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(54) Title: GRID FOR COOKING EQUIPMENT

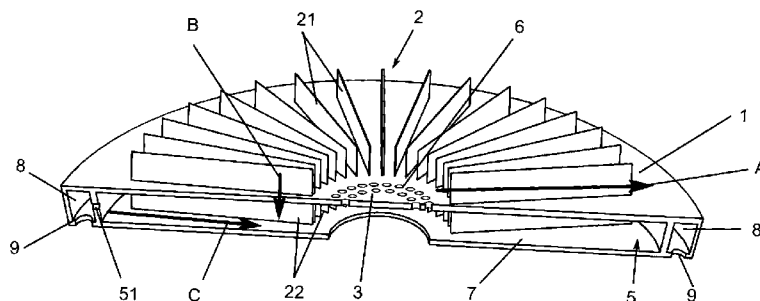


FIG. 2

(57) Abstract: The present invention relates to a grid used in stoves which comprises innovative technical and functional characteristics capable of increasing the thermal efficiency of the burners. More preferably, the grid according to the present invention comprises an upper crown (1) provided with a series of fins (2) arranged around the burner (3), these fins (2) form passage and distribution channels (4) of hot gases, and extend to the underside of crown (1), within an air and / or fuel passage chamber (5) in which it is preheated before the combustion itself.



"GRID FOR COOKING EQUIPMENT"

Field of the Invention

The present invention relates to a grid used in cooking equipment in general, more specifically in domestic stoves, which includes technical and functional characteristics capable of increasing the thermal efficiency of the burners used in such equipment. More preferably, the grid object of the present invention is comprised of fins which promote the recovery of heat generated for heating the cooking utensil and to more properly burn the air / fuel mixture through its preheating.

Background of the Invention

Stoves and cooking equipment generally known in the state of the art are usually equipped with a number of burners over which there are arranged the cooking utensils, wherein the configuration of these burners is intended to produce a flame that can heat the bottom of these utensils and, preferably, such heating should be as uniform as possible.

In this regard, according to the state of the art, it is noticed that the manufacturers of stoves seek to develop burners that somehow are able to provide a more suitable heating of the utensils without, thereby, requiring wasteful consumption of fuel, since that such proposals would make the stoves economically and ecologically inappropriate.

In order to obtain increased thermal efficiency, there are known in the state of the art trivets fitted with elements or configurations that assist in driving and distribution of the flame and the hot gas flow beneath the cooking utensils. More particularly, as can be observed in documents JP 2005009790, JP 60164136, JP 200867808 and JP 2005291583, there are known some models of burners provided with a set of protrusions and fins capable of promoting the conduction of the hot gas flow beneath the cooking utensil.

However these types of trivet have some drawbacks due to the fact that they are only flow straighteners, such as the increase of weight of the assembly and the increase of thermal exchange area with the environment, causing more heat losses. In other words, this type of grill known in the art can only partially solve the problems of conventional burners, because said protrusions and fins are disposed only on the outer and upper surface of the grid, that is, they are only designed on the side where there is contact with the cooking utensil. Thus, the possible increase of the efficiency of such grids is only related to the fact that the path of the exhaust gases below the cooking utensils be greater.

Additionally, as can be seen, the prior art does not disclose burners and grids capable of promoting recovery of part of the heat that, eventual and generally, is lost during the burning of the air / fuel mixture.

Another drawback of the burners and grids known in the current state of the art relates to the fact that the air / fuel mixture admitted to the burner is at a relatively low temperature - generally, at room temperature. Therefore, as it should be within the

knowledge of the skilled in the art, it appears that the combustion process, in such conditions, may be incomplete and inefficient, requiring a fuel consumption higher than necessary.

Moreover, due to this low efficiency of burning, the combustion ultimately results in the emission of undesired relatively high concentrations of pollutants to the atmosphere, since it is not possible to obtain the full burning of the fuel - which, of course, is detrimental to the environment and health of the user.

Thus, despite showing functional and efficient, so far it appears that the burners used in stoves could be improved, especially with regard to thermal efficiency. More particularly, it is observed that the stoves of the prior art lack burners able to perform the burning of the air / fuel mixture more appropriately and with lower heat losses to the environment, thus resulting in high thermal efficiency and lower emissions of pollutants to the environment.

