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(54) Cooking appliance with heat insulated burner

(57) The present invention relates to a cooking device comprising one or more gas burners that extend through passages in a work surface and each have an associated pan support. Each gas burner extends through a separate corresponding passage. At least one thermally insulating element is provided which has a reducing effect on the heat transfer from the pan support and/or a flame of the gas burner to the work surface during operation of the cooking device. The invention further relates to a gas burner and a mounting member for use in such a cooking device.

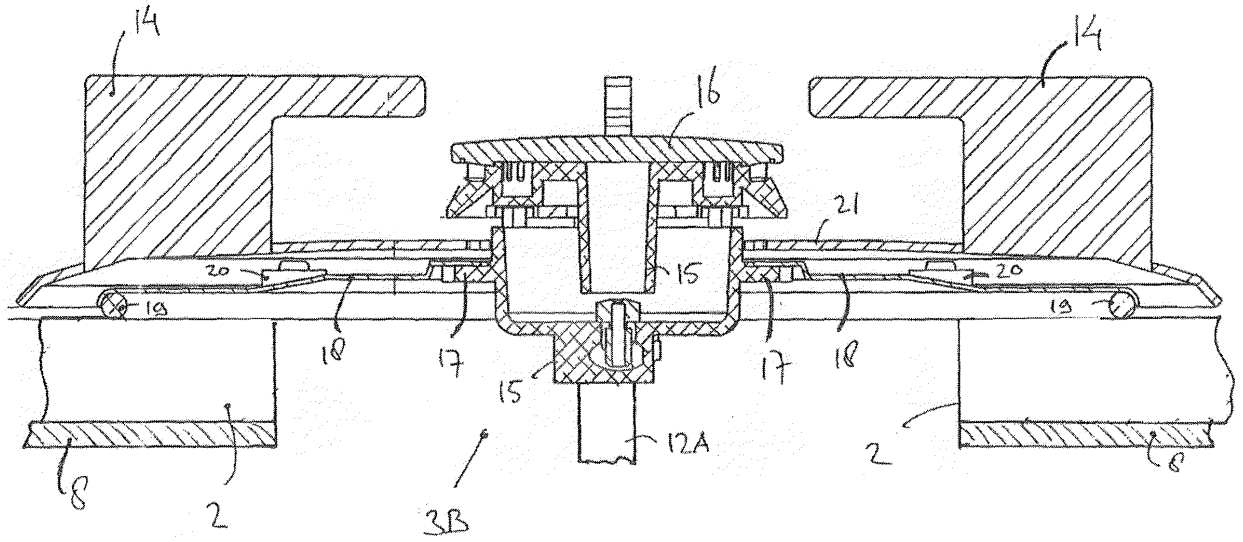

Fig. 3

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Description

[0001] The present invention in a first aspect thereof relates to a cooking device comprising one or more gas burners that extend through a passage in a work surface and each have an associated pan support such that each gas burner extends through a separate corresponding passage.

[0002] Such cooking devices are known. When the work surface directly surrounds a burner and since a pan support bears directly on the work surface, i.e. not via a catchment dish of a gas cooking range, said work surface will be heated by radiation heat of the flame of the gas burner, by conduction heat of the pan support resting on the work surface, and radiation heat of a pan heated by the gas burner, resting on the pan support, and accordingly located somewhat above the work surface during operation of the gas burner. Such heating is undesirable because it may pose a burning risk to a user who comes into contact with the work surface, because a heated work surface is detrimental for any food lying or being prepared on the work surface, or because the work surface is affected by the heat, whereby the risk of fracture increases. In NL1036934, Applicant has described a solution to this problem, wherein an insulation zone is incorporated in a stainless steel work surface, which prevents to a large extent that heat can spread through conduction over the work surface to beyond said zone. This solution, however, is not suitable for work surfaces manufactured from a material that itself is not resistant to comparatively high temperatures. Indeed, the temperature in the portion of the work surface immediately surrounding the gas burner may rise to 60° C or more, sometimes even above 90°C. Materials used for work surfaces may, for example, melt, break, or become discoloured as a result of this.

