



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
24.06.2009 Bulletin 2009/26

(51) Int Cl.:
F24C 3/08 (2006.01) F24C 15/10 (2006.01)

(21) Application number: **07425792.4**

(22) Date of filing: **17.12.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS
(71) Applicant: **Candy S.p.A.**
20052 Monza (MI) (IT)

(72) Inventor: **Fumagalli, Silvano**
20052 Monza (MI) (IT)
(74) Representative: **Leihkauf, Steffen Falk et al**
Jacobacci & Partners S.p.A.
Via Senato, 8
20121 Milano (IT)

(54) **Household gas cooktop**

(57) A household gas cooktop (1) comprises a supporting and containing structure (2) with an upper wall (3) having an on-sight surface (4), one or more support members (5) arranged at the upper wall (3) and defining a support plane (6) for the containers to be heated, the support plane (6) being on the side of the on-sight surface (4) of the upper wall (3), one or more combustion units (7) arranged at the upper wall (3) and being so configured as to generate flames in the space (8) between the on-

sight surface (4) and the support plane (6), a gas supply system (30, 31, 32, 33) so configured as to supply a gas flow (34) to the combustion unit (7). The gas cooktop further comprises a forced suction group (9) adapted to suck a secondary air volume (10) and a ventilation duct (11) connecting the forced suction group (9) to the combustion unit (7) so as to be able to supply the secondary air flow (10) to the combustion unit (7). The ventilation duct (11) extends at least partially on a lower side (12) of the upper wall (3) opposite the on-sight surface (4).

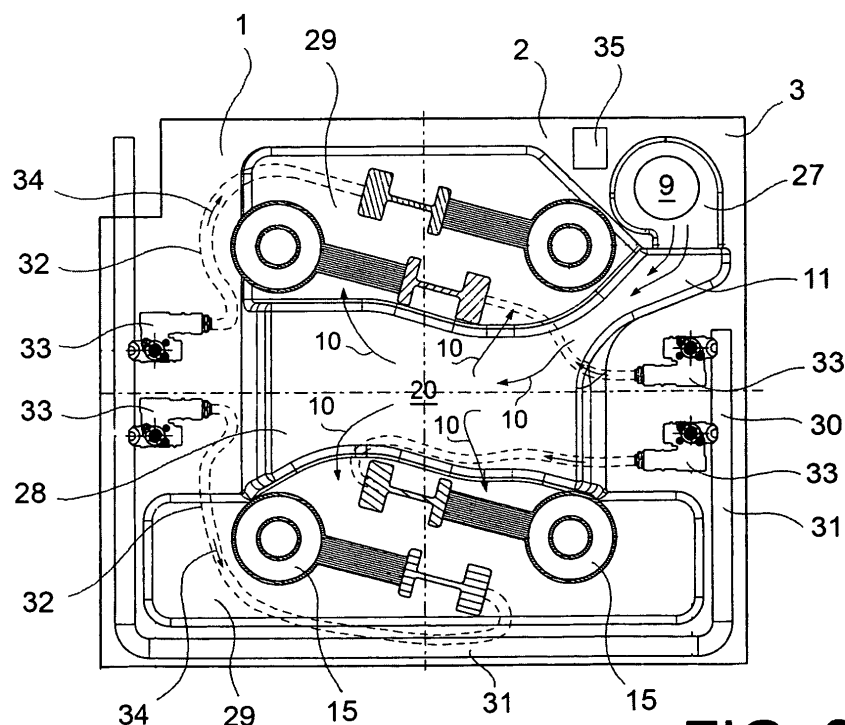


FIG. 3

Description

[0001] The present invention relates to a household gas cooktop.

[0002] A gas cooktop is known to comprise a supporting and containing structure having an upper wall with an upwardly faced on-sight surface, a support grid arranged on the on-sight surface which defines a plane to support containers to be heated, e.g. pots, and one or more fuel gas burners so configured as to generate a series of flames in the gap between the on-sight surface and the support plane, in order to heat the containers supported by the support grid.

