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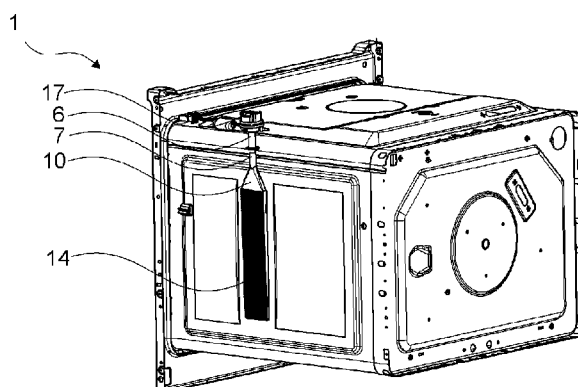
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(54) Title: AN OVEN COMPRISING ILLUMINATION MEANS

Figure 2



(57) Abstract: The present invention relates to an oven (1) comprising a cooking chamber (2) in which the materials to be cooked are placed, a chassis (3) shaped as a box open on the front side enclosing the cooking chamber (2), and an illumination means (11) having a light source (4) placed on the chassis (3) so as to stand out of the cooking chamber (2), an optical guide (5) enabling transmission of the light coming from the light source (4) to the cooking chamber (2), and a bearer (6) enabling attachment of the light source (4) and the optical guide (5) to the chassis (3).



Description**AN OVEN COMPRISING ILLUMINATION MEANS**

[0001] The present invention relates to an oven comprising illumination means.

[0002] In ovens, illumination means are placed in cooking chambers for the users to be able to monitor the cooking state of food without opening the cover of an oven. Thus, the cooking state can be observed from a glass cover without heat loss. In the art, several applications have been developed for illumination means to effectively illuminate the entirety of a cooking chamber. Such illumination means usually comprise an optical guide transmitting the light from a light source to the interior of the cooking chamber. Optical guide usually comprises an optical fiber bundle or alternatively an optical light tube. However, homogeneous light distribution in a cooking chamber cannot be achieved with optical guides and illumination adequate for the user to determine the cooking state of the food product cannot be provided.

[0003] State of the art United States patent application no. US20130081610 discloses an oven having an optical fiber bundle and a light source.

[0004] The aim of the present invention is to realize an oven whose internal volume is effectively illuminated.

[0005] The oven realized to achieve the aim of the present invention and disclosed in the first claim and the dependent claims comprise a cooking chamber in which the materials to be cooked are placed, a chassis shaped as a box open on the front side, enclosing the cooking chamber, and illumination means having

- a light source placed on the chassis so as to stand out of the cooking chamber,
- an optical guide enabling transmission of the light coming from the light source to the cooking chamber, and
- a bearer enabling attachment of the light source and the optical guide to the chassis.

[0006] The food product to be cooked is placed into the cooking chamber from the open front side of the chassis. The food product is cooked by heating of the cooking chamber by means of a heater. The bearer preferably made

of elastic material, holds the light source and the optical guide together in such a way that light transmission between them is not prevented. The elastic form of the bearer protects the light source and the optical guide from excessive mechanical stress. Thus, losses during light transmission from the light source to the optical guide are decreased and the amount of light conducted to the cooking chamber is increased, providing a better illumination of the cooking chamber.

- [0007] The oven of the invention comprises an illumination means comprising
- a holder in which the optical guide is placed,
 - a light transmitting frame placed on the chassis so as to be at least partially in the cooking chamber,
 - a lens arranged on an end of the optical guide, enabling transmission of the light conducted through the optical guide by distributing it towards the light transmitting frame and,
 - a distributor connected to the lens on one end and to the light transmitting frame on the other end, enabling homogeneous distribution of the light distributed, on the light transmitting frame by passing through the lens.
- [0008] In this embodiment, the bearer is placed on the chassis at a relatively cooler region, the light coming from the light source passes through the optical guide placed in the holder, then first passes through the lens and is dispersed on the distributor, sent through the distributor and conducted to the light transmitting frame. The holder, the distributor and the light transmitting frame preferably made of a transparent material such as glass, enable homogeneous distribution of the light coming from the optical guide, inside the cooking chamber.
- [0009] In an embodiment of the invention, the illumination means comprises a planar surface arranged on the surface of the light transmitting frame facing the cooking chamber, and a reflection surface arranged opposite to the planar surface, on which a plurality of reflectors are provided. The reflectors arranged on the reflection surface enable the light conducted to the light transmitting frame, to pass through the planar surface and reach the cooking chamber. Substances splattering from the food product placed

in the cooking chamber such as fat, water, etc. are easily cleaned thanks to the planar surface having a smooth shape facing the cooking chamber.

