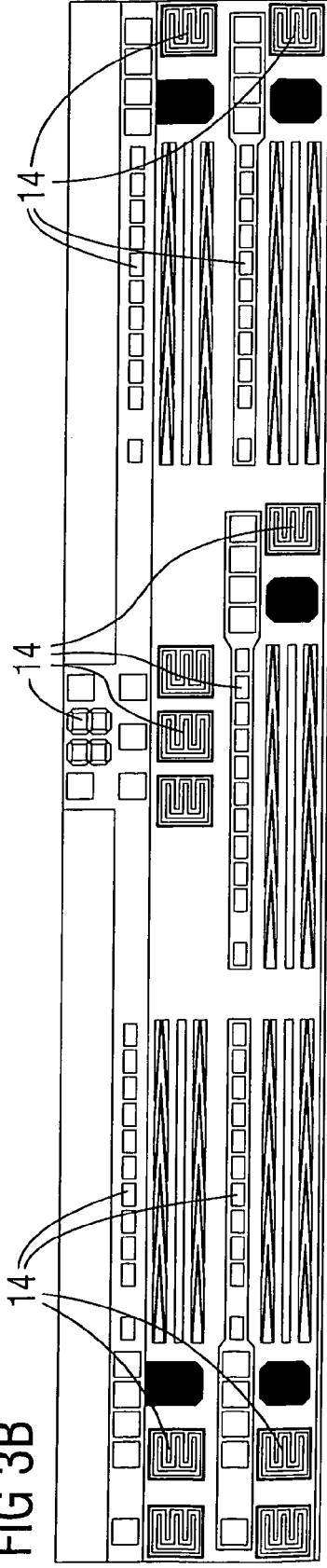


FIG 3C

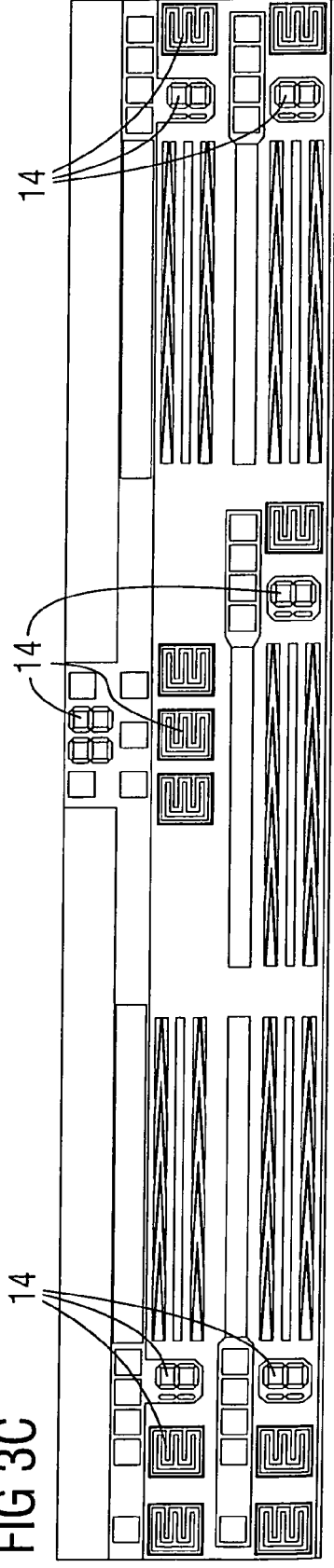


FIG 4A

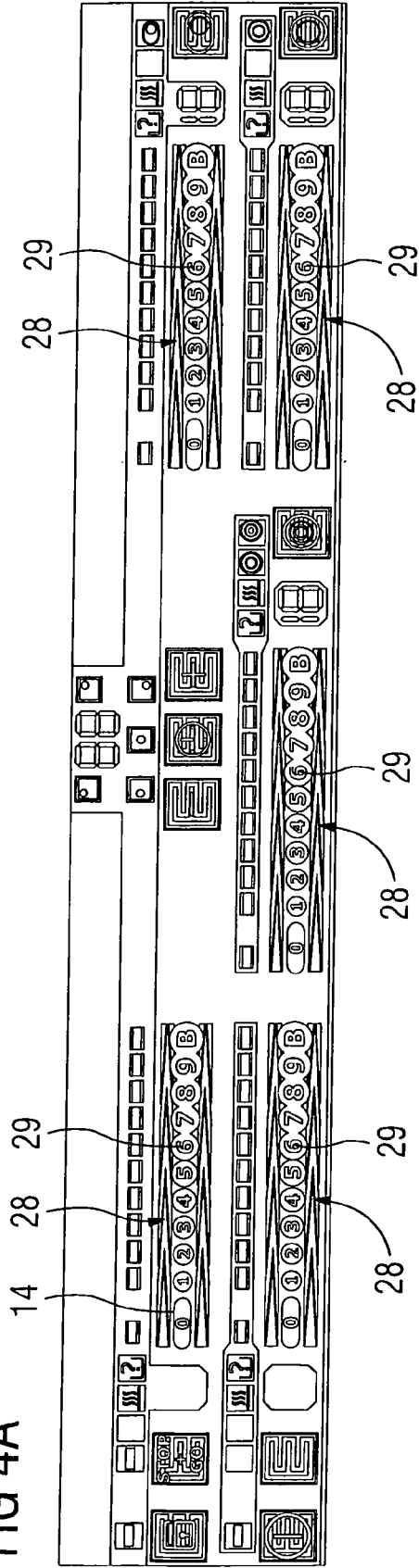


FIG 4B

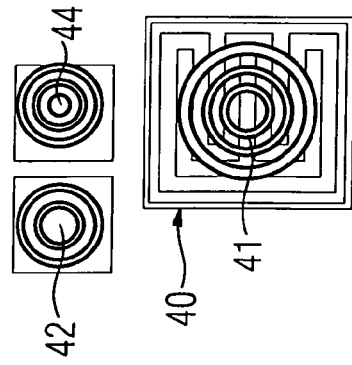


FIG 4C

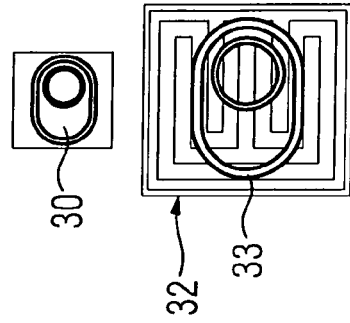


FIG 5A

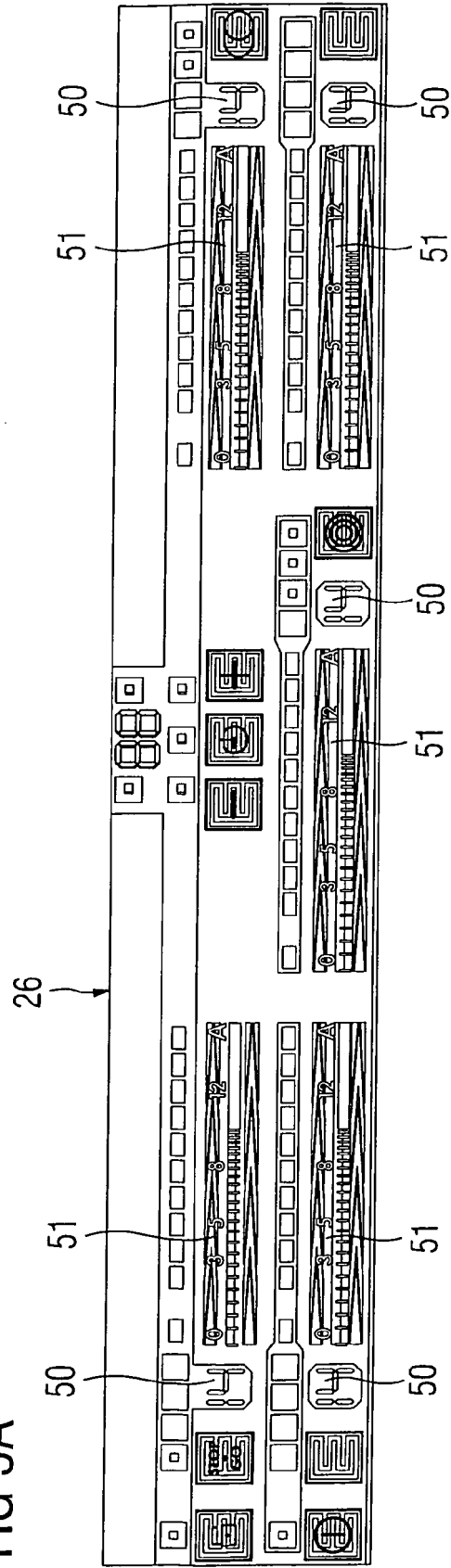


