



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
27.11.2002 Bulletin 2002/48

(51) Int Cl.7: **F23H 13/02**, F23B 1/16,
F23J 1/00, F23H 15/00,
F23N 5/02

(21) Application number: **02011338.7**

(22) Date of filing: **23.05.2002**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR
Designated Extension States:
AL LT LV MK RO SI

(72) Inventor: **Perin, Sergio**
33080 Porcia (IT)

(74) Representative: **Petraz, Gilberto et al**
GLP S.r.l.
Piazzale Cavedalis 6/2
33100 Udine (IT)

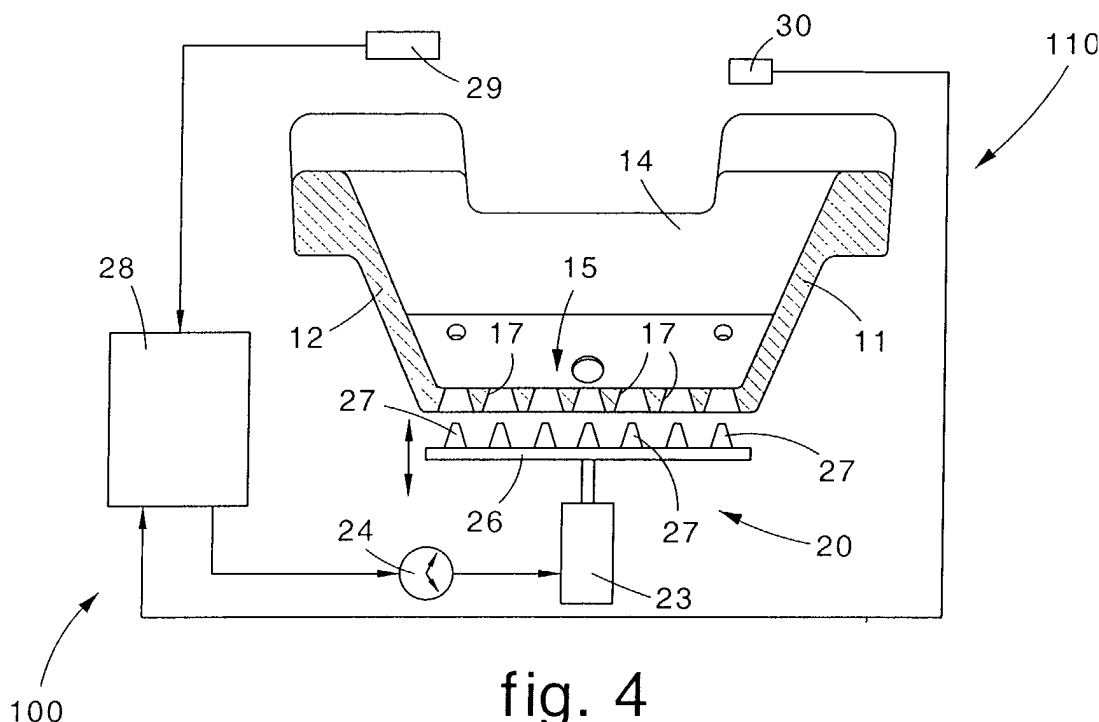
(30) Priority: **25.05.2001 IT UD20010096**

(71) Applicant: **PALAZZETTI LELIO SPA**
I-33080 Porcia (PN) (IT)

(54) **Device and method to remove impurities, ash or similar from a brazier for heaters**

(57) Device and method to remove impurities, ash (31) or similar from a brazier for heaters (10, 110, 210), the brazier comprising a base wall (15) including through apertures (17) for the passage of air. The device comprises agitator means (20) in cooperation with part of the base wall (15) to shake and selectively remove impurities, such as ash, soot or similar, which have been deposited on the base wall (15) and at least partly oc-

cluding the apertures (17). The device comprises motorized drive means (23) associated with the agitator means (20) and able to be selectively driven by a control center (28), the device also comprising detection means (29, 30, 32) to detect at least an operating condition of the heater, during the functioning thereof, able to send signals to the control center (28) to command the selective drive of the agitator means (20).



Description

FIELD OF THE INVENTION

[0001] The invention concerns a device and a method to remove impurities, ash or similar from a brazier for heaters, wherein this brazier is arranged between an upper combustion chamber and a lower intake chamber.