[0010] In another embodiment of the invention, the reflection surface, comprises a reflector with a hemispherical shape. The light hitting the reflectors are prevented from being reflected to a single direction thanks to the hemispherical shape. The light distributed through the hemisphere and sent to the planar surface radiates the entirety of the cooking chamber.

[0011] In another embodiment of the invention, the reflection surface comprises reflector placed so as to have its concave portion facing the planar surface. Thus, light conducted from the reflection surface to the planar surface passes through the planar surface so as to completely cover its surface area. By this, dark regions on the planar surface are prevented from remaining, and the user sees equal illumination throughout the planar surface when he/she looks at the planar surface in the cooking chamber. User satisfaction is thus improved.

[0012] In another embodiment of the invention, the illumination means comprises a planar surface having a larger surface area than the reflection surface. During mounting of the light transmitting frame to the opening arranged on the chassis through inside the cooking chamber, the reflection surface passes through the opening and the planar surface rests on the chassis so as to completely cover the opening. Thus, the light (distributing) transmitting frame sealingly covers the opening provided on the chassis.

[0013] In another embodiment of the invention, the illumination means comprises a reflection surface placed angularly with respect to the planar surface. The light advancing linearly along the light transmitting frame with tapering thickness from its end connected to the distributor to its opposite end, contacts all of the reflectors positioned angularly to the advancement direction of the light. Thus, the amount of light directed from the reflection surface to the planar surface along the light transmitting frame, is increased, providing a better illumination of the cooking chamber.

[0014] In another embodiment of the invention, the illumination means, comprises a distributor dilating from its end connected to the optical guide to the light transmitting frame. The light distributed by the lens is conveyed in the

distributor and conducted to the light transmitting frame without being distributed to the outer environment, thanks to the dilating shape of the distributor.

- [0015] In another embodiment of the invention, the oven comprises a coupling part provided on the chassis having at least one protrusion thereon, and at least one recess accommodating the protrusion and arranged on the lateral surfaces of the light transmitting frame. The coupling between the light transmitting frame and the chassis is reinforced by placement of the protrusions on the chassis to the recesses on the light transmitting frame. Thus, disengagement of the light transmitting frame from the chassis due to temperature variations occurring in the cooking chamber during cooking process, is prevented. In addition, the light transmitting frame's mounting to and dismantling from the chassis is also facilitated.
- [0016] In another embodiment of the invention, the optical guide is made of elastic material. Mounting of the light source on the chassis is facilitated thanks to the elastic structure of the optical guide preferably made of silicone material. The optical guide is able to realize the conduction of the light between the light source and the light transmitting frame by being bent.
- [0017] In another embodiment of the invention, the illumination means comprises a cooling member enabling cooling of the light source, and a first seat arranged on the bearer, in which the cooling member is placed. The bearer enables secure cooling of the light source by holding the cooling member and the light source together.
- [0018] In another embodiment of the invention, the illumination means comprises a second seat arranged on the bearer, in which the optical guide is placed. The second seat which is preferably a cylindrically shaped channel, enables the realization of the light conduction between the light source and the optical guide by providing correct positioning of the optical guide with respect to the light source.
- [0019] With the present invention, an oven comprising an illumination means enabling illumination of a cooking chamber by means of a light source placed out of the cooking chamber, is realized. Thus, the light source is

prevented from being affected of high temperatures generated in the cooking chamber and oven safety is enhanced.

[0020] The oven realized to achieve the aims of the present invention is illustrated in the accompanying drawings, wherein:

[0021] Figure 1 is a perspective view of an oven.

[0022] Figure 2 is a perspective view of the chassis in an embodiment of the invention after an illumination unit is placed by the oven.

[0023] Figure 3 is a perspective view of the chassis in an embodiment of the invention before the illumination unit is placed by the oven.

[0024] Figure 4 is a frontal schematic view of the illumination unit in an embodiment of the invention.

[0025] Figure 5 is a schematic view from behind of the illumination unit in an embodiment of the invention.

[0026] Figure 6 is a side sectional view of the illumination unit in an embodiment of the invention.

[0027] Figure 7 is a perspective view of the illumination unit in an embodiment of the invention.

[0028] Figure 8 is a partial perspective view of the chassis in an embodiment of the invention after the illumination unit and the coupling part are placed by the oven.

[0029] Figure 9 is a perspective view of the coupling part in an embodiment of the invention.

[0030] Figure 10 is a perspective view of the bearer in an embodiment of the invention.

[0031] The elements in the figures are numbered individually and the correspondence of these numbers are given hereinafter.

