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(54) **Cooking top and method for controlling it**

(57) The present invention relates to a cooking top comprising a support surface adapted to receive at least one pot, a user interface, and a control unit adapted to detect the position of the pot and to control the operation

of the cooking top as a function of commands received through the user interface, wherein the control unit is adapted to position the user interface near the detected pot position.

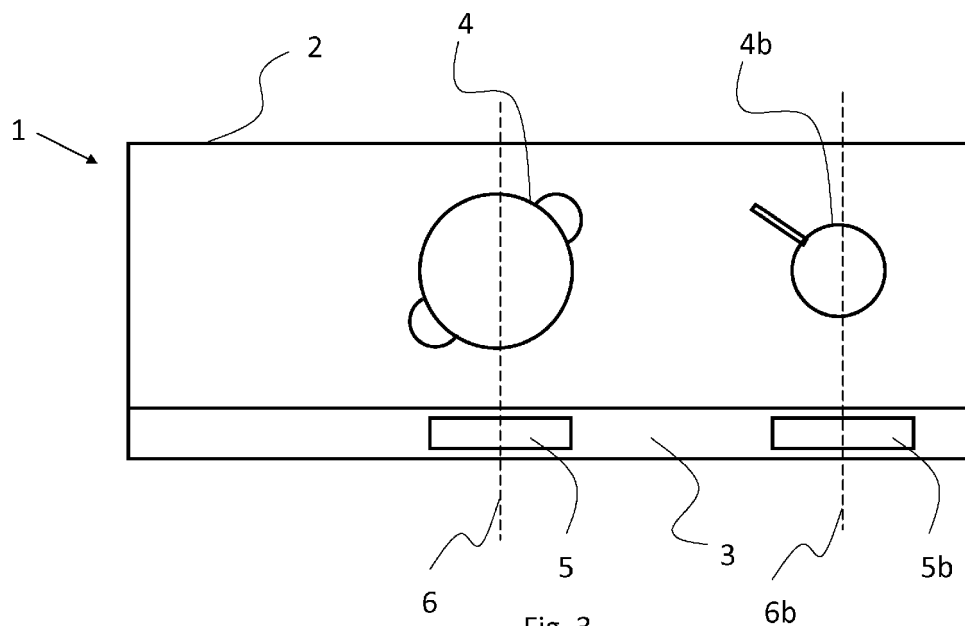


Fig. 3

Description

[0001] The present invention relates to a cooking top according to the preamble of claim 1.

[0002] The invention also relates to a method for controlling such a cooking top.

[0003] One of the main problems suffered by cooking tops is their poor flexibility of use, since the number and size of the cooking areas are typically predefined.

[0004] Aiming at improving the flexibility of use of a cooking top, some known solutions make use of variable-shape cooking areas, which in particular can be adapted to the shape and position of the pots resting thereon.

[0005] Cooking tops of this kind offer the advantage that any point of the top surface can become a cooking area when a pot is laid thereon; active recognition systems are known, in fact, which can selectively heat the area occupied by the pot.

[0006] On the other hand, these cooking tops suffer from the drawback that the heat is generated in continually changing positions, so that it is hard for the user to know if the heating elements are on in order to adjust the power thereof.

[0007] A few solutions have been conceived in order to get round this problem.

[0008] Patent US2007262072 describes a cooking top comprising many heating units laid on a plate, which are surrounded by a plurality of illumination elements; the illumination elements, e.g. arranged along the contour of each heating unit, are turned on to signal when each unit is active, and can change their brightness according to the heating power. This solution however has the drawback that it is complex, since it requires a complex wiring harness and control for the illumination elements. In addition, this solution also has the drawback that it does not provide the user with an intuitive interface for adjusting the heat supplied to the pot by the inductors.

[0009] Patent W02009049989 describes a cooking top wherein the cooking area is defined by a group of elements arranged where the pot to be heated is located; this cooking top comprises a user interface which allows the user to control the heating elements underneath the pot. This solution suffers from the drawback that it does not include an intuitive user interface, neither for indicating the active heating elements nor for adjusting the heat supplied to the pot.

[0010] Patent W02009053279 describes a cooking top comprising a plurality of heating elements defining cooking areas having variable shape and position and a user interface for controlling the heat supplied to the pot; the user interface comprises, for example, a touch-screen display which reproduces the shape of the cooking top and shows the position of the detected pots, thereby allowing the user to select one pot in order to adjust the heating parameters thereof. This solution has the drawback that it is not perfectly intuitive for the user, because the association between the pot on the cooking top and its representation on the display may confuse the user.

[0011] The object of the present invention is to provide a cooking top capable of solving the problems suffered by the prior art.

