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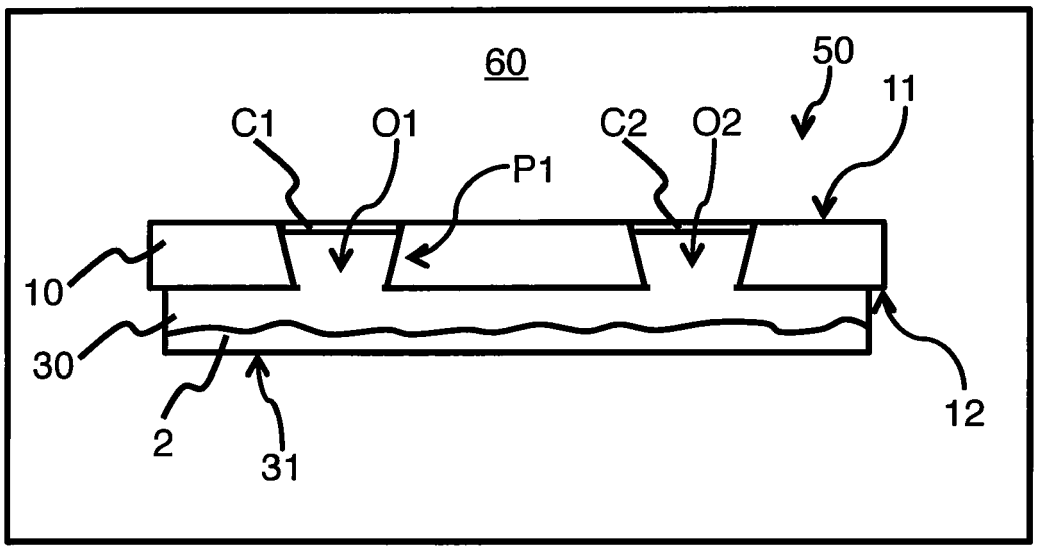
(54) STEAM GENERATING DEVICE AND METHOD

(57) The present invention provides a steam generating device (50). The steam generating device (50) comprises a first tray (10) with a first surface (11) and a second surface (12). The steam generating device (50) further comprises a compartment (30), wherein the compartment (30) is at least partially connected with the second surface (12) of the first tray (10) and wherein the compartment (30) comprises a material with high thermal conductivity. The first tray (10) of the steam generating device (50) further comprises at least one porous area (O1, 02, 03, 04), wherein each of the at least one porous area (O1, 02, 03, 04) comprises a movable cover (C1, C2, C3, C4). The present invention further provides a corresponding method.

Fig.1



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Description

TECHNICAL FIELD

[0001] The invention relates to a steam generating device for a heat source and a corresponding method.

BACKGROUND

[0002] Typically an oven, in particular a steam oven, comprises an additional steam generator, wherein the steam generator comprises an additional separate heater for boiling water.

[0003] Document DE 4403386 C1 describes an assembly to apply heat treatment to food within a chamber.

[0004] Document US 6,101,925 describes a humidity device for an oven. The humidity device is composed of a reservoir in the oven.

[0005] Document US 6,100,502 describes a toaster that has a steam generating system. The steam from a steam generating system is passed into the oven during the heating and rewarming of meats and casserole dishes to prevent them from drying out.

[0006] Document EP 0 277 337 A2 describes a cooking appliance with electric heating of a cooking room.

[0007] Accordingly, there is a need for an improved steam generating device for a heat source.

SUMMARY

[0008] The present invention provides a steam generating device with the features of claim 1 and a method with the features of claim 13.

[0009] The steam generating device for a heat source comprises a first tray with a first surface and a second surface. The steam generating device further comprises a compartment, wherein the compartment is at least partially connected with the second surface of the first tray and wherein the compartment comprises a material with high thermal conductivity. Examples for such materials can be e.g. metal or metal alloys. The first tray of the steam generating device further comprises at least one porous area, wherein each of the at least one porous area comprises a movable cover.