1. Oven
2. Cooking chamber
3. Chassis
4. Light source
5. Optical guide
6. Bearer
7. Holder

8. Light transmitting frame
9. Lens
10. Distributor
11. Illumination means
12. Planar surface
13. Reflector
14. Reflection surface
15. Protrusion
16. Recess
17. Cooling member
18. First seat
19. Second seat
20. Coupling part

[0032] The oven (1) comprises a cooking chamber (2) in which materials to be cooked are placed, a chassis (3) shaped as a box open on the front side, enclosing the cooking chamber (2), and

- illumination means (11) having,
- a light source (4) placed on the chassis (3) so as to stand out of the cooking chamber (2),
- an optical guide (5) enabling transmission of the light coming from the light source (4) to the cooking chamber (2),

[0033] and a bearer (6) enabling attachment of the light source (4) and the optical guide (5) to the chassis (3) (figures 1 and 2). Preferably, the light source (4) comprising LED illuminator is positioned outside the cooking chamber (2) on the chassis (3) so as to be further from the cooking region kept in high temperatures.

[0034] The oven (1) of the invention comprises an illumination means (11) comprising

- a holder (7) in which the optical guide (5) is placed,
- a light transmitting frame (8) placed on the chassis (3) so as to be at least partially in the cooking chamber (2),
- a lens (9) arranged on an end of the optical guide (5), enabling transmission of the light conducted through the optical guide (5) by

distributing it towards the light transmitting frame (8) and,

- a distributor (10) connected to the lens (9) on one end and to the light transmitting frame (8) on the other end, enabling homogeneous distribution of the light distributed by passing through the lens (9), on the light transmitting frame (8).

[0035] The light transmitting frame (8) preferably made of transparent material, enables conduction into the cooking chamber (2) of the light conveyed from the light source (4) positioned out of the cooking chamber (2). The holder (7), lens (9) and the distributor (10) attached to the chassis (3) so as to be out of the cooking chamber (2), enable conduction of the light conveyed by the optical guide (5) from the light source (4), to the light transmitting frame (8) having at least one surface facing the cooking chamber (2).

[0036] In an embodiment of the invention, the illumination means (11) comprises a planar surface (12) arranged on the surface of the light transmitting frame (8) facing the cooking chamber (2), and a reflection surface (14) arranged opposite to the planar surface (12), on which a plurality of reflectors (13) are provided. The light passing through the distributor (10) and advancing in the light transmitting frame (8), is directed towards the planar surface (12) after hitting the reflectors (13) arranged on the reflection surface (14). Thus, the light conveyed in the light transmitting frame (8) is sent to the cooking chamber (2) by being passed via the planar surface (12). The reflectors (13) positioned equally spaced along the light transmitting frame (8), enable directing to the cooking chamber (2) of equal amount of light along the light transmitting frame (8). Thus, the illumination means (11) is enabled to perform homogeneous illumination inside the cooking chamber (2).

[0037] In another embodiment of the invention, the reflection surface (14) comprises a reflector (13) of hemispherical shape. The light hitting the reflectors (13) is sent to the planar surface (12) by being distributed thanks to the hemispherical shape. Thus, the light entering the light transmitting frame (8) is enabled to reach the entirety of the planar surface (12).

[0038] In another embodiment of the invention, the reflection surface (14)

comprises reflectors (13) placed so as to have their concave portions facing the planar surface. Thus, the light conducted from the reflection surface (14) to the planar surface (12) is distributed homogeneously over the planar surface (12) by means of the reflectors (13).

[0039] In another embodiment of the invention, the illumination means (11) comprises a planar surface (12) having a larger surface area than the reflection surface (14). Thus, when the light transmitting frame (8) is placed on the opening arranged on the chassis (3), the planar surface (12) completely covers the opening, blocking passage of hot air out of the coking chamber (2). By this, hot air passage to the light source (4) from the cooking chamber (2) is prevented.

[0040] In another embodiment of the invention, the illumination means (11) comprises a reflection surface (14) placed angularly with respect to the planar surface (12). The distance between the planar surface (12) and the reflection surface (14) decreases from the end of the light transmitting frame (8) connected to the distributor (10), to the other end. The light advancing in the light transmitting frame (8) contacts all of the reflectors (13) positioned along the reflection surface (14) thanks to angular placement of the reflection surface (14) with respect to the planar surface (12). Thus, the light directed from the reflectors (13) is distributed evenly between both ends of the planar surface (12), thereby enabling effective illumination of the cooking chamber (2).