[0012] In particular, it is the object of the present invention to improve the flexibility of use of known cooking tops and to provide an alternative method for controlling the cooking top. It is a further object of the present invention to provide a cooking top which ensures good flexibility of use and which can be controlled by the user through an interface that allows to intuitively select the pot to be heated and to intuitively adjust the heat supplied thereto. These and other objects of the present invention are achieved through a cooking top and a method for controlling a cooking top incorporating the features set out in the appended claims, which are intended as an integral part of the present description.

[0013] The general idea at the basis of the present invention is to provide a cooking top comprising a support surface adapted to receive at least one pot, a user interface, and a control unit adapted to detect the position of the pot and to control the operation of the cooking top as a function of commands received through the user interface, wherein the control unit is adapted to display the user interface in different positions depending on the detected pot position.

[0014] This solution allows to overcome the drawbacks of the prior art; in fact, unlike prior-art cooking tops, here the user can immediately recognise, through the interface, which pot is being heated by the inductors and can operate the corresponding control. Advantageously, the user interface provides intuitive heat adjustment, e.g. by means of at least one button which can be operated by the user.

[0015] The cooking top according to the present invention may advantageously comprise a mobile fume suction hood which can position itself above the heated pot.

[0016] Preferably, the cooking top according to the present invention may comprise mobile heating elements underneath the top surface, which move to the position where the pot to be heated has been placed on the cooking top.

[0017] Further objects and advantages of the present invention will become more apparent from the following detailed description and from the annexed drawings, which are supplied by way of non-limiting example, wherein:

- Figs. 1, 2 and 3 show a first embodiment of the cooking top according to the present invention and exemplify the operation of the user interface;
- Fig. 4 shows a first embodiment of the user interface according to the present invention;
- Fig. 4b shows a second embodiment of the user interface according to the present invention;
- Fig. 5 shows a second embodiment of the cooking top according to the present invention;
- Fig. 6 shows a third embodiment of the user interface according to the present invention;

- Fig. 7 shows a first embodiment of the heating elements comprised in the cooking top according to the present invention;
- Fig. 8 shows a second embodiment of the heating elements comprised in the cooking top according to the present invention.

[0018] As aforementioned in the present patent's introduction, cooking tops exist wherein cooking areas having variable shapes can be created by means of systems that selectively heat the area occupied by the pot in different positions on the cooking top.

[0019] For example, cooking tops featuring such a flexible configuration utilise induction heating elements for cooking foods.

[0020] In the description of the present patent, therefore, reference will be made to an induction cooking top, wherein the advantages deriving from the present invention are especially apparent. It is nevertheless clear that this very same invention is also applicable to different types of cooking tops wherein cooking areas having fixed or variable shapes can be created by using, for example, resistive electric elements or gas burners, whether fixed or movable.

[0021] In induction cooking tops, the pot is positioned on a surface made of ceramic material, under which there are inductors which comprise copper wire windings where an oscillating current is circulated. This current, which oscillates by electromagnetic induction, produces parasite currents in the pot, thus generating localised heat therein without heating the cooking top.

[0022] These flameless cooking tops are more efficient than electric ones (i.e. a greater fraction of the supplied power is effectively converted into heat used for heating up the pot). In addition, induction cooking tops are safer to use, due to the absence of hot surfaces or flames, thus reducing the risk of burns or fire.

[0023] On the other hand, since the heat is only generated in the pot and the cooking top does not get hot nor changes its appearance, it is difficult for the user to understand whether the inductor underneath the pot is on or off and, if it is on, at what power level.

[0024] It is for this very reason that it is desirable to provide induction cooking tops with an intuitive and flexible user interface allowing selection and adjustment of the heat supplied to the pot.

[0025] Fig. 1 shows an example of embodiment of a cooking top 1 according to the present invention. The cooking top 1 comprises a support surface 2 adapted to receive the pots to be heated, and heating elements (not shown) adapted to heat the pot in whatever position it may be, which elements will be described in more detail later on. The cooking top 1 also comprises an interactive display 3, e.g. a touch screen, which extends along one whole dimension of the cooking top 1. This interactive display 3 allows the user to visualise information about the operation of the cooking top, as well as to control the operation of the cooking top by actively adjusting param-

eters related to the operation thereof (e.g. turning on or off one or more inductors), as will be better explained hereafter.

[0026] When the pot 4 is laid on the support surface 2 in any one position, the cooking top control unit will, through known means (not shown), detect the presence of the pot and the interactive display will activate.