[0003] Known burners for gas cooktops usually comprise a main gas supply duct connectable to an external fuel gas source, for example to the gas pipe network or a gas cylinder. One or more combustion units are connected to the main duct through one or more gas partial ducts, respectively. A regulating valve (usually called the gas tap) is associated to each of the gas partial ducts, which is so configured as to regulate the gas passage through the partial duct between a closed position and a maximum opened position. Beside the regulating valve, a safety valve is provided to cut the gas passage off through the partial duct in response to a signal indicative of an incorrect operation of the combustion unit. Such safety valve can be arranged upstream or downstream the regulating valve (in relation to the gas flow direction from the main duct to the combustion unit), or integrated in the valve body of the regulating valve.

[0004] In known household gas cooktops, the burner is a non-aerated burner, or an atmospheric air burner (called induced air burner), in which a venturi tube mixer is provided which is arranged in the partial duct upstream the combustion unit and adapted to suck a primary air amount in the gas partial flux. A further volume of secondary air is needed for an efficient combustion, which is drawn by the same flames in the gap between the support plane (pot bottom) and the upper wall on-sight surface.

[0005] In order to achieve the most complete combustion possible, a high amount of secondary air is needed and, as a result, such gap must have a minimum clear height (currently, about 35 mm) in order to barely meet the emission reduction regulations, in particular of CO and CO₂. Consequently, the cooktops of the prior art are undesirably bulky and do not meet the needs of users who are more and more mindful of ecological sustainability, impact on health, and design of their appliances and fittings.

[0006] Therefore, object of the present invention is to provide a household gas cooktop having such characteristics as to obviate at least some of the drawbacks cited with reference to the prior art.

[0007] In the scope of the main object, a further object of the present invention is to propose a household gas cooktop which allows a drastic reduction of CO and CO₂ emissions during operation.

[0008] A still further object of the present invention is to propose a household gas cooktop which allows reducing the distance between the support plane (pot bottom) and the on-sight surface, in order to permit innovative design solutions.

[0009] These and other objects are achieved by a household gas cooktop according to the claim 1.

[0010] Advantageous embodiments are the object of the dependant claims.

[0011] In order to better understand the present invention and appreciate the advantages thereof, some embodiments thereof will be described below, by way of non-limiting example, with reference to the annexed Figures, in which:

[0012] Fig. 1 is a perspective view of a gas cooktop according to an embodiment of the invention,

[0013] Fig. 2 is a sectional view of the cooktop in Fig. 1,

[0014] Fig. 3 is a sectional view according to the III-III line in Fig. 2,

[0015] Fig. 4 is a side view of the cooktop in Fig. 1,

[0016] With reference to the Figures, a household gas cooktop is generally indicated with the reference numeral 1. The cooktop 1 comprises a supporting and containing structure 2 with an upper wall 3 which has an on-sight surface 4. At the upper wall 3, one or more support members 5 are arranged which support the containers to be heated, for example pots, pans, coffee makers, etc., and define a support plane 6 thereof on the side of the on-sight surface 4 of the upper wall 3. One or more combustion units 7 are arranged at the upper wall 3, preferably partially projecting and partially inserted in such upper wall. The combustion units 7 are so configured as to generate flames in a space 8 between the on-sight surface 4 and the support plane 6 which, in use, matches to the pot bottom plane. The gas cooktop 1 further comprises a gas supply system 30 supported by the supporting and containing structure 2 and so configured as to be able to supply a gas flow 34 to the combustion unit 7.

[0017] According to an aspect of the invention, the gas cooktop further comprises a forced suction group, for example an electrical blower 9 adapted to suck a secondary air volume 10 through a suction opening obtained in the supporting and containing structure 2 and to convey such secondary air 10 in a ventilation duct 11 which extends in the support structure 2 (at least partially, preferably completely) beneath the on-sight surface 4. In other terms, the ventilation duct 11 preferably extends on a lower side 12 of the upper wall 3 opposite the on-sight surface 4.

[0018] The ventilation duct 11 connects the electric fan 9 to the combustion unit 7, so as to be able to supply the secondary air volume 10 to the latter.

[0019] Due to the forced feed of a secondary air flow to the combustion unit, it is possible to achieve a ratio of gas to air which is optimal for a complete combustion, independently from the space 8 height between the on-sight surface 4 and the support plane 6 for the pots. This results in a considerable reduction of the CO and CO₂

emissions, while keeping the heating power constant, and clears the way for new and more pleasant cooktop designs.