Objectives of the Invention

Therefore, it is one objective of the present invention to provide a grid provided with fins to be applied in burners of cooking devices that is able to efficiently solve the drawbacks and limitations of the burners known in the state of the art, as outlined above.

More particularly, it is also an objective of the present invention to provide a grid to burners of equipment comprising innovative technical and functional characteristics that allow increasing the thermal efficiency by promoting a proper combustion of the air / fuel mixture.

Another objective of the present invention is to provide a grate provided with fins capable of recovering heat energy that is generally lost to the environment, aiming to promote pre-heating the fuel / air mixture before burning, which consequently results in increased thermal efficiency of the combustion process.

It is also an objective of the present invention to provide a grid provided with fins capable of reducing the speed of combustion gases and, thereby, increase the residence time of these gases under the cooking utensil, thus increasing the thermal efficiency.

Summary of the Invention

Thus, in order to achieve the objectives and technical effects mentioned above, the present invention relates to a grid for cooking equipment, and comprises a crown comprised of a plurality of fins. In this sense at least one fin is formed by at least one upper projection disposed on the upper face of the crown, and at least one lower projection disposed on the lower face of the crown.

According to the present invention, the grid further comprises at least one lower chamber and at least one channel defined between at least two lower projections of at least two fins. Thus, at least one channel is disposed within at least one lower chamber. The lower

chamber which is defined between the lower face of at least one upper crown and the upper face of at least one lower crown comprises at least one admission inlet which can be laterally arranged or inferiorly disposed.

5 Broadly, and in accordance with the concepts of the present invention, the lower chamber comprises an air passage chamber, or of gas fuel passage, or of passage of the mixture formed by air and fuel gas.

Preferably, the present grid for cooking equipment also provides at least one peripheral lower chamber adjacent and in communication with at least one lower chamber.

10 Also preferably, at least one lower projection of at least one fin is integrally extended along the height of the lower chamber. Optionally, at least one lower projection of at least one fin is partially extended along the height of lower chamber.

According to the preferred embodiment of the present invention, at least one upper projection and at least one lower projection of the same fin are vertically aligned. Moreover, at least one fin has its upper projection and its lower projection physically integrated to the crown. Optionally at least one fin can also be modular to the crown.

15 It should also be noted that, optionally, the lower crown can be understood by the cooking table itself of a cooking equipment.

Brief Description of the Figures

20 The features, advantages and technical effects of the present invention, and as indicated above, will be best understood by one skilled in the art from the following detailed description, given by way of example, and not limitation, of a preferred embodiment and with reference to the appended schematic figures, which:

Figure 1 illustrates a perspective view of the grid with fins according to a preferred embodiment of the present invention;

25 Figure 2 shows a sectioned perspective view of the grid with fins illustrated in figure 1;

Figure 3.1 illustrates a cross-sectional view of one embodiment of grids disclosed herein;

Figure 3.2 illustrates the preferred flow of burning gases within the grid of figure 3.1 ;

30 Figure 4.1 illustrates a cross-sectional view of another embodiment of the grid disclosed herein, and

Figure 4.2 illustrates the preferred flows of burning gases within the grid of Figure 4.1 ;

Detailed Description of the Invention

35 According to the schematic figures indicated above, the grid for stoves according to the present invention comprises an upper crown 1, wherein there are disposed fins 2 around the burner 3, said fins forming channels 4 for the passage and distribution of hot

gases generated by the combustion of the burner, in order to promote uniform heating of the cooking utensil (not shown) which is supported preferably on said fins 2.

Said fins 2 are extended to the underside of crown 1, so that they are, at least partially, in the region formed by an air and / or fuel passage chamber 5 that feeds holes 6 of burner 3.

Preferably, the grid of the present invention comprises a lower crown 7 which is overlaid by crown 1, forming a piece preferably and not exclusively cylindrical shaped, comprising inside said chamber 5 which also provides admission inlets 51.

In an optional embodiment, and as illustrated by figure 2, said part formed by crowns 1 and 7 is provided with a peripheral chamber 8 provided with at least one air and / or fuel feed hole 9. In this case, the admission inlets 51 of chamber 5 ultimately define communication points between chambers 5 and 8.

With respect to the above aspect, it is clear that other embodiments possible for the invention - which are represented in Figures 3.1 and 4.1 - may comprise other forms of fluid inlet to the process, for example, side inlets (single or multiple) or with lower fluid inlets directly linked to passage chamber.