[0010] The method for operating a steam generating device comprises the steps of providing a first tray with a first surface, a second surface and at least one porous area of the first tray. The method further comprises covering each of the at least one porous area by a movable cover and providing a compartment with a material of high thermal conductivity. The method further comprises connecting the first tray with the compartment with the second surface of the first tray.

[0011] Another aspect of the invention is an oven, in particular a steam oven, wherein the oven comprises the here described steam generating device.

[0012] The steam generating device can be used e.g. to prepare food or prevent food from drying out. The steam generating device can be e.g. inserted to the heat source, such as the oven, for example.

[0013] The present invention uses the finding that heat of a heat source can be efficiently used when the generated heat of the heat source can be efficiently transferred to a so called compartment or reservoir.

[0014] The present invention therefore provides the compartment, wherein the compartment is mechanically, e.g. via strews, or chemically, e.g. via glue, connected to the first tray. Alternatively the compartment can be welded with the first tray.

[0015] It has to be mentioned that the first surface and the second surface of the first tray are connected to each other by a corresponding side wall, wherein the side wall can be configured to limit the first tray in a lateral direction or lateral extent.

[0016] It has to be further mentioned that the at least one porous area can be an opening, hole or through hole. Alternatively the at least one porous area can comprise a plurality of openings, holes or through holes within the at least one porous area.

[0017] Further embodiments of the present invention are subject of the further subclaims and of the following description, referring to the drawings.

[0018] In one embodiment, the compartment can be configured to store a fluid, such as water, and the compartment is heated up by the heat source such that the fluid evaporates through the at least one porous area and the movable cover. In other words the movable cover changes its initial position on the at least one porous area such the evaporated fluid may exit, leave or leak in the heat source. Therefore, a fast evaporation of the fluid can be efficiently prevented.

[0019] In another embodiment, the movable cover can be flush with the first surface of the first tray and the movable cover is at least partially connected with the tray and/or compartment. Therefore, a space-saving steam generating device can be provided. The movable cover can be at least partially connected with the tray and/or compartment by a connecting element, for example a string or a line. The connecting element can be arranged between a bottom surface of the compartment and a surface of the movable cover, wherein the bottom surface of the compartment and the surface of the movable cover face each other.

[0020] In one embodiment, the movable cover can comprise a rotation axis, wherein the rotation axis can be connected with the first tray. That is that the movable cover can be foldable, rotatable or turnable with respect to the first tray, e.g. the first surface of the first tray. The rotations axis can be arranged within the movable cover. Therefore, a space-saving steam generating device can be provided. The rotation axis can run parallel to the first surface of the first tray, wherein an orientation of the rotation axis of each movable cover can be the same or can be different to each other.

[0021] In a further embodiment, the movable cover can comprise a silicone. Alternatively, the movable cover can

comprise a light metal or light alloy, such as aluminum or aluminum alloy. By using silicone a form of the movable cover can be easily tailored with respect to the at least one porous area of the first tray.

[0022] In one embodiment, the movable cover can be configured to adapt to a steam pressure of evaporated fluid. For example, a lateral extent of the movable cover can be adapted in dependence of the steam pressure. Therefore, various steam modes can be easily provided by the steam generating device.

[0023] In another embodiment, the movable cover of each of the at least one porous area covers the at least one porous area by its weight. That is that the movable covers are substantially arranged, mounted or positioned in a loose manner on the corresponding porous area. It is understood that the weight of the movable cover can be such that an evaporation of the fluid can be prevented at low temperature, e.g. between 30°C and 50°C. Therefore, various steaming conditions can be provided by the steam generating device by simply varying or changing the weight of the movable cover. That is that the movable cover can be easily exchangeable.

[0024] In one embodiment, the at least one porous area can have a conical profile and the conical profile tapers in direction from the first surface to the second surface of the first tray. Therefore, the steam pressure can be regulated depending on a diameter of the conical profile of the porous area.

[0025] In a preferred embodiment, the steam generating device can further comprise a second tray with a third surface and a fourth surface, wherein the second tray is at least partially connected with the compartment by the third surface and wherein the first tray and the second tray are arranged such to each other that the steam generating device can comprise a recess or a protrusion to arrange the steam generating device in the heat source. In other words, the corresponding lateral extents of the surfaces of the first and second tray can be smaller or larger than a lateral extent of the compartment. Therefore, the steam generating device can be easily inserted in the heat source.