[0003] The present invention accordingly has for its object to provide a device as described in the opening paragraph wherein the temperature of the work surface rises less high than in a comparable combination of work surface and gas burner according to the know solution. This object is achieved according to the present invention in that for a particular pan support at least one thermally insulating element belonging to the particular pan support in question is provided which during operation of the cooking device has a reducing effect on the heat transfer from the pan support in question and/or a flame from the corresponding gas burner to the work surface. A work surface, as used herein, means a surface on which food can be prepared by a user. The scope of protection preferably further extends to a cooking range (to be) integrated in the work surface, at approximately the same level as the work surface and in which the gas burners are incorporated. The term 'particular' indicates that a thermally isolating element is provided for a particular pan support, impeding heat transfer between the said pan support and the cooking range. It will be obvious that the cooking range does not belong to a particular pan support, but to the joint pan supports. The mounting member with the at least one thermally insulating element ensures that the heat transfer from the flame of the burner, from the pan support and/or from the heated pan on the pan support to the work surface is hampered. The thermal insulation may be constructed in various ways, some of which will be discussed herein. It will become clear to the reader hereof that a combination of particular insulation measures will lead to the temperature being reduced even further, i.e. down to a level that is acceptable for a work surface even if a burner with a power of 6 kW is incorporated in the work surface.

[0004] Up to a few years ago it was usual to provide four, five or six burners in a usually rectangular gas cooking range and to support this gas cooking range subsequently in a corresponding recess of, for example, 57 x 49 cm in the work surface. In modern kitchens, however, the burners are increasingly mounted separately in the work surface itself. This implies that, though the burners may be interconnected below the work surface, a separate, usually circular opening is provided in the work surface for each burner. This leads to a design with simple outlines. The known cooking range is clearly defined and it is obvious to a user that the cooking range may become hot. The cooking range can be connected to the work surface in an heat isolated manner. The cooking range should accordingly not be confused with the work surface as envisaged in the present invention. In a preferred embodiment a cooking range can be part of such a work surface.

[0005] American patent US 2,972,990 discloses a work surface with a cooking range wit gas burners. The cooking range is connected to the work surface in a thermally insulating manner.

[0006] American patent US 2, 806,464 discloses a work surface with a cooking range wit gas burners. The cooking range is connected to the work surface in a thermally insulating manner.

[0007] Japanese patent document JP 10-170003 discloses a cooking range of a stove that is integrated in an opening of a slab.

[0008] In a preferred embodiment of the present invention, the gas burner and the pan support are connected to the work surface via the mounting member that comprises the at least one thermally insulating element. The thermally insulating element may thus be included in or form an integral part of connecting means by which a gas burner is usually fastened to the work surface. It at least reduces the heat between the gas burner and/or the pan support and the work surface.

[0009] It is preferable in the cooking device that a radiation heat insulating element is provided that is designed for preventing, or at least substantially reducing, the transfer of heat through radiation from a pan bottom, from the pan support, or from a flame of the gas burner to the work surface. During cooking, the work surface in a device according to the prior art is heated inter alia by radiation heat from the elements mentioned above. The heat radiation insulating element accordingly reduces at

least in part a rise in temperature of the work surface as compared with the prior art.

[0010] It is preferred here that the heat radiation insulating element comprises two shells lying one on top of the other and located between the pan support and the work surface. Said shells are preferably made from a thermally conductive material so that any heat can spread evenly over the shell. The pan support may or may not be fastened to the uppermost one of the two shells. A contact heat insulating material may be used for this so as to reduce the transfer of heat through contact from the pan support to the radiation heat insulating element. Two shells on top of one another may be separated by a thermally insulating material, but a sufficient radiation heat insulating effect is achieved, for example, when the material present between the two shells is at least substantially formed by air.

[0011] In order to maintain a sufficient distance between the two shells, it is preferred that spacer elements of an insulating material are present between the shells.