[0020] According to an embodiment of the invention, the support members 5 are formed integrally with the upper wall 3, which can be preferably manufactured by means of cast iron fusion.

[0021] According to a further advancement of the invention, part of the combustion units 7 can also be formed integrally with the upper wall 3. With reference to the example illustrated in Fig. 2, the combustion units 7 comprise a diffuser 13, which defines a plurality of gas outlet holes 14, and a base portion 15, which forms one or more distribution chambers 16, 17 adapted to spread and convey the gas flow 34 and the secondary air flow 10 to the diffuser 13. In the illustrated case, at least part of the base portion 15, 16, 17 (the so-called burner "cup") is formed integrally with the upper wall 3.

[0022] Advantageously, the whole upper wall 3, the support members 5, and the base portions 15 of the combustion units 7 are formed by means of cast iron fusion in a single piece. Beside the plain advantages in the cooktop assembling, such integration of upper wall, support members, and burner cups in a single cast iron piece markedly decreases the production cost of the whole appliance.

[0023] In accordance with an embodiment, the upper wall 3 and the diffuser 13 are shaped in such manner that a transition zone 19 between the on-sight surface 4 and an outer surface 18 of the diffuser 13 has an essentially continuous, without step progression, in order to promote the gas cooktop cleaning. This does not rule out that this transition zone 19 can have a surface interruption, or a grout line or slit between the upper wall 3 and the diffuser 13 which are preferably manufactured individually and in different materials.

[0024] In accordance with an embodiment, the ventilation duct 11 is connected to a plurality of combustion units 7 and comprises a ventilation chamber 20 essentially plate-like and extending on all the combustion units 7 which it supplies with secondary air 10.

[0025] The ventilation chamber 20 has a distribution wall 21 which defines a plurality of air outlet openings 22, each connected to a combustion unit 7. In particular, the base portions 15 of the combustion units 7 form a secondary air distribution chamber 17 and a gas distribution chamber 16, as well as a tubular portion 25 in flow connection with the secondary air distribution chambers 17 and vertically downwardly projecting. The distribution wall 21 is arranged on the lower side 12 of the upper wall 3 and shaped so as that the tubular portion 25 is inserted in the relative air outlet opening 22 or, alternatively, on an edge of such air outlet opening 22. Preferably, but not necessarily, sealing gaskets can be provided between the air outlet openings 22 and the relative tubular portions 25.

[0026] The supporting and containing structure 2 further comprises a lower wall 26 with upwardly bent outer

sides and connected, for example, glued, to the upper wall 3. The distribution wall 21 comprises, in turn, downwardly bent outer sides and connected to the lower wall or abutting against the latter, so that the lower wall 26 and the distribution wall 21 define the ventilation chamber 20. Also in this case, it can be advantageous to provide a sealing gasket, for example a rubber tape, in the junction area between the distribution wall 20 and the lower wall 26.

[0027] According to an embodiment of the invention, the blower 9 is located in a seat 27 formed by the lower wall 26 and the upper wall 3 or the air distribution wall 21, and a blower 9 suction opening is connected to a gas cooktop suction grid, while the blower outlet opening is in flow connection with the above-mentioned ventilation duct 11, particularly with the ventilation chamber 20.

[0028] With reference to an embodiment (Fig. 2 and 3), the ventilation chamber 20 which extends in the supporting and containing structure 2 plane forms a first portion 28 without said air outlet openings 22, and one or more second portions 29 with the air outlet openings 22, in which the second portions 29 have a height which is lesser than the first portion 28 height, so as to promote an even distribution of the secondary air on all the outlet openings 22.

[0029] The gas supply system 30 of the cooktop 1 comprises a main gas supply duct 31 which can be connected to an external fuel gas source. One or more partial ducts 32 connect the main duct 31 to each of the combustion units 7, and a regulating valve 33 associated to the partial duct 32 allows a regulation, preferably continuous, of the gas passage through the partial duct 32 between a closed position and a maximum opened position.