[0002] This brazier functions as a container for the fuel of the heater, for example in pellet form, that is, substantially cylindrical wood-based particles, or chips, bio-masses, wood logs or other suitable fuel.

[0003] At least on its base wall, this brazier has a plurality of apertures able to allow the air to pass which triggers and feeds combustion.

[0004] The brazier has agitator means associated with at least part of said base wall and able to shake and selectively remove the impurities, such as for example ash, soot or similar, which are deposited and accumulate on the bottom of the brazier as combustion proceeds.

[0005] The present invention is characterized in that said agitator means are associated with at least a motorized actuator with a selective drive governed automatically by the detection of at least an operating condition detected inside the heater during the functioning thereof.

BACKGROUND OF THE INVENTION

[0006] There are known heaters wherein, between an upper combustion chamber and a lower intake chamber, a brazier is arranged to contain the fuel, for example consisting of pellets, chips, bio-masses, wood logs or other suitable fuel.

[0007] This brazier is usually concave in shape and comprises at least a substantially vertical or sub-vertical lateral wall and a base wall. On the walls of the brazier there is a plurality of apertures able to permit the passage of air which triggers and feeds the combustion of the fuel located inside the brazier.

[0008] The apertures on the vertical walls also have the function of allowing a part of the comburent air to affect an intermediate zone of the flame and to contribute to the combustion process of the unburnt noxious gases.

[0009] As combustion proceeds, on the base wall of the brazier impurities are produced and build up, such as ash, soot or suchlike, which as time passes become compact and form a sort of layer which blocks the apertures and considerably reduces the passage of air.

[0010] To keep the intensity of the flame substantially constant, this problem makes necessary to increase the flow of air intake, but this on the one hand causes a greater energy consumption and on the other hand a greater emission of polluting substances, for example carbon monoxide.

[0011] Moreover the heater progressively loses func-

tionality and obliges the user, in the long term, to switch off the heater in order to clean the brazier carefully.

[0012] Document DE-C-17109 discloses a heater with a grid for the fuel having a plurality of holes on the bottom. Under the grid there is a plate which has a plurality of pins on its upper surface; there are as many pins as there are holes in the grid, and they are in the same position thereas. This plate can be raised manually by means of a lever, taking the relative pins through the holes of the grid to break and distribute the coal and slag which are above the grid, and to allow the ash to fall through apertures which are at the side of these pins.

[0013] Document DE-C-24023 describes a heater with a grid for the fuel where the grid is cleaned by means of using a revolving cross equipped with teeth which, by activating a lever, are inserted between the rings of the grid with an oscillating movement.

[0014] These documents not only provide only a manual drive for the agitator means, which are therefore completely and exclusively dependent on human intervention, but also they do not provide any functional connection between the times and methods of driving the agitator means and the real functioning of the heater; therefore, this causes that the interventions can be either too frequent or too infrequent, but in both cases there is a reduction in efficiency and a deterioration of the functioning conditions of the heater.

[0015] JP-A-56149511 provides a motor able to act on a kinematism which causes an alternate movement on a horizontal plane of the grid which supports the fuel; this document does not provide to use auxiliary agitator means associated with the base of the grid.

[0016] The present Applicant has devised and embodied this invention to overcome these shortcomings of the state of the art and to obtain further advantages.

SUMMARY OF THE INVENTION

[0017] The invention is set forth and characterized essentially in the main claims, while the dependent claims describe other innovative characteristics of the invention.

[0018] One purpose of the invention is to achieve a device applicable to a brazier for heaters, for example of the type using pellets, chips, bio-masses or other type of suitable fuel, which will allow to automatically overcome the disadvantage of the formation of thick layers of impurities and ash which partly occlude the apertures through which the air passes.

[0019] The brazier for heaters according to the invention comprises at least a base wall, on which a plurality of through apertures are made able to allow the air to pass.

[0020] According to one characteristic of the invention, automatically driven agitator means are provided in cooperation with at least part of said base wall to agitate and selectively remove the impurities, due to combustion, which are deposited and accumulate on said

base wall and partly occlude the relative through apertures.