[0012] If the lowermost of the two shells rests on the work surface, the radiation heat insulating element may at the same time act as the mounting member.

[0013] In a preferred embodiment of the present invention, the shells have a surface area that corresponds substantially to that of a pan bottom to be supported by the pan support. If the shells extend at least as far away from the burner as the maximum diameter of a pan to be placed on the pan support, the radiation heat of a pan bottom in the direction of the work surface is reduced in the desired manner.

[0014] It is preferable that a contact heat insulating element is provided, designed to reduce at least to a high degree a heat transfer through contact between the mounting member and the work surface. The contact heat insulating element may in this case be provided between the mounting member and the work surface, but it may alternatively be provided in the mounting member, for example as an interruption thereof, such that the portion of the mounting member facing the work surface can indeed rest directly on the work surface, but since this portion is insulated from the higher portion of the mounting member, the heat transfer is still reduced. The contact heat insulating element and the radiation heat insulating element may be combined into one element.

[0015] The contact heat insulating element preferably comprises at least one support element by means of which the mounting member bears on the work surface. If a plurality of support members is provided, these may together form a continuous support member which at the same time, for example, provides a good seal against, for example, moisture. It is alternatively possible, however, that several support members are located at a distance to one another.

[0016] The contact heat insulating element is preferably a ring of insulating material that is provided on or in the work surface and on which the mounting member is supported.

[0017] The contact heat insulating element is preferably manufactured from silicone material, but obviously alternative materials may be used which are resistant to the temperatures to which they are exposed during use in a kitchen environment and which in addition have a thermally insulating effect.

[0018] In a preferred embodiment of the present invention, the work surface comprises two or more passages for gas burners, said gas burners being connected to one another below the work surface. This renders it possible to provide a previously assembled and tested 'gas burner assembly' or 'hob' which is partly mounted underneath the work surface. This is advantageous in view of the safety requirement imposed on cooking devices and precludes the necessity of testing and certifying the cooking device after the particular gas burners have been mounted.

[0019] The present invention in a second aspect thereof relates to a gas burner with a pan support and a mounting member which comprises, at least when used in a work surface, at least two shells lying one above the other and which is located, at least when used in a work surface, between the gas burner plus the pan support at one side and the work surface at the other side. Further developments in such a gas burner with a pan support and a mounting member are discussed in the present document, for example with reference to the first aspect of the present invention.

[0020] The present invention further relates to a gas burner with a pan support and a mounting member, wherein the mounting member is provided with at least one contact heat insulating and/or radiation heat insulating member which is designed for preventing or at least reducing the transfer of heat from the mounting member to the work surface.

[0021] The invention will now be explained in more detail with reference to an embodiment and to the appended figures, in which:

Figure 1 is a perspective view from above of a cooking device according to the present invention;
Figure 2 presents an exploded view of the cooking device of figure 1; and
Figure 3 is a cross-sectional view of the cooking device of figure 1 taken on the line I-I.

[0022] Figure 1 is a perspective view of a cooking device 1 according to the present invention. The cooking device has a work surface 2 of composite material in which holes (not visible in figure 1) are provided through which gas burners 3a to 3e and control knobs 4a to 4e extend. Below the work surface 1 there is a metal frame 5 for a gas burner assembly (not shown in figure 1) on which the gas burners 3a to 3e are mounted.

[0023] Figure 2 is an exploded view of partly assembled components of the cooking device 1 of figure 1. The work surface in figure 2 has dimensions corresponding to a gas burner assembly. It will be clear, however, that