FIG 5B

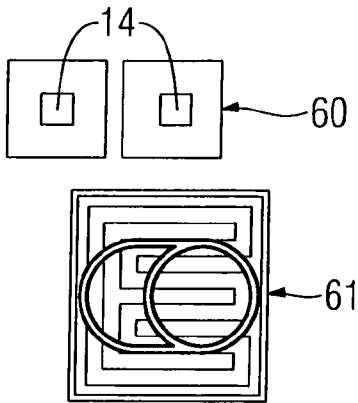


FIG 5C

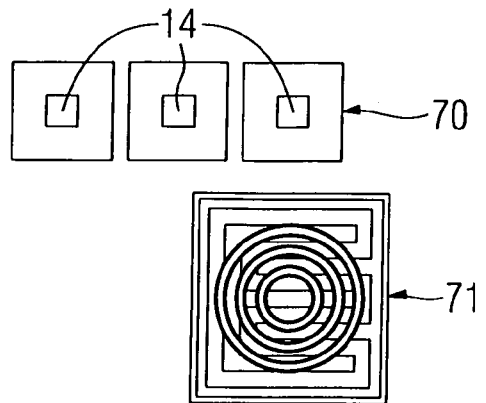


FIG 5D

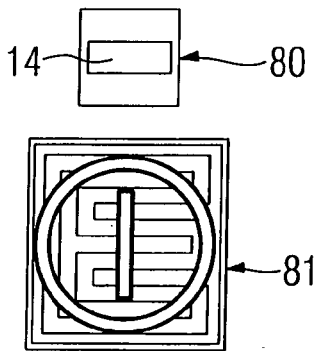


FIG 5E

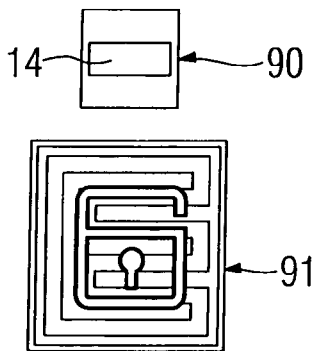


FIG 5F

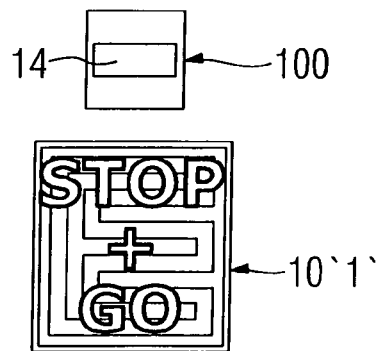


FIG 5G

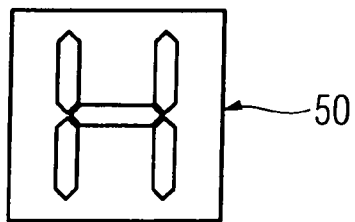
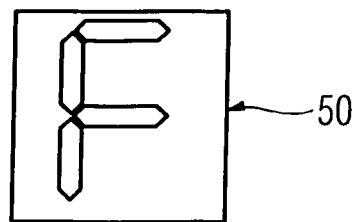


FIG 5H





## EUROPEAN SEARCH REPORT

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ANNEX TO THE EUROPEAN SEARCH REPORT  
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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