[0027] In particular, the cooking top control unit will show on the interactive display 3 a user interface 5 positioned near the pot 4 detected by the cooking top control unit. The position of the user interface corresponds to that of the pot, in the sense that its projection on a plane containing the support surface 2 intersects at least partly an axis lying in the support surface 2, indicated by line 6, which passes through one point of the projection on the same plane of the pot 4 according to a preferred orientation, in this example orthogonal to the longitudinal direction of the display 3, meaning by longitudinal the direction x in which the display is longer.

[0028] After having detected the position of a pot on the cooking top, the cooking top control unit will activate different areas of the interactive display 3; said areas thus make up the user interface 5, through which the user can control the operation of the cooking top and receive information which is suitably displayed as images or alphanumeric characters. Through the user interface 5, the user can control the operation of the cooking top, in particular by adjusting the heat supplied to the pot 4; this improves the intuitiveness of the user's control because it is possible to immediately locate the pot 4 being controlled, since it lies in the position corresponding to the position where the user interface 5 is being displayed.

[0029] Fig. 2 shows the same cooking top 1, wherein the same items are identified by the same reference numerals. As can be easily understood, in this case the pot 4 is positioned in a different point on the surface 2, and the display 3 always shows the interactive interface 5 near the pot 4.

[0030] Fig. 3 shows the same cooking top 1, but in this case two pots 4 and 4b have been placed in different positions. Therefore, the display 3 will show the user interfaces 5 and 5b at the pots 4 and 4b, i.e. on the lines 6 and 6b, respectively. Of course, this reasoning can be extended to any number of pots laid on the cooking top. In addition, if there were more than one pot arranged side by side in a position defined by line 6, the user interface 5 would be shown in the same position and would control the heat supplied to all of the pots placed on the line 6.

[0031] Fig. 4 shows an example of embodiment of the user interface 5 employed in the cooking top 1. This user interface 5 uses, for example, a touch-screen technology to display five buttons 7a, 7b, 7c, 7d, 7e corresponding to five different pot heating power levels, e.g. corresponding to increasing levels equal to 0%, 25%, 50%, 75%, 100% of the rated maximum power, from left to right. In this manner, the user can intuitively adjust the heat supplied to the pot.

[0032] Fig. 4b shows a second example of embodi-

ment of the user interface 5; for clarity, in Fig. 4b the interactive display is shown at two successive instants 3 and 3'.

[0033] When a pot is laid on the cooking top, the control unit detects its position and activates an area of the display near the pot, in particular, just one finger-sized area acting as a pushbutton.

[0034] The activated area is illuminated, so that a single button 5b is shown on the display 3, acting as an ON button.

[0035] When the cooking top control unit detects that the button 5b has been pressed, it changes the appearance of the interface by activating additional display portions, thus displaying the user interface 5 previously described with reference to Fig. 4a.

[0036] In a preferred embodiment, the button 5b is displayed on an axis which is orthogonal to one dimension of the cooking top and which passes through one point of the pot. After the button 5b has been pressed, the display area occupied by the interface will grow larger while still remaining aligned on the left with the previous button 5b, so that the interface can be used intuitively.

[0037] Fig. 5 shows a second example of embodiment of a cooking top 1' according to the present invention. The cooking top 1' comprises some of the items described with reference to Fig. 1, in particular the support surface 2, on which there is a pot 4, and the interactive display 3. In addition, the cooking top 1' also comprises a fume suction hood 8 which is movable to different positions over the cooking top, e.g. by sliding along a guide 9. The hood 8 comprises, for example, a suction fan system and a cooking top illumination system.

[0038] Thus, when desired by the user, the hood 8 can be moved by the cooking top control unit through automatic means (not shown) in order to be placed over the pot 4, i.e. on the line 6, exactly where also the user interface 5' is located.

[0039] Fig. 6 shows this user interface 5' which, in addition to the buttons previously described with reference to Fig. 4, also comprises an additional button 10 for controlling the suction hood 8. For example, by means of the button 10 it is possible to turn on the suction hood 8 and control the speed of the suction fans. The suction hood 8 may also be of the hidden type, i.e. it may be folded out of sight when not in use. In another embodiment, the hood includes a control interface arranged on the hood itself and movable therewith.

[0040] As an alternative, a fixed suction hood may be associated with the cooking top for sucking air from the cooking area; this second type of hood (not shown) comprises a plurality of fans which can be selectively switched on, also automatically, depending on the position of the pot detected by the cooking top control unit.

[0041] This suction hood may comprise a plurality of suction ducts, wherein the suction through each of said ducts is selectively controlled by the cooking top control unit as a function of the pot position.