[0021] According to the invention, said agitator means are associated with motorized drive means which, in one embodiment, are governed by the command of timer means, programmed to selectively carry out cycles to agitate and remove the impurities on the bottom of the brazier.

[0022] According to the invention, the device comprises at least a control unit able to receive information concerning at least one parameter of the real functioning of the heater; this information is found by at least a detector means which sends the data detected to the control unit for the selective command of the motorized drive means.

[0023] In a first embodiment, said motorized drive means are governed by means to detect the flow rate of the air passing through the brazier.

[0024] In a further embodiment, the motorized drive means are governed by means to detect the concentrations of gases produced by combustion.

[0025] According to a further embodiment, said motorized drive means are governed by means, for example optical sensors and/or level sensors, to detect the quantity of ash or impurities on the bottom of the brazier.

[0026] The motorized drive means can consist of any type of actuator, for example pneumatic, hydraulic, oil-dynamic, or otherwise.

[0027] According to a first form of embodiment, the agitator means consist of movable elements which partly constitute said base wall; said movable elements are able to be selectively moved, for example simultaneously and with an alternating movement, on a plane substantially parallel to the plane defined by said base wall.

[0028] By making a repeated alternate movement of said movable elements, at desired intervals of time, we obtain the effect of shaking and breaking the thick layer of impurities which forms on the base wall, or bottom, of the brazier.

[0029] In a second form of embodiment, the agitator means comprise plate means arranged below the base wall of the brazier and on which pin elements are fixed, facing upwards and able to be inserted alternately in the through apertures present in the base wall.

[0030] According to another form of embodiment, the base wall is made as a separate body from the lateral wall and can be made to move alternately in order to remove the impurities and free the through apertures.

[0031] The brazier according to the invention, therefore, does not oblige the user to switch off the heater in order to clean it, or to increase the quantity of air introduced, since the selective and automatic drive of said agitator means, functionally connected to the real operating conditions of the heater itself, allows to selectively and automatically remove the impurities which have accumulated on the bottom, thus ensuring an efficient and constant passage of air for combustion.

BRIEF DESCRIPTION OF THE DRAWINGS

[0032] These and other characteristics of the invention will be apparent from the following description of some preferential forms of embodiment, given as a non-restrictive example with reference to the attached drawings, wherein:

- Fig. 1 is a plane view of a first form of embodiment of the brazier for heater used in the device to remove impurities and ash according to the invention;
- Fig. 2 is a section from A to A of Fig. 1;
- Fig. 3 is a section from B to B of Fig. 1;
- Fig. 4 is a section of a second form of embodiment of the brazier used in the device according to the invention;
- Fig. 5 is a section of a third form of embodiment of the invention.

DETAILED DESCRIPTION OF SOME PREFERENTIAL FORMS OF EMBODIMENT OF THE INVENTION

[0033] With reference to the Figures, the device 100 to remove impurities, ash or similar is applied to a brazier 10 for heaters, for example of the type using pellets, of a conventional type and not shown in the drawings, which has a substantially parallelepiped shape defined by a base wall 15 and four erect walls, respectively lateral 11, 12 and front 13, 14.

[0034] A plurality of apertures 17 are made on the base wall 15 and, during use, are able to allow comburent air to pass, to trigger and feed combustion.

[0035] In the embodiment shown in Figs. 1-3, the base wall 15 is conformed as a grid with elements parallel to the front elements 13, 14, and consists of a plurality of fixed elements 25, each alternating with movable elements 21 which are connected, at one end, to a cross-piece 22. Said movable elements 21, in this embodiment, constitute the agitator means 20 of the base wall 15.

[0036] These movable elements 21 partly define said base wall 15 and intersect it longitudinally in the spaces defined between said fixed elements 25. Said movable elements 21 are able to be moved in alternation, in this case, by means of a motorized linear actuator 23, the rod 23a of which is fixed to the cross-piece 22.

[0037] By driving said movable elements 21 with respect to the fixed elements 25, we obtain the effect of agitating and breaking the thick layer of ash and soot which forms on the base wall 15 and, in particular, freeing from occlusion the apertures defined between said elements 25 and 21 through which the air passes.

[0038] In this way, the air passing from below the brazier 10 can keep up a substantially constant flow and, consequently, the flame can maintain a substantially constant intensity.