the work surface will usually be larger and in fact broader than shown in figure 2. The gas burners 3a to 3e and the control knobs 4a to 4e for the gas burners 3a to 3e are mounted on the gas burner assembly 11. The gas burners 3a to 3e and the control knobs 4a to 4e are connected to gas lines 12 by means of the gas burner assembly 11 in a known manner. Mounting members 13 and pan supports 14, which will be discussed in more detail with reference to figure 3, are arranged around the gas burners 3a to 3e. The gas burner assembly 11 will normally be supplied factory-mounted, tested and certified. The mutual positions of the gas burners 3a to 3e and the control knobs 4a to 4e are thus fixed. A frame 5 surrounds the gas burner assembly 11 when the cooking device 1 is in the assembled state. An aluminium cooling plate 8 and the frame 5 are clamped against the work surface 2 upon installation. For this purpose, the mounting members 13 and the pan supports 14 are removed from the respective gas burners 3a to 3e, so that the gas burners 3a to 3e can be passed through the holes 9a to 9e in the cooling plate 8. The control knobs 4a to 4e are also removed so that the associated gas controls can be passed through holes 10a to 10e in the cooling plate 8. The assembly thus obtained can then be mounted to the lower side of the work surface 2 in that the gas burners 3a to 3e and the gas controls are passed through the holes 6a to 6e and 7a to 7e in the work surface, respectively. Then the mounting members 13, the pan supports 14, and the control knobs 4a to 4e are reinstated and the cooking device 1 is ready.

[0024] Figure 3 is a cross-sectional view taken on the line I-I in figure 1. A round through hole 3a, through which a gas line 12a of the gas burner 3b extends, is present in both the gas burner assembly 11 and the cooling plate 8. The gas line 12a is connected to a burner housing 15 on which a burner cover 16 rests. A lower annular stainless steel shell 18 of the mounting member 13 rests on a flange 17 of the burner housing 15. A silicone ring 19 is fastened to the lower side of the circumference of the shell 18, with which ring the shell 18 bears on the work surface 2 and which ring at the same time acts as a sealing ring between the work surface 2 and the mounting member 13. The shell 18 is thus kept at a certain distance above the work surface 2 by the silicone ring 19. Four rubber studs 20 (of which only two are visible in figure 3) are provided as spacers about halfway the radius of the shell 18. An upper annular stainless steel shell 21 of the mounting member 13 rests on said studs 20. The shell 21 extends to beyond the circumference of the shell 18 and floats above the work surface 2. A pan support 14 is fastened to the shell 21. The mounting member 13 thus comprises two shells 18 and 21 which are placed loose one upon the other and are kept at a distance to one another by studs 20. Accordingly the main substance present between the shells 18 and 21 is air.

[0025] The heat insulation effect of the cooking device 1 will now be discussed. The object of this heat insulation is to reduce the temperature of the work surface 2 when the cooking device 1 is used for cooking. When a gas burner operates at full power, for example, on a known cooking device with gas burners directly mounted in the work surface, and a pan with boiling liquid stands on the pan support, the temperature of the work surface may rise owing to a number of effects:

- the flame of the gas burner imparts heat to the work surface by radiation;
- the pan support resting on the work surface is heated by the flame, so that heat is conducted from the pan support to the work surface owing to contact with the work surface;
- heat radiates from the bottom of the pan with boiling liquid to the work surface.

[0026] The result of these effects is that the temperature of the work surface may rise to an undesirable level. Until now the temperature rise has been counteracted in known cooking devices by means of higher pan supports, whereby the distance of a pan, and possibly a gas burner, to the work surface is increased, and by means of a reduction in the power of the gas burners. The former measure reduces the freedom of design for an often prominent feature in a living space. The latter measure adversely affects the cooking possibilities.

[0027] In the cooking device 1 according to the invention, the increase in temperature of the work surface 2 is reduced by the shells 18 and 21. The upper shell 21 absorbs radiation heat from the gas burner 3b and the pan as well as heat from the pan support 14, or at least screens off the work surface 2 locally against radiation heat. Since the upper shell 21 and the lower shell 18 are separated from one another by air and by the rubber studs 20, there will be no or hardly any direct heat transfer from the upper shell 21 to the lower shell 18. However, there will still be some heat transfer through radiation from the upper shell 21 to the lower shell 18. The lower shell 18 in its turn is kept at a distance from the work surface 2 by the silicone ring 19. Thus there is no or hardly any direct heat transfer from the lower shell 18 to the work surface 2. Again, there will be some heat transfer owing to radiation from the lower shell 18 to the work surface 2. An additional effect of the above solution is that the air drawn in for combustion in the gas burner 3b will flow in mainly between the shells 18 and 21. This has the result that the shells 18, 21 are cooled by the air flowing between them and that the hot air flows directly to the gas burner, whereupon fresh, cool air can be supplied.