[0042] Fig. 7 shows a first example of embodiment of

the heating elements comprised in the cooking top 1 according to the present invention; in this example, underneath the support surface 2 there are a plurality of small inductors 11 which cover the entire surface of the cooking top. Through known control means (not shown), the cooking top can detect the presence of pots and turn on the corresponding inductors.

[0043] Fig. 8 shows a second example of embodiment of the heating elements comprised in the cooking top 1 according to the present invention; in this example, underneath the surface of the cooking top there are a plurality of mobile inductors 13, which in this case define two cooking areas 12. The inductors 13 can be moved, e.g. through known methods like, for instance, electric actuators, along at least the direction indicated by the arrow 14 in order to be brought to the position of the pot to be heated.

[0044] In both of the embodiments of the heating elements shown in Figs. 7 and 8, it is conceivable that the cooking top control unit, in addition to the other functions previously described, can also inform the user about which elements are currently active, by means of lighting elements arranged, for example, along the contours of each heating element.

[0045] It is apparent that many changes may be made to the present invention by those skilled in the art without departing from the protection scope thereof as resulting from the appended claims.

[0046] The present invention is clearly not limited to induction cooking tops, but is also applicable to other types of cooking tops employing, for example, resistive electric elements or gas burners, whether movable or fixed.

[0047] Furthermore, the support surface referred to in the present patent may be either a flat surface of an induction cooking top or a pot support grate of another type of cooking top. Moreover, the cooking top may have any other shape, e.g. circular or semicircular, in which cases the user interface will be displayed at the circumference radius where the pot lies.

[0048] Finally, different user interfaces are also conceivable, e.g. providing "continuous" heat adjustment through a scroll bar, or providing heat adjustment in fixed increments by means of "plus" and "minus" buttons.

Claims

1. A cooking top comprising
 - a support surface (2) adapted to receive at least one pot,
 - a user interface (5) allowing a user to adjust an operating parameter of said cooking top, and
 - a control unit adapted to detect the position of said at least one pot and to control the operation of said cooking top as a function of commands received through said user interface, **characterised in that** said control unit is adapted to position said user in-

terface near said detected position.

2. A cooking top according to claim 1, comprising an interactive display (3) of the touch-screen type, wherein said control unit is adapted to visualise said user interface (5) on said interactive display (3). 5
3. A cooking top according to claim 2, wherein said interactive display (3) extends along one whole dimension of the cooking top. 10
4. A cooking top according to claim 3, wherein said control unit is adapted to display said user interface (5) in a position such that the projection thereof on a plane containing said support surface (2) intersects at least partly an axis orthogonal to the longitudinal direction of said display and passing through at least one point of the projection of said pot on said plane containing said support surface (2). 15 20
5. A cooking top according to any one of claims 1 to 4, wherein said user interface (5) comprises at least one button (7a,7b,7c,7d,7e) for adjusting the heat supplied to said at least one pot. 25
6. A cooking top according to any one of claims 1 to 5, further comprising a suction hood (8), said control unit being adapted to control said suction hood (8) in different modes as a function of said detected position. 30
7. A cooking top according to claim 6, wherein said suction hood (8) is movable and said control unit is adapted to move said suction hood (8) to different positions as a function of said detected position. 35
8. A cooking top according to claim 6, wherein said suction hood (8) comprises a plurality of fans and said control unit is adapted to control the operation of said fans as a function of said detected position. 40
9. A cooking top according to claim 6 or 8, wherein said suction hood (8) comprises a plurality of suction ducts and said control unit is adapted to control the suction through said plurality of ducts as a function of said detected position. 45
10. A cooking top according to claim 6 or 7 or 8 or 9, wherein said user interface (5) further comprises at least one button for activating said movable suction hood (8). 50
11. A cooking top according to any one of the preceding claims, comprising a plurality of heating elements distributed under said support surface (2). 55
12. A cooking top according to any one of claims 1 to 11, further comprising means for moving at least one

heating element of said plurality.

13. A method for controlling a cooking top, wherein a user adjusts at least one operating parameter of the cooking top through a user interface, **characterised in:**
 - detecting the presence of a pot on said cooking top,
 - positioning said user interface near said detected position.
14. A method for controlling a cooking top according to claim 13, wherein said user interface is visualised on an interactive display (3), and wherein
 - when said pot is detected, only one button will be displayed,
 - when said one button is pressed, further information will be displayed and/or other areas of said interactive display (3) will become active.
15. A method according to claim 14, wherein said one button is intersected by an axis passing through said pot and being orthogonal to the longitudinal direction of said display.