[0039] In one embodiment of the invention, the motorized actuator 23 is selectively driven by a user by

means of external command means, for example a button or switch of any type.

[0040] In the embodiment shown in Fig. 2, the actuator is governed by the command of a timer 24 by means of which a user can set desired periodic cycles to drive said movable elements 21.

[0041] The timer 24, which can be commanded by the control center 28 which manages the functioning of the entire heater where the brazier 10 is located, or by an autonomous command unit, is advantageously of the programmable type, so as to permit a desired regulation of the frequency and intervals at which said movable elements 21 are driven, according to the methods of functioning of the heater.

[0042] According to a characterizing feature of the present invention, the motorized actuator 23 is governed in feedback according to the detection of one or more signals indicative of the real functioning of the heater which allow to obtain information regarding the formation of a thicker or thinner layer of ash and soot on the base wall 15.

[0043] In a first embodiment, said signals indicate the flow rate of the air passing through said brazier 10. To be more exact, as shown in Fig. 4, the device 100 comprises a flow rate sensor 29, arranged downstream of the brazier 110 and able to detect the flow rate of air passing through the brazier 110, and to transmit to the control center 28 a signal relating to said detection. When the value of the flow rate of air reaches a pre-set lower threshold value, this is considered indicative of a high level of blockage in the apertures 17 of the brazier 10; therefore, the control center 28 commands the actuator 23 to be driven, for a time which can be programmed by the timer 24, to remove the impurities from said apertures 17 and thus restore correct conditions for the passage of air.

[0044] In another embodiment, said signals indicate the concentration of the gases produced by combustion; in this case, in a substantially identical manner to the previous embodiment, the device 100 comprises a sensor 30 able to detect the concentration of combustion gases produced downstream of the brazier 10 and to send the relative information to the control center 28. Based on the analysis of said gases, said center 28 is able to recognize the presence of an anomalous functioning condition caused by an at least partial blockage of the apertures 17 of the brazier 10 and consequently to activate the motorized actuator 23 to remove the impurities from the bottom of the brazier 10.

[0045] In yet another embodiment, shown in Fig. 2, said signals indicate the quantity of ash or soot 31 which has been deposited on the base wall 15. In this case, the device 100 comprises a sensor 32, for example of the optical type, level type or other suitable type, able to detect the level reached by the layer of ash 31 which accumulates on the bottom of the brazier 10 and to send the relative signal to the control center 28 which, when a maximum threshold level has been reached, com-

mands the actuator 23 to be driven to remove the ash and to free the apertures 17 from blockage.

[0046] In another embodiment, as shown in Fig. 4, a brazier 110, substantially identical in shape to that shown in Fig. 1, has a base wall 15 on which apertures 17 are made, in this case substantially circular, for the passage of comburent air.

[0047] The agitator means 20 comprise, in this case, a plate 26, arranged below the base wall 15, on which pins 27 are mounted facing upwards in spatial correspondence with said apertures 17.

[0048] The plate 26 is able to be selectively and alternately taken from a first lowered position wherein it does not interfere with said base wall 15, to a raised position wherein the pins 27 are taken inside the relative apertures 17. The alternate movement of the plate 26 is achieved by a linear actuator 23, which is associated with a timer 24 which, as in the embodiment described above, defines the timing of the drive.

[0049] In this case too, the introduction of the pins 27 into the relative apertures 17 causes the thick layer of ash and soot which has formed during combustion on the base wall 15 to be agitated and broken, thus obtaining the desired result.

[0050] In a third preferential embodiment, shown in Fig. 5, the brazier 210 is substantially cylindrical in shape and comprises a base wall 15 mounted rotatory with respect to an erect lateral wall 11; the base wall 15 and the lateral wall 11 are in this case made as two separate bodies. In this case too, at least the base wall 15 has apertures 17 able to allow the comburent air to pass.

[0051] Since it can rotate with respect to the lateral wall 11, the base wall 15 can be made to rotate, selectively and alternately, around a median axis "X", for example by means of an electric motor, a circular actuator, or other means which are not shown in the Figures, to remove the impurities deposited thereon.

[0052] Advantageously, in cooperation with the upper face of said base wall 15, there are scraper means, for example fixed to the lateral wall 11, to increase the capacity to agitate and remove the impurities which have deposited and accumulated on the base wall 15.