In another possible configuration (not shown), the piece may contain multiple fluid inlets without, however, containing a lower crown 7 so that the mixing and passage chamber is formed by the contact of the side walls of the part with the cooking table.

According to the attached figures, it is noted that said fins 2 are arranged so that they are divided into an upper portion 21 positioned on the upper surface of crown 1, and a lower portion 22 disposed within the passage chamber 5. Lower portions 22 of fins 2 may be or not supported on the lower crown 7, or alternatively, it is also possible to arrange a combination of fins with different heights, such as intercalating some fins supported and others spaced from the lower crown 7 or possibly from the cooking table.

As shown in Figure 2, particularly with reference to the indicative arrows, it appears that the flow of hot gases (arrow A) is guided through the mentioned channels 4 heating upper portions 21 of fins 2. Upon heating of these upper portions 21, by means of thermal conduction (arrow B), it occurs the transfer of heat to lower portions 22 of fins 2, which are arranged inside said passage chamber 5. Thus, as the air and / or fuel mixture passes over the chamber 5 (arrow C), lower portions 22, which are heated, promote heating of the mixture, so that at the time of the combustion the mixture is preheated, allowing to obtain a more efficient combustion process.

In summary, as can be seen, fins 2 arranged in order to pass over crown 1 are capable of promoting the recovery of part of the heat that, in many cases, is lost to the environment without any use. Thus, it is important to highlight that the grid according to the present invention can greatly enhance the efficiency due to the recovery of heat through the

thermal conduction between the upper 21 and lower 22 portions of fins 2, so that air and / or fuel is preheated before the combustion itself. Therefore, this preheating can increase the flame temperature and, consequently, it is obtained a greater amount of heat that will be supplied for heating the cooking utensil.

It is noteworthy that despite these fins 2 are illustrated in Figures 2 with a rectangular shape, nothing prevents that these fins comprise different formats, being only recommended that they are capable of forming channels for the uniform conduction and circulation of hot gases generated in the combustion, and being extended until the passage chamber 5. Thus, said fins 2 may comprise a rectangular, arched, elliptical, tilted or even sinuous format.

Additionally, it should be noted that the grid according to the invention can be manufactured by a machining or casting process, fins 2 may be machined or cast in the crowns themselves. In an alternative embodiment of the present invention, said crown 1 can be provided with grooves (not shown) in which said fins 2 can be inserted and fixed.

With the construction suggested, the portions of fins 2 that are arranged on the upper crown 1 are configured to form channels whose purpose is to carry and distribute more evenly the hot gases generated by the combustion of the air / fuel mixture by the burner, especially when accommodating the cooking utensils on said grid. In this regard, with the passage of hot gases through the channels mentioned, there occurs the heating the upper portions 21 of fins 2 which, by thermal conduction, transfer heat to the lower portions 22 of said fins 2 which are arranged inside said passage chamber 5 of air / fuel.

Thus, considering that lower portions 22 of fins 2 are positioned within the passage chamber 5, when the flow of air and / or fuel, at room temperature, passes over said chamber, there is contact with the lower portions 22 of fins 2 which are heated, in order to cause heat exchange between upper 21 and lower 22 regions of fins 2 and the air and / or fuel. Therefore, because of this heat exchange, the air / fuel mixture is preheated before reaching the burner and thereby allows that the fuel burn occurs more efficiently, with less generation of polluting compounds and with flame temperature higher than in cases where the air / fuel mixture is burned at room temperature.

Among the preferred embodiments of the grid object of the present invention, the lower portions 22 of fins 2 are, at least partially, inside the passage chamber 5 of air / fuel. However, as it should be appreciated by those skilled in the art, such lower portions may also be extended until the inner surface of the lower crown, in this case, will result in the increase of the contact area with fins 2 for the heat exchange.

It is important to note the configuration of the trivet, according to the present invention, promotes the increase of the heat transfer capability due to the reduction in speed of the exhaust gases and the consequent increase in residence time of gases under the

cooking utensil. Additionally, it is noticed that the arrangement of the fins on the trivet is able to recover the heat that in many cases ends up being lost to the environment.

5 The above description is solely intended to describe such preferred exemplary embodiments of the grill for cooking equipment, according to the present invention. Therefore, as well comprise those skilled in the art, they are possible numerous constructive modifications variations and combinations of the elements which exert the same function substantially of the same way to achieve the same results, which are within the scope of protection defined by the appended claims.