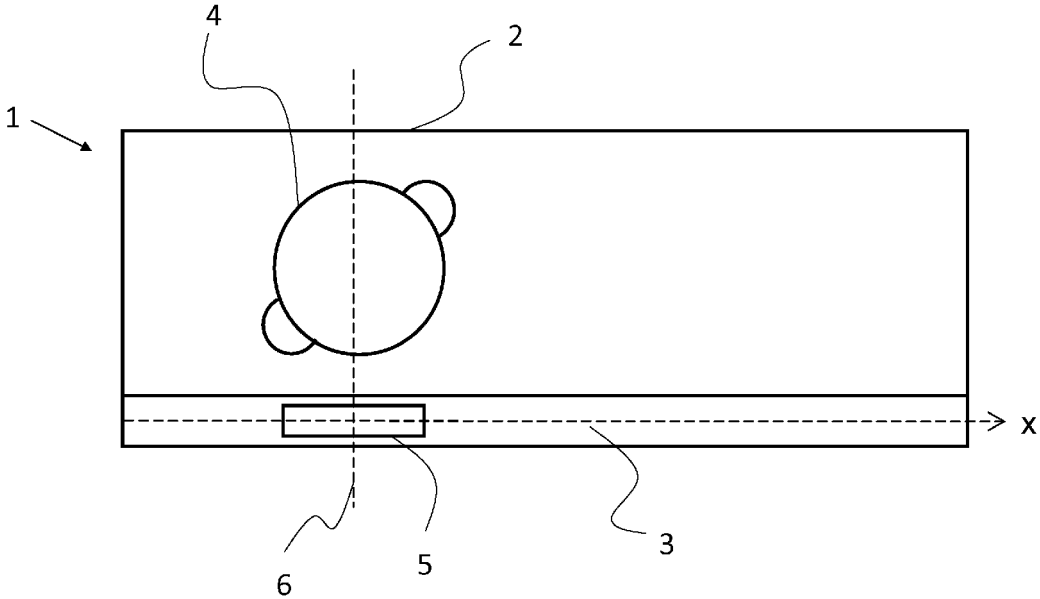


Fig. 1

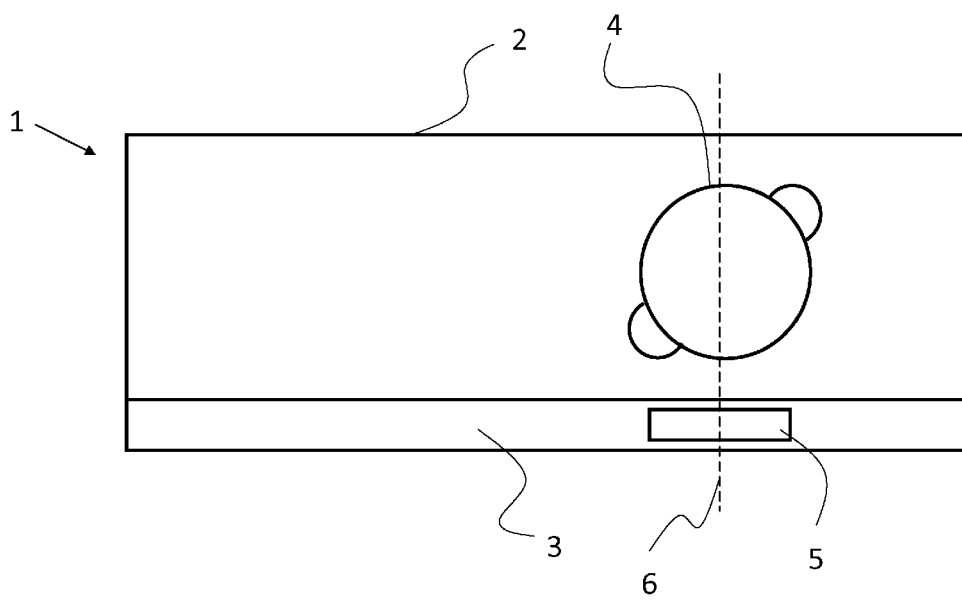
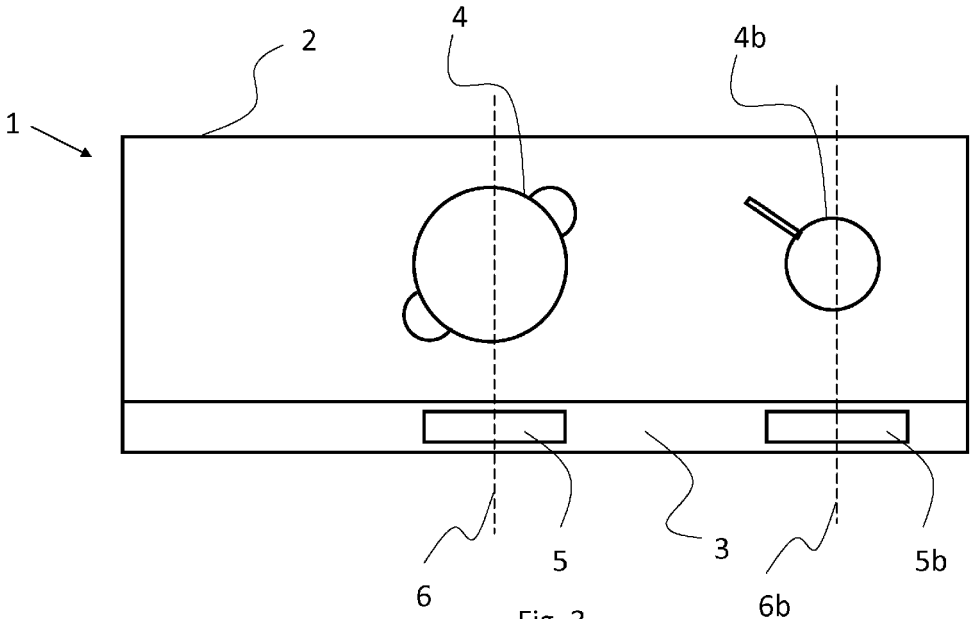