[0053] It is obvious, however, that modifications and/or additions of parts can be made to the brazier 10, 110, 210 as described heretofore, without departing from the field and scope of the present invention.

[0054] It is also obvious that, although the invention has been described with reference to specific examples, a person of skill in the art shall certainly be able to achieve many other equivalent forms of the brazier for heaters 10, 110, 210, all of which shall come within the field of the present invention.

Claims

1. Device to remove impurities, ash (31) or similar from a brazier for heaters (10, 110, 210), the brazier

comprising at least a base wall (15), said base wall (15) including through apertures (17) for the passage of air, the device comprising agitator means (20) in cooperation with at least part of said base wall (15) to shake and selectively remove impurities, such as ash, soot or similar, which have been deposited on said base wall (15) and at least partly occluding said apertures (17), **characterized in that** it comprises at least motorized drive means (23) associated with said agitator means (20) and able to be selectively driven by a control center (28), the device also comprising detection means (29, 30, 32) to detect at least an operating condition of the heater, during the functioning thereof, able to send signals to said control center (28) to command the selective drive of said agitator means (20).

2. Device as in claim 1, **characterized in that** said detection means comprise at least a flow rate sensor (29) arranged downstream of said brazier (10, 110, 210) in the direction of the passage of air and able to send to said control center (28) a signal relating to the value of said flow rate for the selective command of said motorized actuator (23) associated with said agitator means (20).

3. Device as in claim 1, **characterized in that** said detection means comprise at least a sensor (30) able to detect the concentration of the combustion gases, arranged downstream of said brazier (10, 110, 210) in the direction of the passage of air and able to send to said control center (28) a signal relating to said concentration of gases for the selective command of said motorized actuator (23) associated with said agitator means (20).

4. Device as in claim 1, **characterized in that** said detection means comprise at least a level sensor (32) arranged in cooperation with at least a wall of said brazier (10, 110, 210) and able to send to said control center (28) a signal relating to the value of the level of impurities, ash or similar which have been deposited on said base wall (15) for the selective command of said motorized actuator (23) associated with said agitator means (20).

5. Device as in claim 1, **characterized in that** said agitator means (20) consist of movable elements (21) able to define at least part of said base wall (15).

6. Device as in claim 5, **characterized in that** said base wall (15) is conformed as a grid and comprises a plurality of fixed elements (25) arranged in cooperation with said movable elements (21).

7. Device as in claim 5 or 6, **characterized in that** one end of said movable elements (21) is fixed to a cross-piece (22) able to be associated with drive

means.

8. Device as in claim 1, **characterized in that** said agitator means (20) comprise pin means (27) able to be selectively inserted inside said apertures (17) present on said base wall (15).

9. Device as in claim 8, **characterized in that** said pin means (27) are arranged on plate means (26) positioned below said base wall (15) and associated with drive means able to move them selectively from a position of non-interference to a position of cooperation with said base wall (15) wherein said pin means (27) are at least partly inserted inside said apertures (17).

10. Device as in claim 1, **characterized in that** said agitator means (20) comprise said base wall (15) made as a separate body from said lateral wall (11) and associated with drive means able to make it selectively move with respect to said lateral wall (11).

11. Device as in claim 10, **characterized in that** said base wall (15) is associated with scraper means fixed to said lateral wall (11).

12. Device as in claim 1, **characterized in that** said motorized drive means (23) are governed by timer means (24) able to define the frequency at which said agitator means (20) are driven.

13. Device as in claim 1, **characterized in that** said drive means (23) consist of an electric motor.

14. Device as in claim 1, **characterized in that** said drive means (23) consist of a hydraulic, oil-dynamic or pneumatic actuator.

15. Method to remove impurities, ash (31) or similar from a brazier for heaters, the brazier (10, 110, 210) comprising at least a base wall (15), said base wall (15) including through apertures (17) for the passage of air, agitator means (20) being included in cooperation with at least part of said base wall (15) to shake and selectively remove impurities, such as ash, soot or similar, which have been deposited on said base wall (15) and at least partly occluding said apertures (17), **characterized in that** it provides a step to detect at least an operating condition of the heater, during the functioning thereof, performed by detection means (29, 30, 32), a step to send, from said detection means (29, 30, 32) to a control center (28), at least a signal indicative of said operating condition of the heater, and a step to selectively drive motorized drive means (23) to command said agitator means (20) when said control center (28) detects a functioning condition which does not correspond to a correct functioning condition.