[0041] In another embodiment of the invention, the illumination means (11) comprises a distributor (10) dilating from its end connected to the optical guide (5) to the light transmitting frame (8). The width of the end of the distributor (10) connecting to the light transmitting frame (8) is equal to the width of the light transmitting frame (8). The distributor (10) preferably having a triangular shape, enables distribution of the light conducted through the optical guide (5), so as to spread to the entirety of the light transmitting frame (8).

[0042] In another embodiment of the invention, the oven (1) comprises a coupling part (20) provided on the chassis (3) having at least one protrusion (15) thereon, and at least one recess (16), accommodating the protrusion (15),

arranged on the lateral surfaces of the light transmitting frame (8). The light transmitting frame (8) is tightly placed on the chassis (3) by placement of the protrusion (15) to the recess (16). Thus, the light transmitting frame (8) is prevented from falling into the cooking chamber (2) by being removed from the opening wherein it is placed on the chassis (3).

[0043] In another embodiment of the invention, the optical guide (5) is made of elastic material. Placement of the light source (4) on the chassis (3) so as to be protected from the heat dissipating from the cooking chamber (2) is enabled thanks to the elastic structure of the optical guide (5) preferably made of silicone. The elastic structure of the optical guide (5) also facilitates mounting of the illumination means (11) to the oven (1).

[0044] In another embodiment of the invention, the illumination means (11) comprises a cooling member (17) enabling cooling of the light source (4), and a first seat (18) arranged on the bearer (6), in which the cooling member (17) is placed. The cooling member (17) preferably made of metal material, is placed to the first seat (18) together with the light source (4) provided thereon. The bearer (6) enables the cooling member (17) to be held adjacent with the light source (4).

[0045] In another embodiment of the invention, the illumination means (11) comprises a second seat (19) arranged on the bearer (6), in which the optical guide (5) is placed. The second seat (19) having the same shape as the optical guide (5), enables the bearer (6) to effectively grasp the optical guide (5).

[0046] In the oven (1) of the invention, the light conducted from a light source (4) placed on the chassis (3) so as to stay out of the cooking chamber (2), is distributed inside the cooking chamber (2) by means of a light (distributing) transmitting frame (8). The illumination means (11) providing homogeneous illumination in the cooking chamber (2) is realized by means of the light (distributing) transmitting frame (8).

Claims

1. An oven (1) comprising, a cooking chamber (2) in which materials to be cooked are placed, a chassis (3) shaped as a box open on the front side, enclosing the cooking chamber (2), and
 - illumination means (11) having
 - a light source (4) placed on the chassis (3) so as to stand out of the cooking chamber (2),
 - an optical guide (5) enabling transmission of the light coming from the light source (4) to the cooking chamber (2),and a bearer (6) enabling attachment of the light source (4) and the optical guide (5) to the chassis (3), characterized in that, the illumination means (11) comprise
 - a holder (7) in which the optical guide (5) is placed,
 - a light transmitting frame (8) placed on the chassis (3) so as to be at least partially in the cooking chamber (2),
 - a lens (9) arranged on an end of the optical guide (5), enabling transmission of the light conducted through the optical guide (5) by distributing it towards the light transmitting frame (8) and,
 - a distributor (10) connected to the lens (9) on one end and to the light transmitting frame (8) on the other end, enabling homogeneous distribution of the light distributed by passing through the lens (9), on the light transmitting frame (8).
2. An oven (1) according to claim 1, characterized in that, a planar surface (12) is arranged on the surface of the light transmitting frame (8) facing the cooking chamber (2), and in that a reflection surface (14) arranged opposite to the planar surface (12), has a plurality of reflectors (13) thereon.
3. An oven (1) according to claim 2, characterized in that, the reflector (13) has a hemispheric shape.
4. An oven (1) according to any one of claim 2 or 3, characterized in that, the reflector (13) is placed with its concave portion facing the planar surface (12).
5. An oven (1) according to any one of claims 2 to 4, characterized in that, the planar surface (12) has a larger surface area than the reflection surface (14).
6. An oven (1) according to any one of the claims 2 to 5, characterized in that, the

reflection surface (14) is placed angularly with respect to the planar surface (12).

7. An oven (1) according to any one of the preceding claims, characterized in that, the distributor (10) dilates from its end connected to the optical guide (5) to the light transmitting frame (8).
8. An oven (1) according to any one of the preceding claims, characterized in that, a coupling part (20) provided on the chassis (3) has at least one protrusion (15) thereon, and in that at least one recess (16), in which the protrusion (15) is accommodated, is arranged on the lateral surfaces of the light transmitting frame (8).
9. An oven (1) according to any one of the preceding claims, characterized in that, the optical guide (5) is made of elastic material.
10. An oven (1) according to any one of the preceding claims, characterized in that, a cooling member (17) enables cooling of the light source (4), and in that a first seat (18) in which the cooling member (17) is placed, is arranged on the bearer (6).
11. An oven (1) according to any one of the preceding claims, characterized in that, a second seat (19) in which the optical guide (5) is placed, is arranged on the bearer (6).