CLAIMS

1. Grid for cooking equipment, comprising a crown (1) formed by a plurality of fins (2), CHARACTERIZED by the fact that it comprises:

at least one fin (2) formed by at least one upper projection (21) disposed on the upper face of crown (1), and at least one lower projection (22) disposed on the lower face of crown (1);

at least one lower chamber (5) defined between the lower face of crown (1) and the upper face of at least one lower crown (7);

at least one channel (4) defined between at least two lower projections (22) of at least two fins (2);

at least one channel (4) disposed within at least one lower chamber (5).

2. Grid for cooking equipment, according to claim 1, CHARACTERIZED by the fact that the lower chamber (5) comprises at least one admission inlet (51).

3. Grid for cooking equipment, according to claim 2, CHARACTERIZED by the fact that the admission inlet (51) is laterally disposed.

4. Grid for cooking equipment, according to claim 2, characterized by the fact that the admission inlet (51) is inferiorly disposed.

5. Grid for cooking equipment, according to any one of claims 1 to 4, CHARACTERIZED by the fact that the lower chamber (5) comprises an air passage chamber.

6. Grid for cooking equipment, according to any one of claims 1 to 4, CHARACTERIZED by the fact that the lower chamber (5) comprises a fuel gas passage chamber.

7. Grid for cooking equipment, according to any one of claims 1 to 4, CHARACTERIZED by the fact that the lower chamber (5) comprises a mixing chamber passage formed by air and fuel gas.

8. Grid for cooking equipment, according to claim 1, CHARACTERIZED by the fact that it also foresees at least one peripheral lower chamber (8) adjacent and in communication with the at least one lower chamber (5).

9. Grid for cooking equipment, according to claim 1, CHARACTERIZED by the fact that at least one fin (2) has its upper projection (21) and its lower projection (22) physically integrated to crown (1).

10. Grid for cooking equipment, according to claim 1, CHARACTERIZED by the fact that at least one fin (2) is modular to crown (1).

11. Grid for cooking equipment, according to claim 1, CHARACTERIZED by the fact that at least one lower projection (22) of at least one fin (2) is integrally extended along the height of lower chamber (5).

12. Grid for cooking equipment, according to claim 1, CHARACTERIZED by the fact that at least one lower projection (22) of at least one fin (2) is partially extended along the height of lower chamber (5).

13. Grid for cooking equipment, according to claim 1, CHARACTERIZED by the fact
5 that lower crown (7) comprises the cooking table of a cooking equipment.

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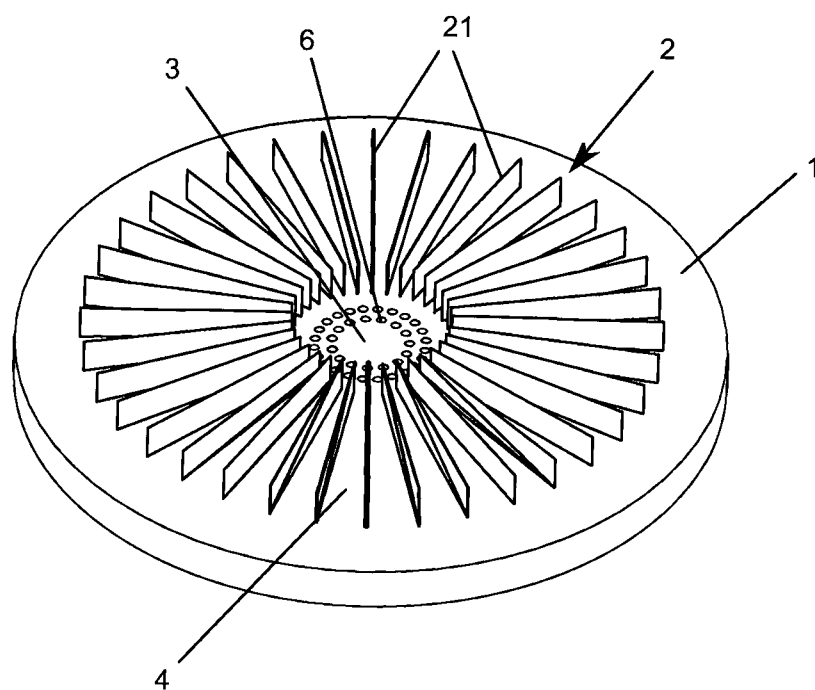