[0028] It will be clear after reading of the above that the device according to the invention is capable of substantially reducing the temperature in the work surface 2, at least to a degree sufficient for providing an acceptable solution to the problem posed in the introduction. The cooling plate 8 is provided under the work surface as an extra measure. The cooling plate 8 is made from aluminium. A local rise in temperature of the work surface

2 above the cooling plate 8 will result in a local transfer of heat from the work surface 2 to the cooling plate 8. Since the conduction coefficient of the cooling plate 8 is substantially higher than that of the work surface 2, the heat will distribute itself comparatively quickly over the cooling plate 8. At a distance from the relevant hot location the cooling plate 8 will in its turn give off heat to a relatively cool portion of the work surface 2 above the cooling plate 8. The cooling plate 8 thus provides a faster distribution of heat over the work surface 2, so that local temperature rises remain limited.

[0029] The figures and the description deal with only one embodiment of a cooking device, a gas burner, and a mounting member according to the present invention. It will be clear, however, that various modifications are conceivable within the scope of protection of the invention as defined in the appended claims. Thus a material other than a composite material may be chosen for the work surface. Many materials for kitchen work surfaces are known to those skilled in the art. The gas burners together with the insulation elements can be mounted in a cooking range (to be) integrated in a work surface as well, to impede heating of the cooking range itself. The gas burner assembly may be fastened to the work surface such that the gas burners are connected to the work surface exclusively via the gas cooking range and for the rest extend through and above the work surface in a floating manner relative thereto. The insulating elements may also be of an alternative design. Other suitable radiation heat insulating materials may be used instead of silicones and rubber. Also, a suitable material other than stainless steel or aluminium may be used for the shells or the cooling plate. For the cooling plate it is important that a material with good heat conduction should be used; for the shells this is not a requirement, but it is preferred because then the relevant elements will be evenly heated. It is also possible to use, instead of two shells, one shell or more than two shells. A suitable material choice can then be of importance, aiming at a reduction in the heat transfer to the work surface. An insulating material may be provided between the pan support and the upper shell, if so desired.

Claims

1. A cooking device comprising a work surface and one or more gas burners that extend through a passage in said work surface and each have an associated pan support such that each gas burner extends through a separate corresponding passage, **characterised in that** for a particular pan support at least one thermally insulating element belonging to the particular pan support in question is provided which during operation of the cooking device has a reducing effect on the heat transfer from the pan support in question and/or a flame from the corresponding gas burner to the work surface.

2. A cooking device according to claim 1, **characterised in that** the gas burner and the pan support are connected to the work surface via a mounting member, which comprises the at least one thermally insulating element.

3. A cooking device according to claim 2, **characterised in that** a radiation heat insulating element is provided that is designed for preventing, or at least substantially reducing, the transfer of heat through radiation from a pan bottom or from a flame of the gas burner to the work surface.

4. A cooking device according to claim 3, **characterised in that** the heat radiation insulating element comprises two shells located between the pan support and the work surface, one shell lying on top of the other.

5. A cooking device according to claim 4, **characterised in that** spacer elements of an insulating material are provided between said shells.

6. A cooking device according to claim 5, **characterised in that** the lowermost of the two shells rests on the work surface.

7. A cooking device according to claim 5 or 6, **characterised in that** the shells have a surface area that corresponds substantially to that of a pan bottom to be supported by the pan support.

8. A cooking device according to one of the claims 3-6, **characterised in that** the shells are made from a thermally conducting material.