Figure 1

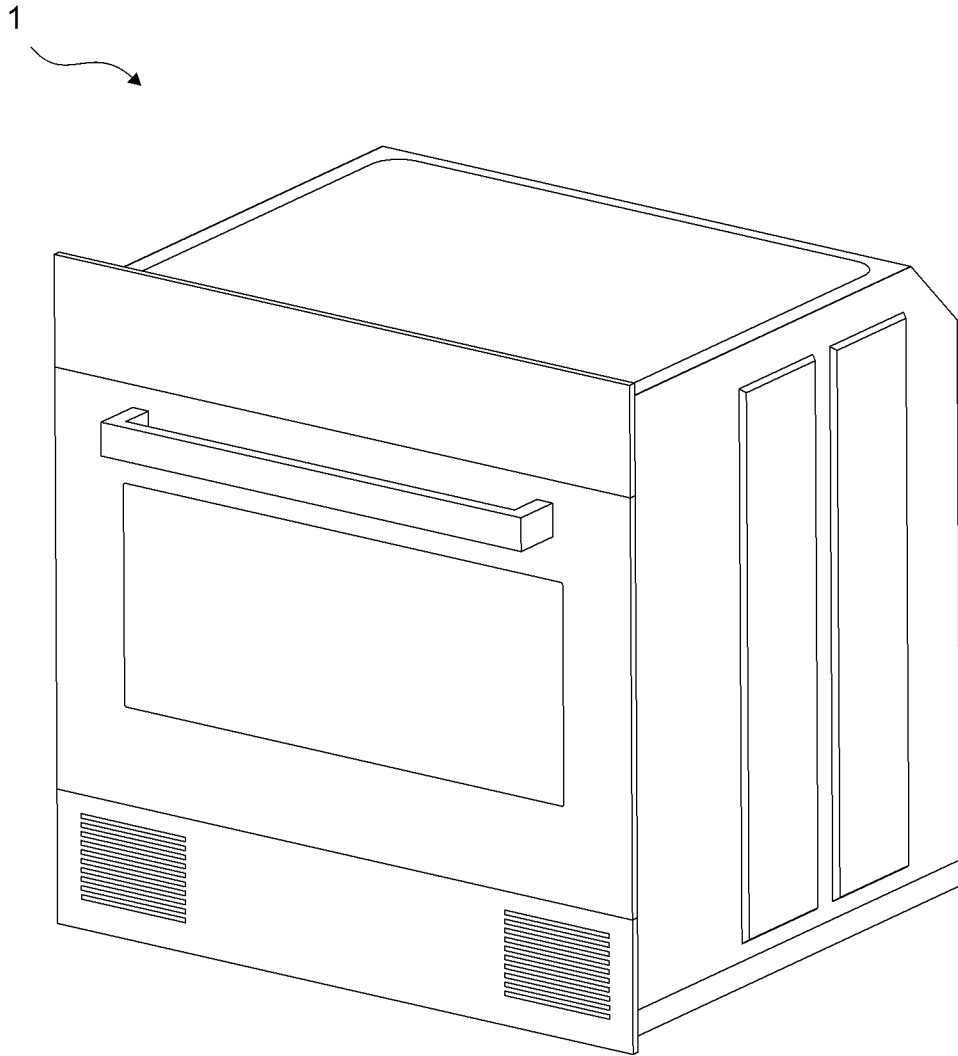


Figure 2

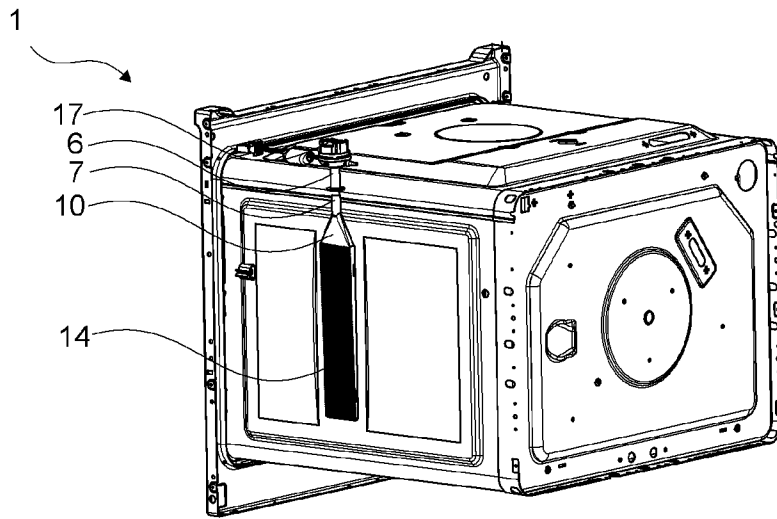


Figure 3

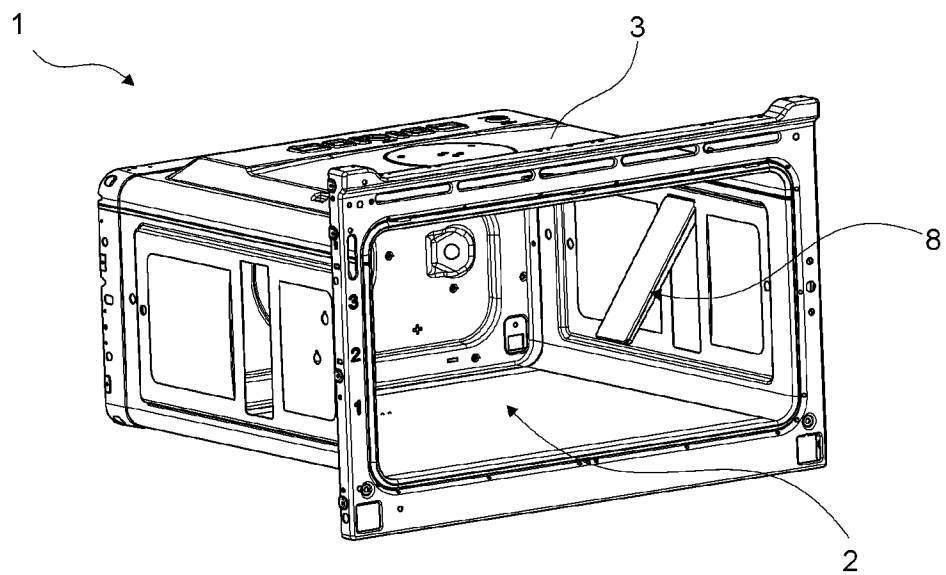


Figure 4

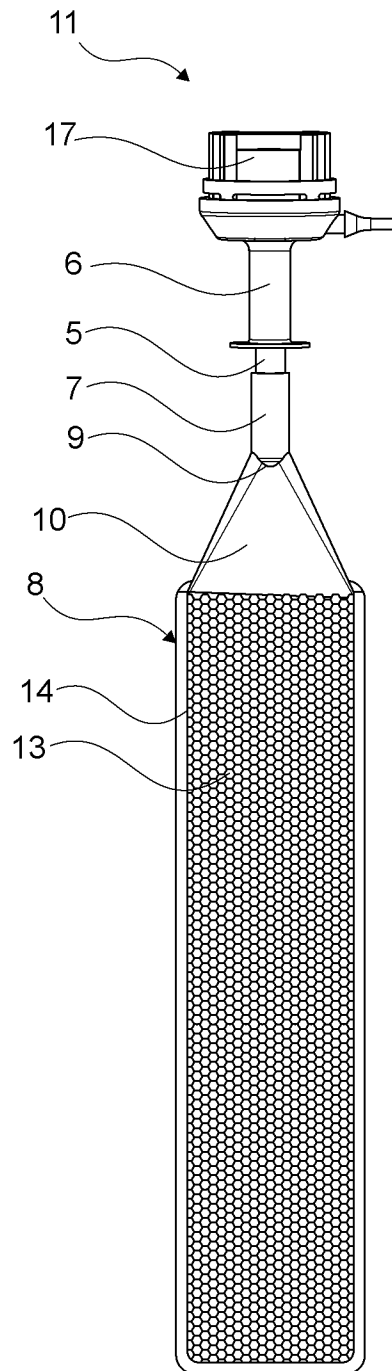


Figure 5

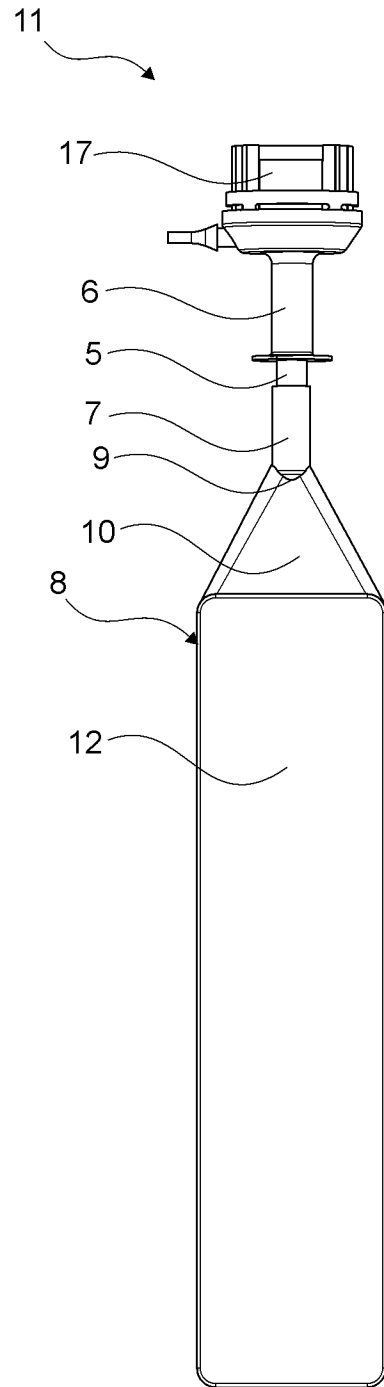


Figure 6

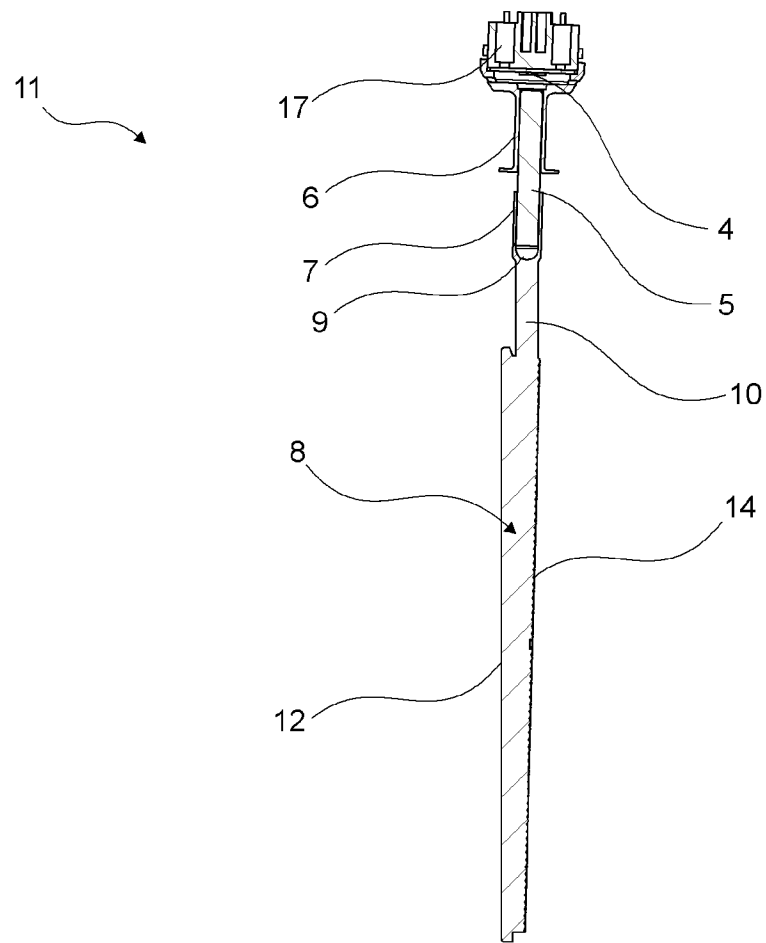