FIG. 1

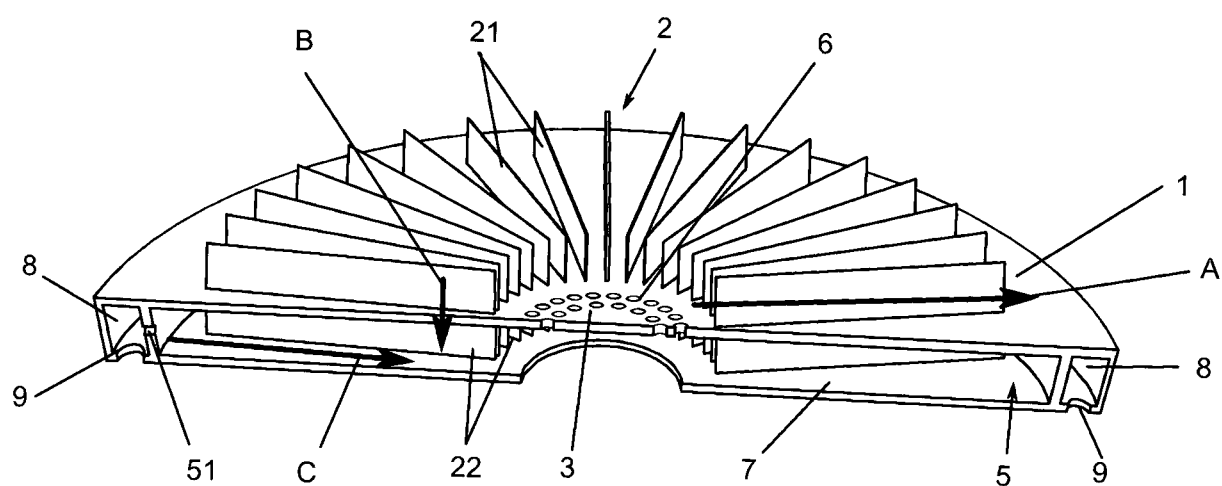


FIG. 2

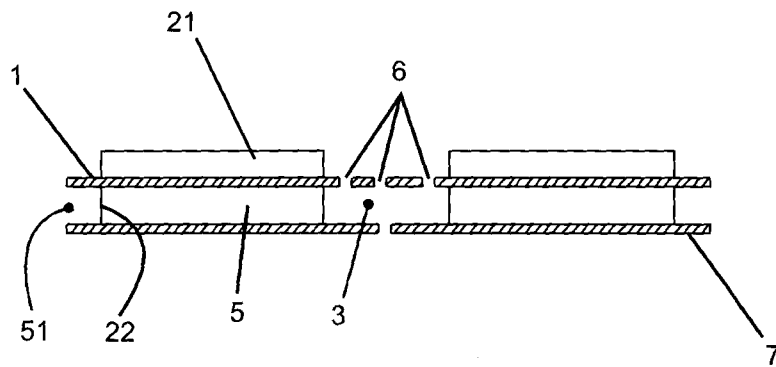


FIG. 3.1

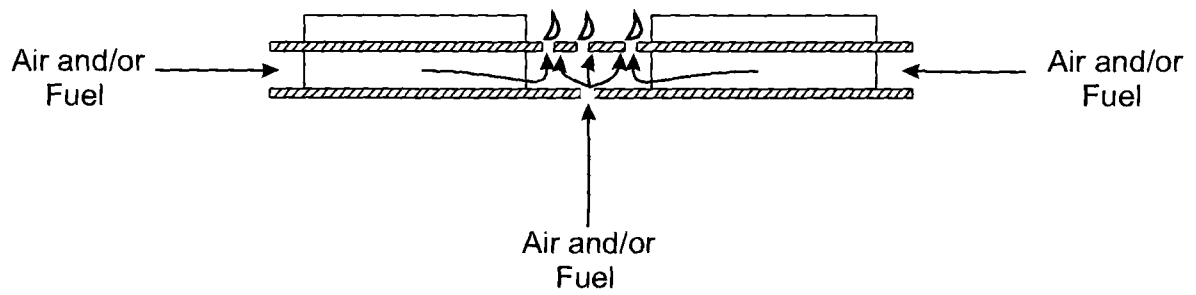


FIG. 3.2

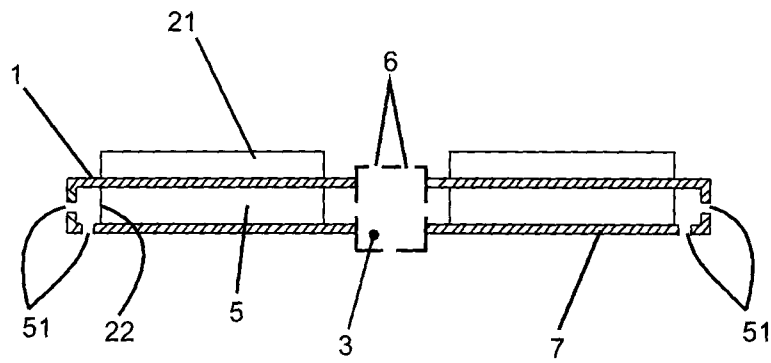


FIG. 4.1

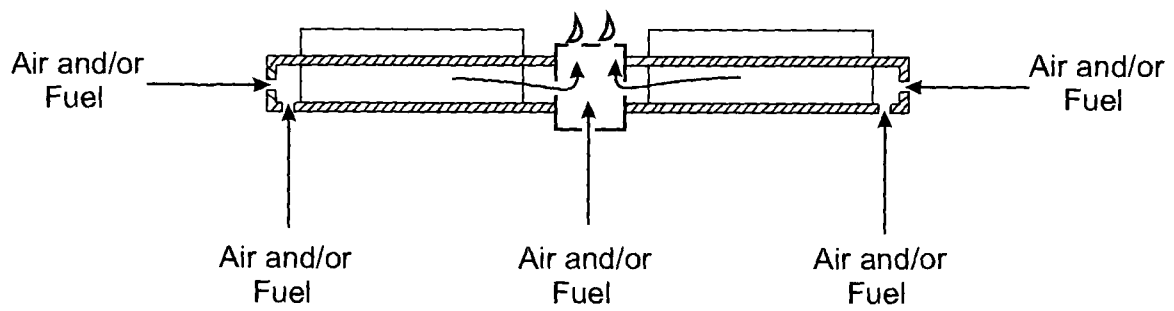


FIG. 4.2

INTERNATIONAL SEARCH REPORT

International application No
PCT/BR2012/000497

A. CLASSIFICATION OF SUBJECT MATTER
INV. F24C15/10 F23D14/66
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)
F24C F23D

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

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	NL 4 272 C (JOHANNES REIJENGA [NL]) 1 November 1919 (1919-11-01)	1-5 ,8,9 , 11
Y	the whole document	7, 13
X	JP 2007 155221 A (RINNAI KK; TOHO GAS KK; EI KEN IND CO LTD) 21 June 2007 (2007-06-21) abstract figures 2,3,7,8	1-4,6, 9-12
Y	DE 801 226 C (SEN KARL BURKHART) 28 December 1950 (1950-12-28)	7
A	page 2, column 1, line 37 - line 53; figures 1,2	1
Y	JP 61 086522 A (MATSUSHITA ELECTRIC IND CO LTD) 2 May 1986 (1986-05-02)	13
A	abstract; figure 1	1
- / - -		



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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28/03/2013

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INTERNATIONAL SEARCH REPORT

International application No
PCT/BR2012/000497

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2009 186153 A (PALOMA KOGYO KK; NAGOYA INST TECHNOLOGY) 20 August 2009 (2009-08-20) abstract; figures 1, 2 -----	1
A	JP 2007 155216 A (TOHO GAS KK; EI KEN IND CO LTD; RINNAI KK) 21 June 2007 (2007-06-21) abstract; figures 5, 6 -----	1
A	GB 00865 A A.D. 1914 (EVANS WILLIAM BYRON [US]) 26 February 1914 (1914-02-26) the whole document -----	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/BR2012/000497

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
NL 4272	C	01-11-1919	NONE

JP 2007155221	A	21-06-2007	JP 4704900 B2 22-06-2011
			JP 2007155221 A 21-06-2007

DE 801226	C	28-12 -1950	NONE

JP 61086522	A	02-05 -1986	NONE

JP 2009186153	A	20-08 -2009	NONE

JP 2007155216	A	21-06 -2007	JP 4694955 B2 08-06- -2011
			JP 2007155216 A 21-06- -2007

GB 191400865	A	26-02 -1914	NONE