Fig. 2



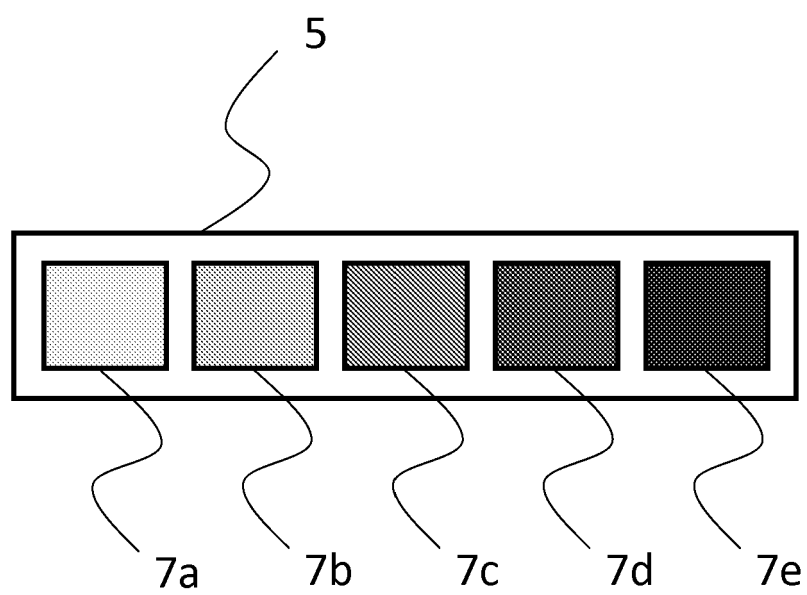


Fig. 4

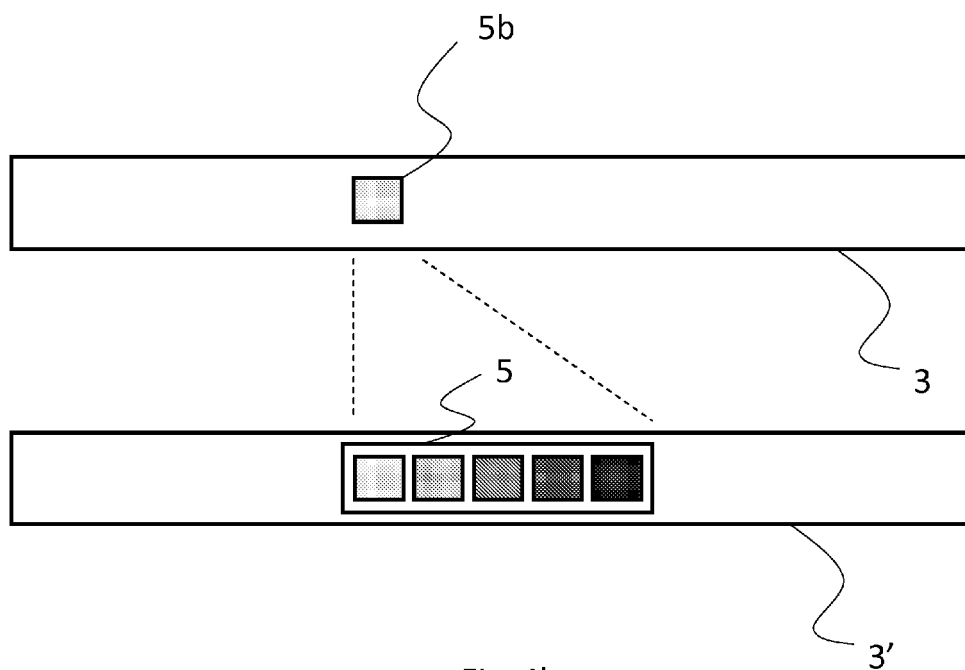


Fig. 4b

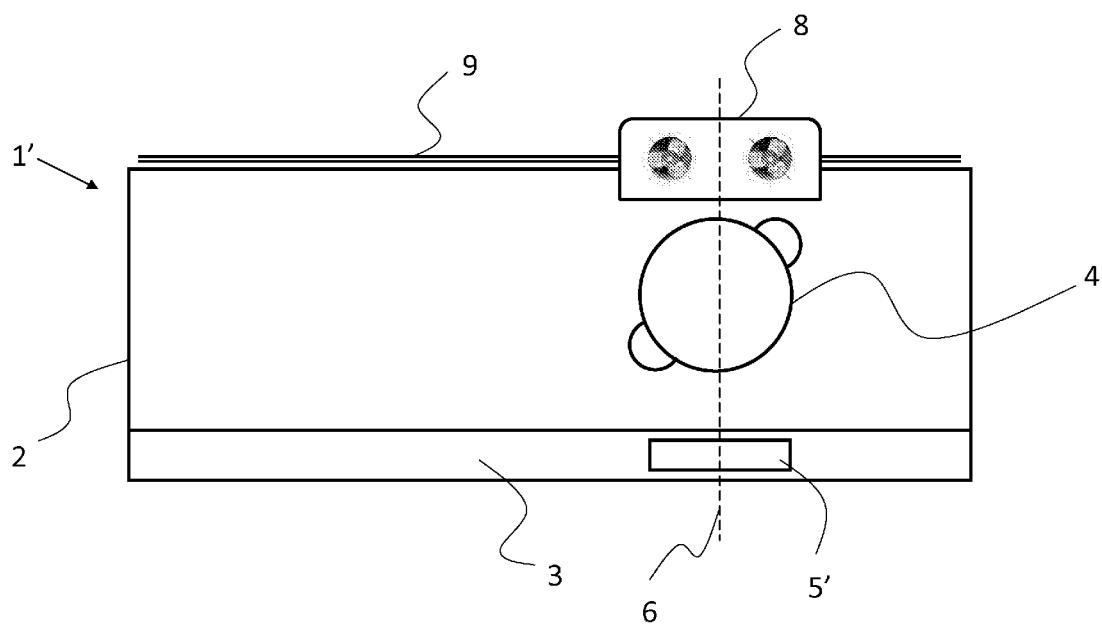


Fig. 5

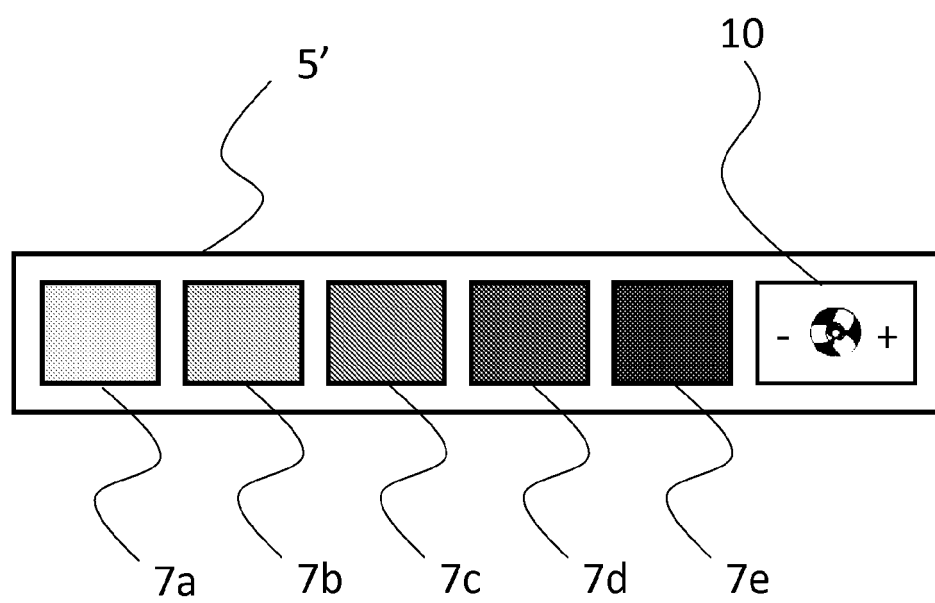