Figure 7

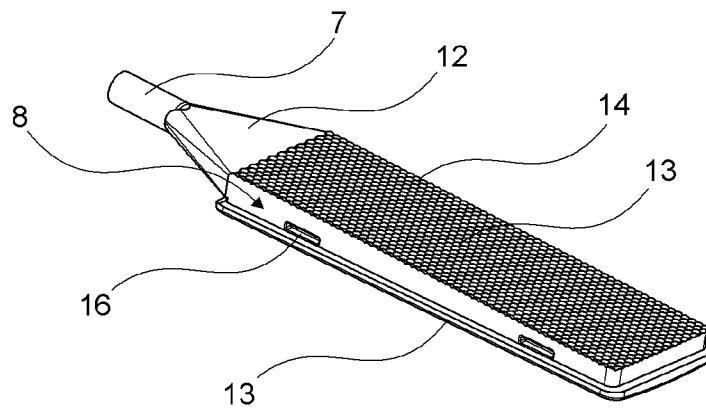


Figure 8

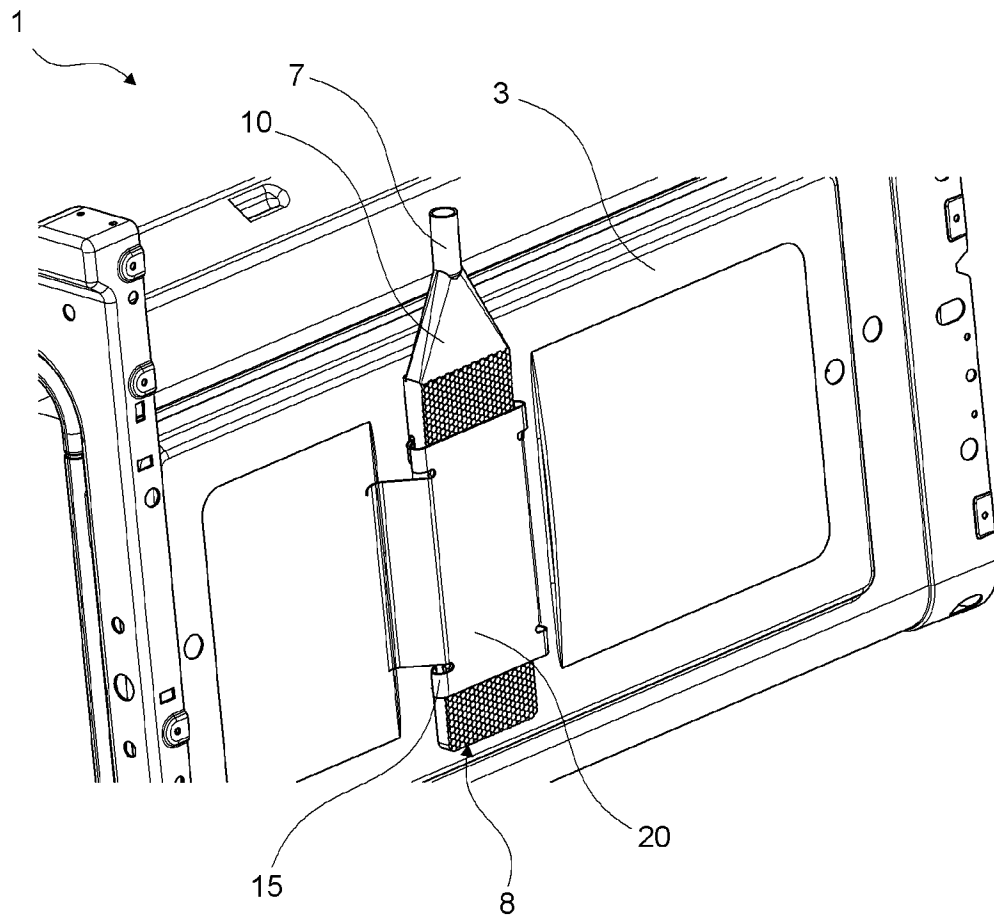


Figure 9

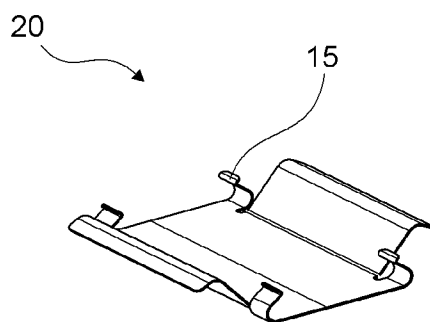
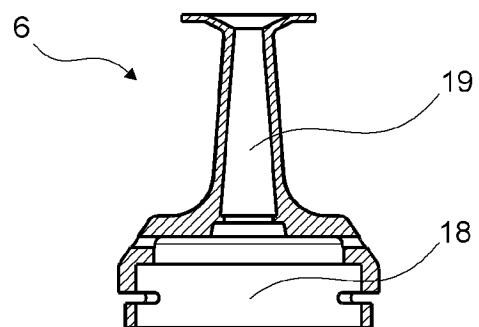


Figure 10



INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
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ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Date of the actual completion of the international search

10 November 2017

Date of mailing of the international search report

17/11/2017

Name and mailing address of the ISA/

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Verdoodt, Luk

INTERNATIONAL SEARCH REPORT

International application No
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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A	EP 3 045 819 A1 (V ZUG AG [CH]) 20 July 2016 (2016-07-20) figure 2 -----	8

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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