16. Method as in claim 15, **characterized in that** said detection step provides to detect the flow rate of air passing through said brazier (10, 110, 210), said control center (28) driving said motorized drive means (23) to command said agitator means (20) when the value detected of said flow rate of air reaches a pre-set lower threshold value. 5
17. Method as in claim 15, **characterized in that** said detection step provides to analyze the content of the combustion gases downstream of said brazier (10, 110, 210), said control center (28) driving said motorized drive means (23) to command said agitator means (20) when said analysis of the gases detects the presence of an anomalous condition due to an at least partial blockage of said apertures (17). 10 15
18. Method as in claim 15, **characterized in that** said detection step provides to detect the level of impurities, ash or similar which have accumulated on said base wall (15), said control center (28) driving said motorized drive means (23) to command said agitator means (20) when the value detected of said level of impurities, ash or similar reaches a pre-set maximum threshold value. 20 25

30

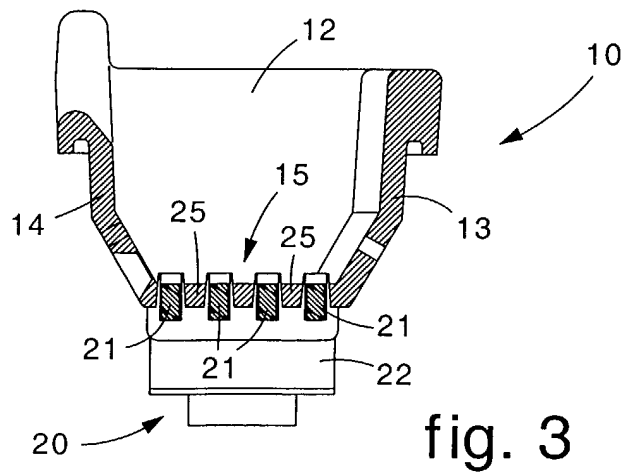
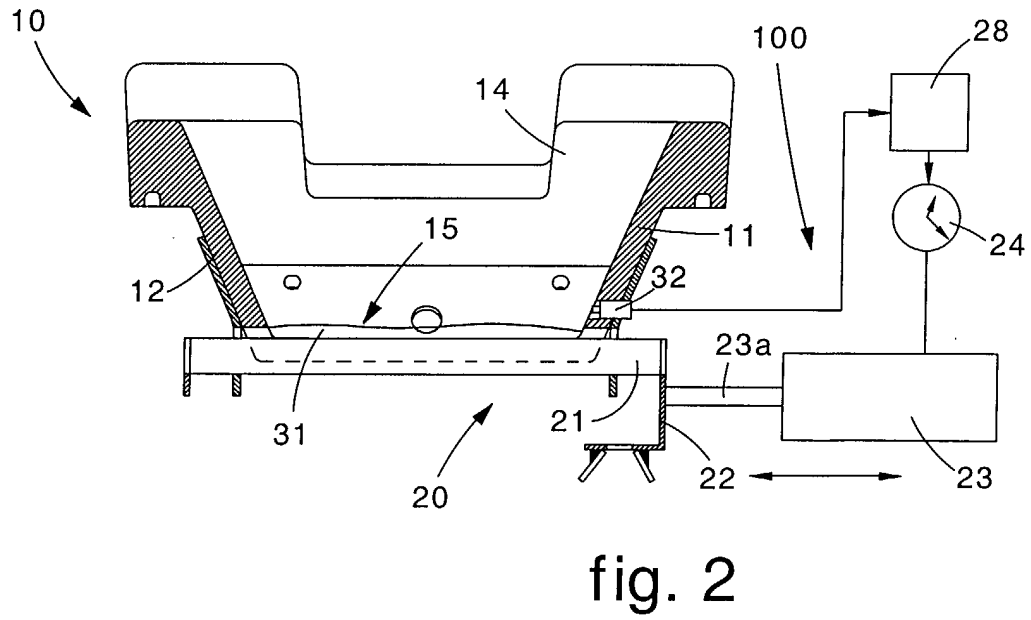
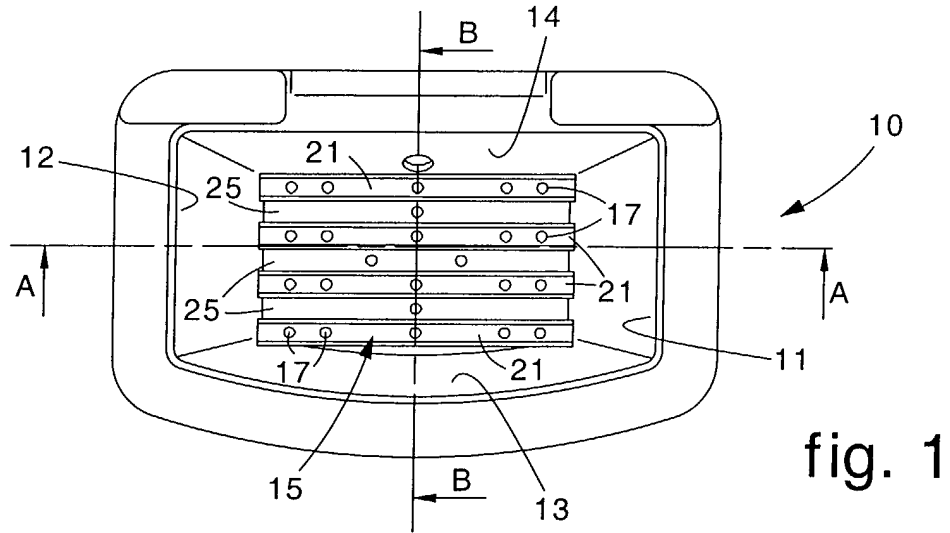
35