9. A cooking device according to any one of the preceding claims, **characterised in that** a contact heat insulating element is provided which is designed to prevent, or at least to reduce to a high degree, any heat transfer through contact between the mounting member and the work surface.

10. A cooking device according to claim 9, **characterised in that** the contact heat insulating element comprises at least one support element with which the mounting member bears on the work surface.

11. A cooking device according to claim 9 or 10, **characterised in that** the contact heat insulating element comprises a ring of insulating material.

12. A cooking device according to one of claims 9 to 11, **characterised in that** the contact heat insulating element is made of a silicone material.

13. A cooking device according to any one of the preceding claims, **characterised in that** the work sur-

face comprises two or more passages for respective gas burners, said gas burners being connected to one another below the work surface.

14. A gas burner with a pan support and a mounting member with a thermally insulating element which comprises, at least when used in a work surface, at least two shells lying one above the other and which is located, at least when used in a work surface, between the gas burner plus the pan support at one side and the work surface at the other side.

15. A gas burner with a pan support and a mounting member, **characterised in that** the mounting member is provided with at least one contact heat insulating and/or radiation heat insulating member which is designed for preventing or at least reducing the transfer of heat from the mounting member to the work surface.

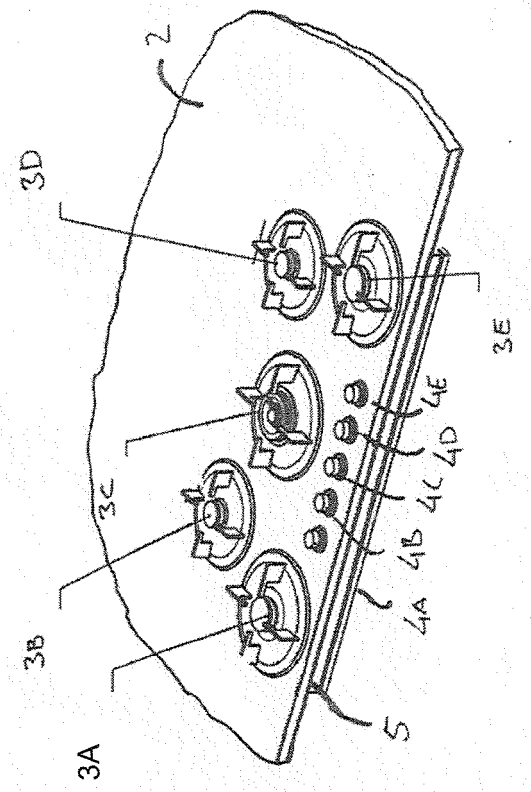

Fig. 1

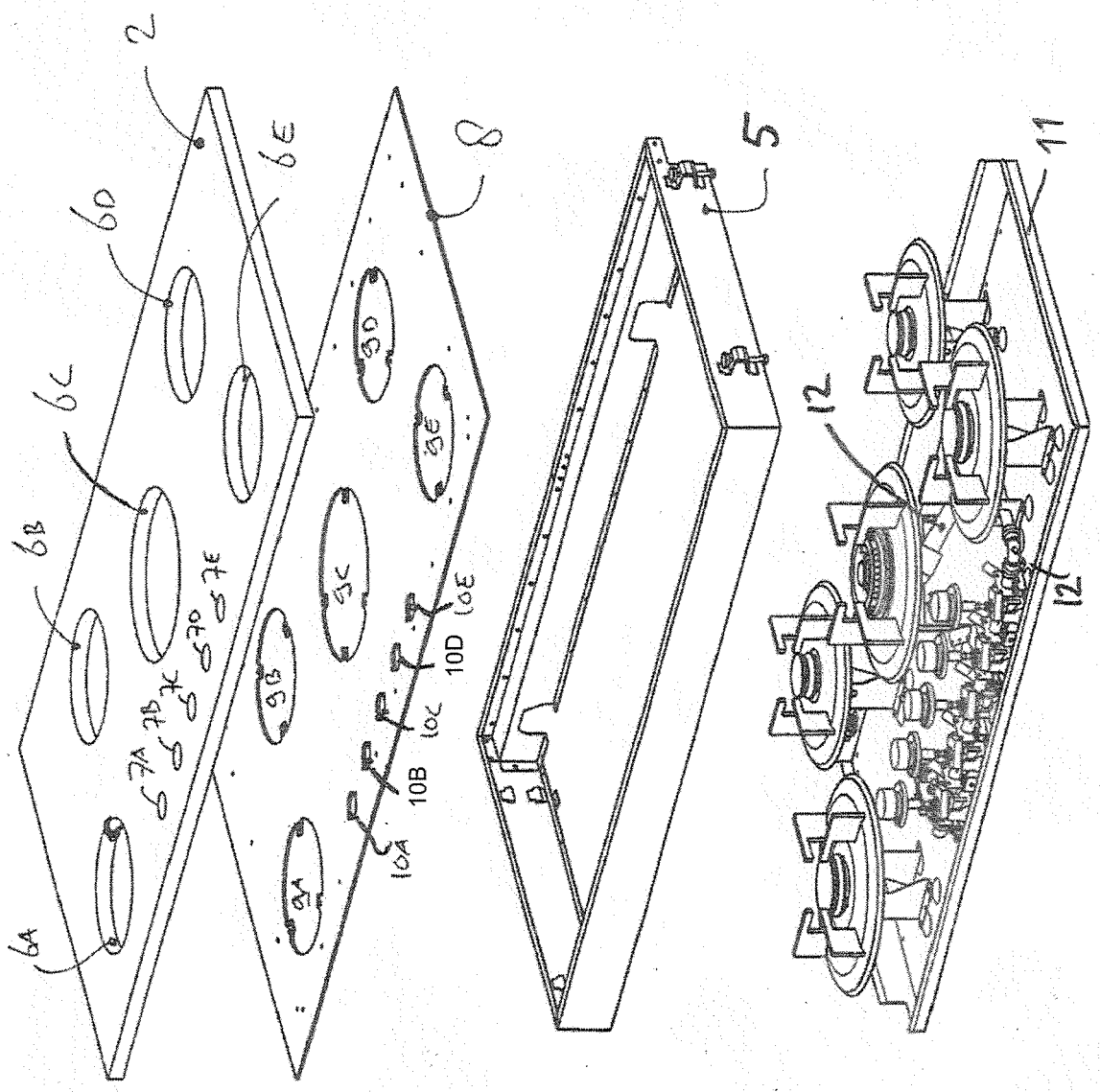
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Fig. 2