[0026] Further on, heat generated by the heat source can be used for further applications. Thus, in one embodiment, the heat source is an oven for further applications. For instance, the heat generated by the oven can be used for warming up a further component of the steam generating device. Therefore, a weight reduction can be achieved.

[0027] In another embodiment, the steam generating device can be an integrated system. That is, that the here descripted components of the steam generating device can be configured to be integral components.

[0028] The features of the here described steam generating device are disclosed for the corresponding method as well as vice versa.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] For a more complete understanding of the present invention and advantages thereof, reference is now made to the following description taken in conjunction with the accompanying drawings. The invention is explained in more detail below using exemplary embodiments, which are specified in the schematic figures of the drawings, in which:

Fig. 1 shows a schematic cross section of an embodiment of a steam generating device according to the present patent application;

Fig. 2 shows a schematic top view of another embodiment of a steam generating device according to the present patent application;

Fig. 3 shows a schematic cross section of another embodiment of a steam generating device according to the present patent application;

Fig. 4 shows a schematic cross section of an embodiment of an oven comprising the steam generating device of Fig. 3; and

Fig. 5 shows a flow diagram of an embodiment of a method according to the present patent application.

[0030] In the figures like reference signs denote like elements unless stated otherwise.

DETAILED DESCRIPTION OF THE DRAWINGS

[0031] Fig. 1 shows a schematic cross section of an embodiment of a steam generating device 50. The steam generating 50 can be arranged or located in a heat source 60.

[0032] The steam generating device 50 comprises a first tray 10 with a first surface 11 and a second surface 12. The steam generating device 50 further comprises a compartment 30 or reservoir, wherein the compartment 30 is at least partially connected with the second surface 12 of the first tray 10 and wherein the compartment 30 comprises a material with high thermal conductivity. Examples for such materials can be e.g. metal or metal alloys. The first tray 10 of the steam generating device 50 further comprises at least one porous area 01, 02, 03, 04, wherein each of the at least one porous area 01, 02, 03, 04 comprises a movable cover C1, C2, C3, C4 (see Fig. 2).

[0033] The compartment 30 can be configured to store a fluid 2 and the compartment 30 can be heated up by the heat source 60 such that the fluid 2 evaporates through the at least one porous area O1, O2, O3, O4 and its movable cover C1, C2, C3, C4. Further the movable cover C1, C2, C3, C4 can be flush with the first surface

11 of the first tray 10 and the movable cover C1, C2, C3, C4 can be at least partially connected with the tray 10 and/or the compartment 30. For example the movable cover C1, C2, C3, C4 can be connected with a bottom surface 31 of the compartment 30 by a string or a line (not shown).

[0034] As shown in Fig.1 the at least one porous area O1, O2, O3, O4 can have a conical profile P1, wherein the conical profile P1 tapers in direction from the first surface 11 to the second surface 12 of the first tray 10. The heat source 60 of Fig. 1 can be an oven 55 for further applications (see Fig. 4). The steam generating system 50 can in particular be an integrated system.

[0035] Fig. 2 shows a schematic top view on the first surface 11 of the first tray 10 of another embodiment of a steam generating device. Fig.2 shows four movable covers C1, C2, C3, C4 and the corresponding four porous areas O1, O2, O3, O4.

[0036] Fig. 2 is substantially based on the embodiment shown in Fig. 1 with the difference that the porous areas O1, O2, O3, O4 have a same diameter as the movable covers C1, C2, C3, C4. Therefore each of the movable cover C1, C2, C3, C4 can comprise a rotation axis 15, wherein the rotation axis 15 can be connected or fixed with the first tray 10. For example, the porous areas O1, O2, O3, O4 can be formed as through holes, which are passing from the first surface 11 to the second surface 12 of the first tray 10. Alternatively the here described movable covers C1, C2, C3, C4 can be at least partially foldable, rotatable or turnable with respect to the at least one porous area O1, O2, O3, O4.