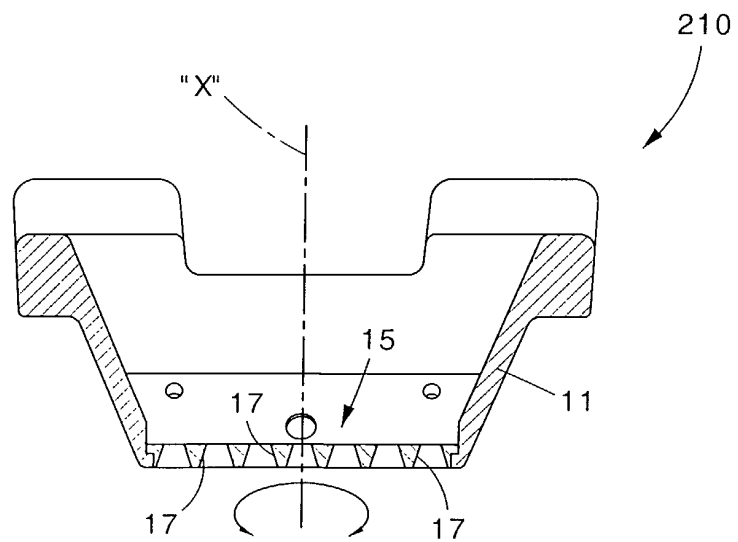
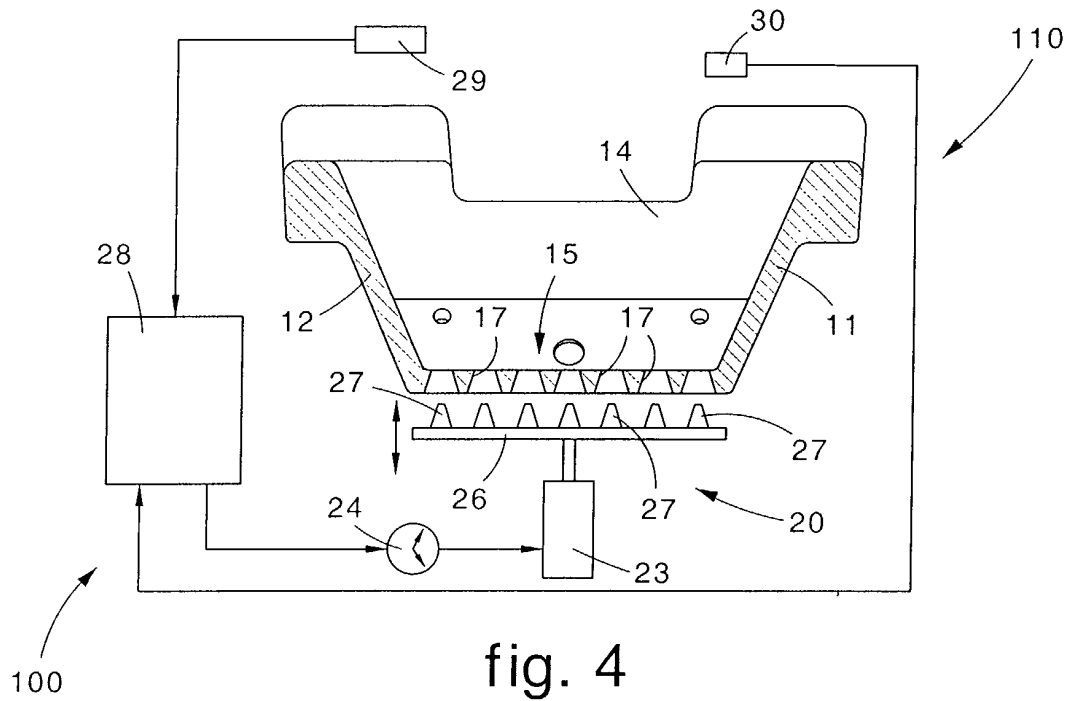
40