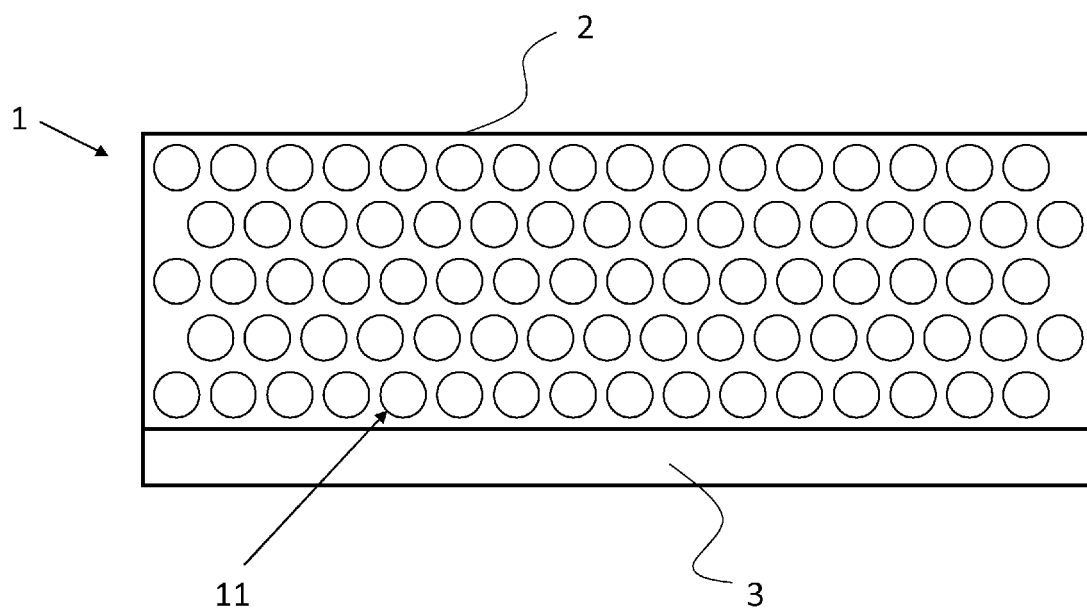


Fig. 6



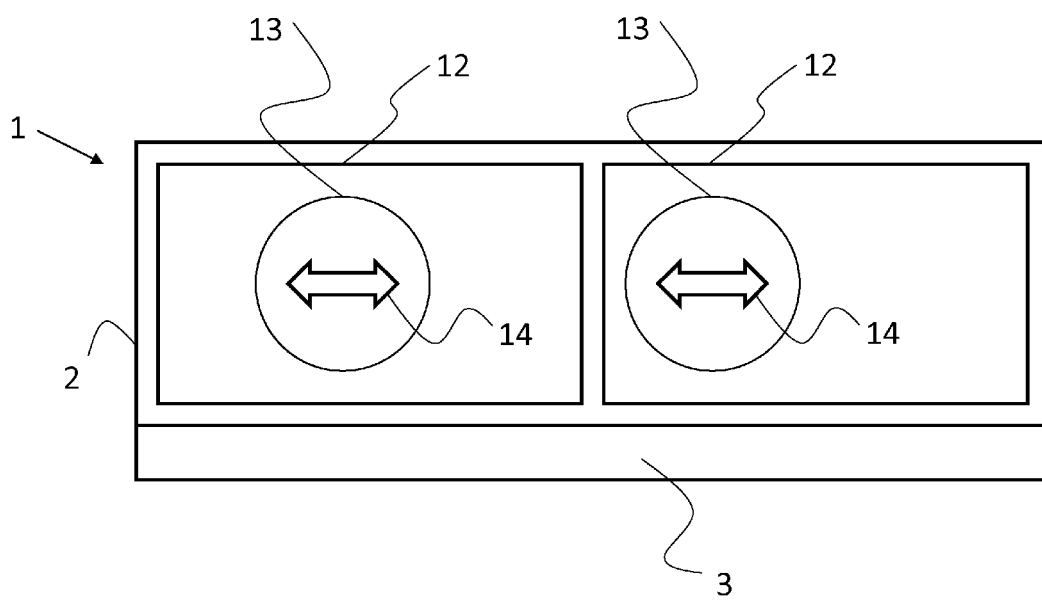


Fig. 8



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Application Number
EP 10 19 2984

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Place of search The Hague		Date of completion of the search 29 March 2011	Examiner Rodriguez, Alexander
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