[0037] Fig.3 shows a schematic cross section of another embodiment of a steam generating device.

[0038] The steam generating device 50 of Fig.3 can be based on the steam generating device 50 of Fig 1, wherein the steam generating device 50 can further comprise a second tray 20 with a third surface 21 and a fourth surface 22, wherein the second tray 20 can be at least partially connected with the compartment 30 by the third surface 21 and wherein the first tray 10 and the second tray 20 can be arranged in such a way to each other that the steam generating device 50 can comprise a recess 41 or a protrusion 42 (not shown) to arrange the steam generating device 50 in the heat source 60. In other words, the corresponding lateral extents of the surfaces 11, 12, 21, 22 of the first and second tray 10, 20 can be larger or smaller than a lateral extent of the compartment 30. Therefore, the steam generating device 50 can be easily inserted in the heat source 60, such as the oven 55 shown in Fig 4.

[0039] Fig. 4 shows a schematic cross section of an embodiment of the oven 55 comprising the steam generating device of Fig. 3.

[0040] The oven 55 can comprise rails 56, 57, which can be arranged on opposite side walls of the oven 55. The recess 41 of the steam generating device 50 can be formed on opposite sides of the steam generating device 50. Therefore the here described steam generating device 50 can be easily inserted in the oven 55 and vice versa. The steam generating device 50 therefore functions without using an additional separate heater system expect that of the heat source 60 or alternatively the oven 55. That means that the here descripted steam generating device 50 can be exclusively heated-up by the heat source 60 or the oven 55.

[0041] Fig.5 shows a flow diagram of an embodiment of a method for operating a steam generating device.

[0042] The method for operating a steam generating device comprises in the steps of providing S1 a first tray 10 with a first surface 11, a second surface 12 and at least one porous area O1, O2, O3, O4 of the first tray 10. The method further comprises covering S2 each of the at least one porous area O1, O2, O3, O4 by a movable cover C1, C2, C3, C4 and providing S3 a compartment 30 with a material of high thermal conductivity. The method further comprises the step connecting S4 the first tray 10 with the compartment 30 with the second surface 12 of the first tray 10.

[0043] Although specific embodiments have been illustrated and described herein, it will be appreciated by those of ordinary skill in the art that a variety of alternate and/or equivalent implementations exist. It should be appreciated that the exemplary embodiment or exemplary embodiments are only examples, and are not intended to limit the scope, applicability, or configuration in any way. Rather, the foregoing summary and detailed description will provide those skilled in the art with a convenient road map for implementing at least one exemplary embodiment, it being understood that various changes may be made in the function and arrangement of elements described in an exemplary embodiment without departing from the scope as set forth in the appended claims and their legal equivalents. Generally, this application is intended to cover any adaptations or variations of the specific embodiments discussed herein.

[0044] The present invention provides a steam generating device 50. The steam generating device 50 comprises a first tray 10 with a first surface 11 and a second surface 12. The steam generating device 50 further comprises a compartment 30, wherein the compartment 30 is at least partially connected with the second surface 12 of the first tray 10 and wherein the compartment 30 comprises a material with high thermal conductivity. The first tray 10 of the steam generating device 50 further comprises at least one porous area O1, O2, O3, O4, wherein each of the at least one porous area O1, O2, O3, O4 comprises a movable cover C1, C2, C3, C4. The present invention further provides a corresponding method.

List of reference signs

[0045]

2	fluid
10	first tray
11	first surface

12	second surface
15	rotation axis
20	second tray
21	third surface
22	fourth surface
30	compartment
31	bottom surface of the compartment
41	recess
42	protrusion
50	steam pressure device
55	oven
56,57	rails
60	heat source
O1 - O4	porous area
C1 - C4	movable covers
P1	conical profile
S1 - S4	method steps

Claims

1. Steam generating device (50) for a heat source (60), the device comprising:

a first tray (10) with a first surface (11) and a second surface (12),
a compartment (30), which is at least partially connected with the second surface (12) of the first tray (10), and wherein the compartment (30) comprises a material with high thermal conductivity, and
wherein the first tray (10) comprises at least one porous area (O1, 02, 03, 04), wherein each of the at least one porous area (01, 02, 03, 04) comprises a movable cover (C1, C2, C3, C4).