45

50

55







European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 01 1338

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Y,D	PATENT ABSTRACTS OF JAPAN vol. 006, no. 033 (M-114), 27 February 1982 (1982-02-27) & JP 56 149511 A (TOSHIBA ELECTRIC APPLIANCE CO LTD), 19 November 1981 (1981-11-19) * abstract *	1,10,12, 13,15	F23H13/02 F23B1/16 F23J1/00 F23H15/00 F23N5/02
Y	GB 827 268 A (VORKAUF HEINRICH) 3 February 1960 (1960-02-03) * page 1, line 33 - line 72 * * page 1, line 87 - page 2, line 33; claims 1,3; figure 1 *	1,10,12, 13,15	
A,D	DE 17 109 C (ELTERICH) 28 February 1882 (1882-02-28) * page 1, left-hand column, line 5 - line 16 * * page 2, left-hand column, line 10 - line 33 * * page 2, left-hand column, line 52 - right-hand column, line 19 * * page 3, right-hand column, line 7 - line 43; figures 1,13-15,17-20 *	5,6,8,9, 11	
A,D	GB 2 178 523 A (AARROW DYNAMICS LIMITED) 11 February 1987 (1987-02-11) * page 1, line 58 - line 65 * * claims 1,2,5 *	5-7	
A,D	PATENT ABSTRACTS OF JAPAN vol. 002, no. 119 (M-035), 4 October 1978 (1978-10-04) & JP 53 087582 A (KAWASAKI HEAVY IND LTD), 2 August 1978 (1978-08-02) * abstract *	14	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 25 September 2002	Examiner Coli, E
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P4/C01)



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 01 1338

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	US 4 313 387 A (SATO KANICHI) 2 February 1982 (1982-02-02) * column 2, line 30 - line 44 * * column 3, line 5 - line 34; figures 5,6 *	1,15	
A	EP 0 915 289 A (PYRO IND INC) 12 May 1999 (1999-05-12) * column 7, paragraphs 29,30 * * column 9, line 34 - line 57 * * column 10, line 14 - line 37; figures 2,4,5 *	1,15	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 25 September 2002	Examiner Coli, E
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03 82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 02 01 1338

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

25-09-2002

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
JP 56149511	A	19-11-1981	NONE		
GB 827268	A	03-02-1960	NONE		
DE 17109	C		NONE		
GB 2178523	A	11-02-1987	GB	2149908 A	19-06-1985
JP 53087582	A	02-08-1978	NONE		
US 4313387	A	02-02-1982	NZ	195508 A	20-03-1985
EP 0915289	A	12-05-1999	US	5893358 A	13-04-1999
			EP	0915289 A2	12-05-1999
			NO	985121 A	05-05-1999