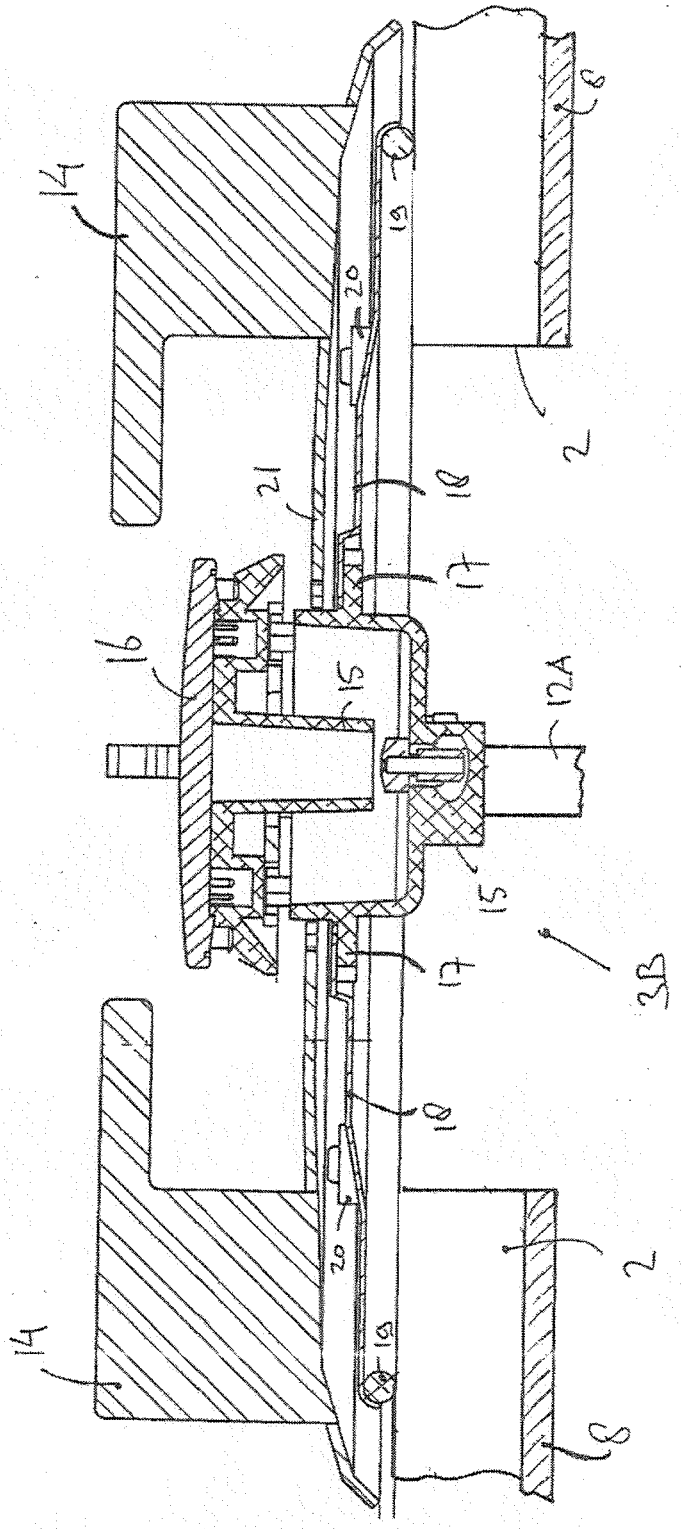

Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 11 16 3060

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 830 133 A1 (PALOMA KOGYO KK [JP]) 5 September 2007 (2007-09-05) * paragraphs 88,91,96,178 - page 1 *	1-15	INV. F24C3/08 F24C15/34 F24C15/10
X,D	JP 10 170003 A (HARMAN CO LTD) 26 June 1998 (1998-06-26) * abstract *	1	
X,D	US 2 806 464 A (WILLIAMS WILLIS E ET AL) 17 September 1957 (1957-09-17) * column 1, lines 21-37; figures 1,2,6 *	1	
X,D	US 2 972 990 A (CALDWELL ROBERT H) 28 February 1961 (1961-02-28) * column 2, lines 24-39; figures 1,2 *	1	
A	US 5 156 140 A (ZISMAN HERBERT J [US]) 20 October 1992 (1992-10-20) * the whole document *	1-15	
A	DE 102 59 296 A1 (SCHOTT GLAS [DE] SCHOTT AG [DE]) 14 August 2003 (2003-08-14) * the whole document *	1,14	TECHNICAL FIELDS SEARCHED (IPC) F24C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	3 August 2011	Rodriguez, Alexander

CATEGORY OF CITED DOCUMENTS

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1 EPO FORM 1503 03.82 (P04C01)

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03-08-2011

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1830133 A1	05-09-2007	WO 2006051631 A1	18-05-2006
		US 2007199558 A1	30-08-2007
JP 10170003 A	26-06-1998	NONE	
US 2806464 A	17-09-1957	NONE	
US 2972990 A	28-02-1961	NONE	
US 5156140 A	20-10-1992	NONE	
DE 10259296 A1	14-08-2003	CN 1435600 A	13-08-2003
		FR 2835309 A1	01-08-2003
		US 2003140918 A1	31-07-2003

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- NL 1036934 **[0002]**
- US 2972990 A **[0005]**
- US 2806464 A **[0006]**
- JP 10170003 A **[0007]**