2. Steam generating device (50) according to claim 1, wherein the compartment (30) is configured to store a fluid (2) and the compartment (30) is heated up by the heat source (60) such that the fluid (2) evaporates through the at least one porous area (01, 02, 03, 04) and its movable cover (C1, C2, C3, C4).

3. Steam generating device (50) according to any one of the preceding claims, wherein the movable cover (C1, C2, C3, C4) is flush with the first surface (11) of the first tray (10) and the movable cover (C1, C2, C3, C4) is at least partially connected with the tray (10) and/or the compartment (30).

4. Steam generating device (50) according to any one of the preceding claims, wherein the movable cover (C1, C2, C3, C4) comprises a rotation axis (15), wherein the rotation axis (15) is connected with the first tray (10).

5. Steam generating device (50) according to any one of the preceding claims, wherein the movable cover comprises a silicone.

6. Steam generating device (50) according to any one of the preceding claims, wherein the movable cover (C1, C2, C3, C4) is configured to adapt to a steam pressure of evaporated fluid (2).

7. Steam generating device (50) according to any one of the preceding claims, wherein the movable cover (C1, C2, C3, C4) of each of the at least one porous area (O1, O2, O3, O4) covers the at least one porous area (O1, O2, O3, O4) by its weight.

8. Steam generating device (50) according to any one of the preceding claims, wherein the at least one porous area (O1, O2, O3, O4) has a conical profile (P1) and wherein the conical profile (P1) tapers in direction from the first surface (11) to the second surface (12) of the first tray (10).

9. Steam generating device (50) according to any one of the preceding claims, wherein the steam generating device (50) further comprises a second tray (20) with a third surface (21) and a fourth surface (22), wherein the second tray (20) is at least partially connected with the compartment (30) by the third surface (21) and wherein the first tray (10) and the second tray (20) are arranged such to each other that the steam generating device (50) comprises a recess (41) or a protrusion (42) to arrange the steam generating device (50) in the heat source (60).

10. Steam generating device (50) according to any one of the preceding claims, wherein the heat source (60) is an oven (55) for further applications.

11. Steam generating device (50) according to any one of the preceding claims, wherein the steam generating device (50) is an integrated system.

12. Oven, in particular a steam oven, comprising a steam generating device according to claims 1 to 11.

13. Method for operating a steam generating device (50) for a heat source (60), the method comprising the steps of:

providing (S1) a first tray (10) with a first surface (11), a second surface (12) and at least one porous area (O1, O2, O3, O4) of the first tray (10),
covering (S2) each of the at least one porous area (O1, O2, O3, O4) by a movable cover (C1, C2, C3, C4),
providing (S3) a compartment (30) with a material of high thermal conductivity, and
connecting (S4) the first tray (10) with the compartment (30) with the second surface (12) of the first tray (10).

14. Method according to claim 13, wherein providing the compartment (30) comprises storing a fluid (2) in the compartment (30) and heating up the compartment (30) by the heat source (60) such that the fluid (2) evaporates through the at least one porous area (O1, O2, O3, O4) and its movable cover (C1, C2, C3, C4).

Fig.1

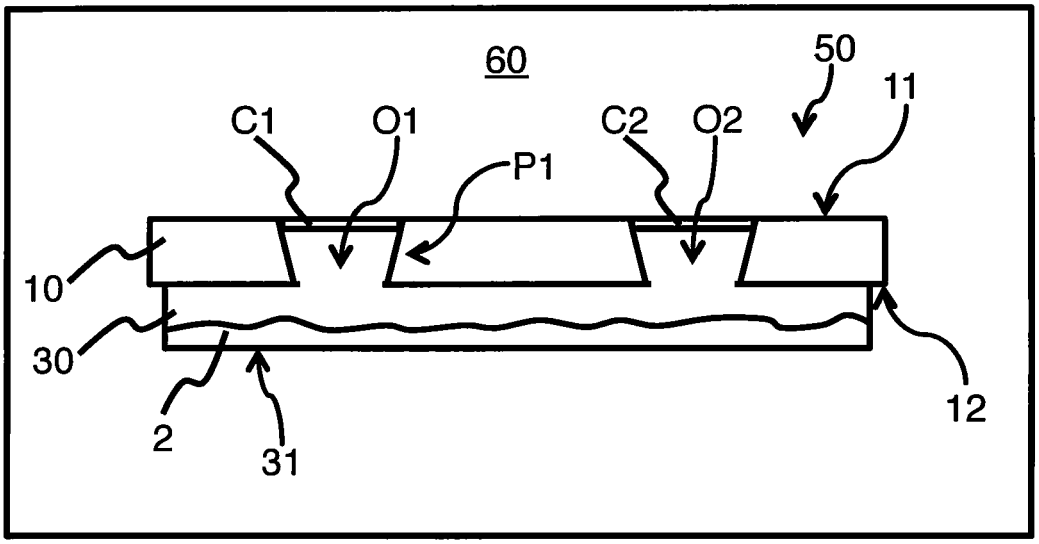


Fig.2

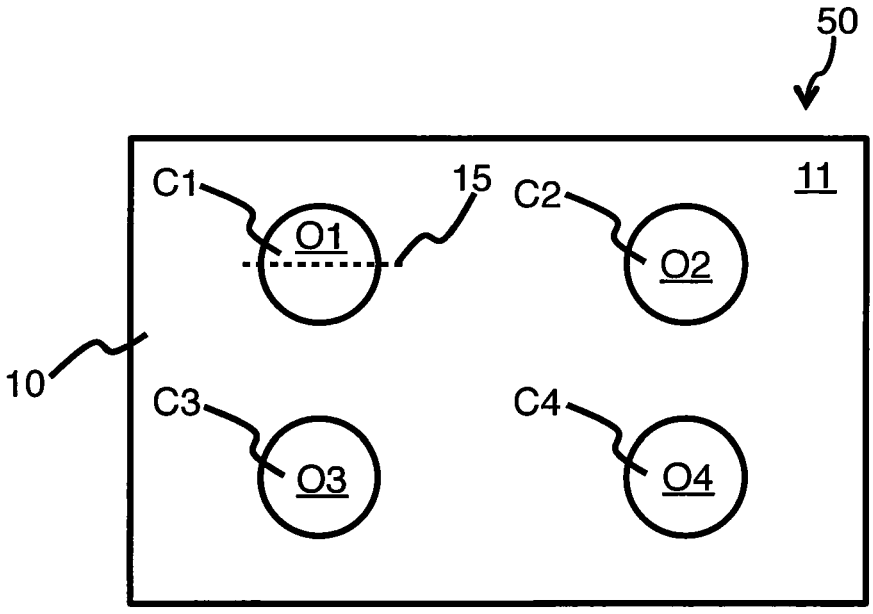


Fig.3

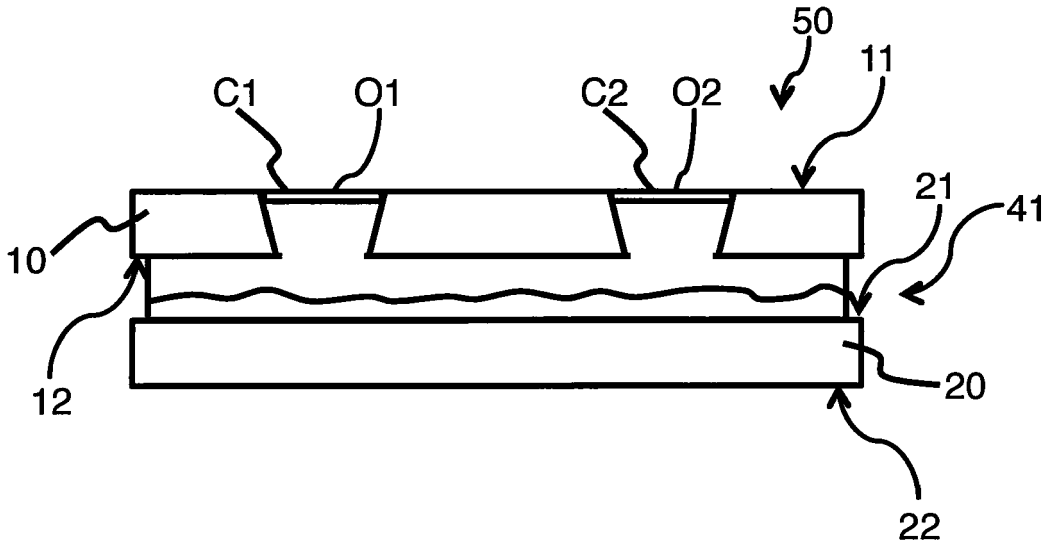


Fig.4

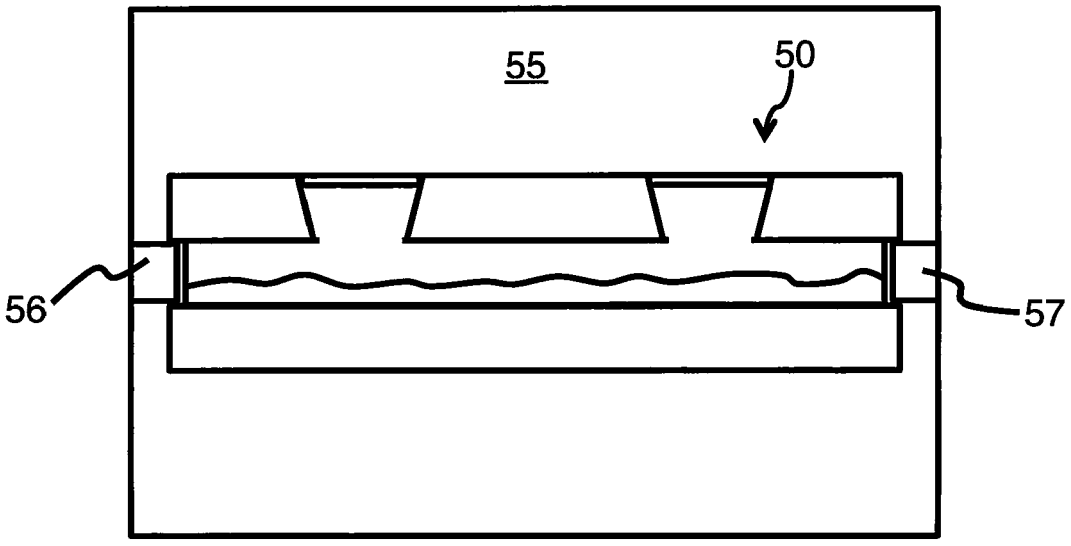
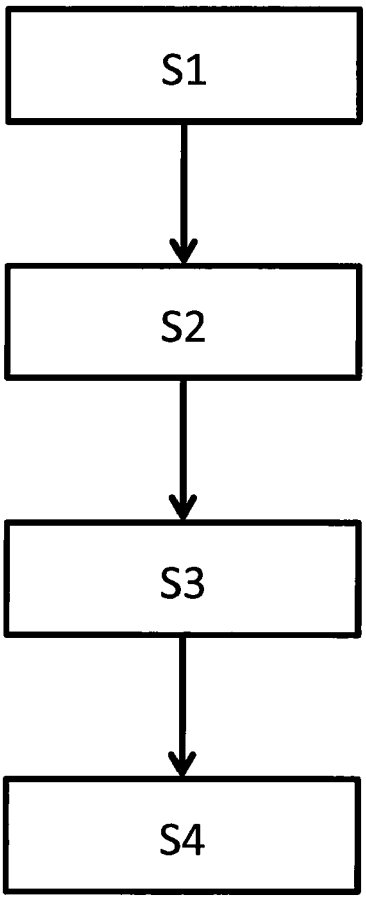


Fig.5



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EUROPEAN SEARCH REPORT

Application Number
EP 16 20 6860

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F24C
A21B
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	30 May 2017	Moreno Rey, Marcos

CATEGORY OF CITED DOCUMENTS

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