[0030] Air adduction means can be provided in the partial duct 32 which are configured so that, during operation, the gas flow 34 in the partial duct and/or the same flame draw a first volume of oxidizing primary air. The air adduction means comprise, for example, a venture tube device (not shown) with a gas passage having a throttled section portion and one or more primary air passages which open in the proximity of the throttled section portion, so that the gas acts as a driving fluid in order to draw the primary air volume in the partial gas flow 34.

[0031] In the case where the above-mentioned primary air adduction means are provided, the forced suction group 9 is advantageously configured so as to suck the secondary air 10 from a zone which is different from the zone of the primary air volume.

[0032] A control unit 35 drives the forced suction group 9 in response to an actuation of the regulating valve 33, so as to actuate the forced flow of secondary air concurrently to a gas supply to the combustion unit 7.

[0033] The household gas cooktop 1 has a number of advantages. Due to the provision of a ventilation duct 11 arranged on the lower side 12 of the upper wall 3 opposite the on-sight surface 4, the cooktop visible parts, in particular the space between the on-sight surface 4 and the support plane for the pots, can be formed in an aesthet-

ically very pleasant design, without compromising the most complete combustion possible. Furthermore, while keeping the heating power constant, the CO and CO₂ emissions turn out to be sensibly reduced compared to those of the gas cooktops of the prior art.

[0034] In fact, laboratory tests showed that, by means of a cooktop according to the invention, it is possible to reduce the space 8 height between the on-sight surface 4 and the support plane 6 from the known 35 mm to a value of 9 mm, and anyway, that it is possible to halve the CO and CO₂ emissions, while keeping the heating power of the combustion units constant.

[0035] The manufacturing of the upper wall and the support members in a single piece by means of cast iron fusion reduces the production and assembling cost and time for the cooktop.

[0036] It shall be appreciated that those skilled in the art, with the aim of meeting contingent, specific needs, will be able to make further modifications and variations to the household gas cooktop according to the present invention, which are all also covered by the protection scope of the invention, as defined by the following claims.

Claims

1. A household gas cooktop (1) comprising:

- a supporting and containing structure (2) with an upper wall (3) having an on-sight surface (4),
- one or more support members (5) arranged at said upper wall (3) and defining a support plane (6) for the containers to be heated, said support plane (6) being on the side of the on-sight surface (4) of the upper wall (3),
- one or more combustion units (7) arranged at said upper wall (3) and being so configured as to generate flames in the space (8) between said on-sight surface (4) and said support plane (6),
- a gas supply system (30, 31, 32, 33) so configured as to supply a gas flow (34) to said combustion units (7),

characterized in that it comprises:

- a forced suction group (9) adapted to suck a secondary air volume (10),
- a ventilation duct (11) which connects said forced suction group (9) to said combustion unit (7) so as to be able to supply said secondary air flow (10) to said combustion unit (7),

in which said ventilation duct (11) extends at least partially on a lower side (12) of the upper wall (3) opposite said on-sight surface (4).

2. The cooktop (1) according to claim 1, wherein said support members (5) are formed integrally with said

upper wall (3).

3. The cooktop (1) according to claim 1 or 2, wherein said combustion units (7) comprise a diffuser (13) which defines a plurality of gas outlet holes (14) and a base portion (15) which defines one or more distribution chambers (16, 17) adapted to distribute and convey the gas flow (34) and the secondary air flow (10) to said diffuser (13), wherein said base portion (15) is at least partially formed integrally with said upper wall (3).

4. The cooktop (1) according to any preceding claim, wherein said upper wall (3) is in cast iron.

5. The cooktop (1) according to any preceding claim, wherein said upper wall (3) and said support members (5) and said base portions (15) of the combustion units (7) are formed in a single cast iron piece.

6. The cooktop (1) according to any preceding claim, wherein said diffuser (13) comprises an outer surface (18) facing said support plane (6), and wherein said upper wall (3) and said diffuser (13) are shaped so that a transition zone (19) between said on-sight surface (4) and said outer surface (18) has an essentially continuous and step-less outer on-sight surface (4, 18) such as to promote the cleaning of said surfaces (4, 18).

7. The cooktop (1) according to any preceding claim, wherein said ventilation duct (11) is connected to a plurality of combustion units (7) and comprises an essentially plate-like single ventilation chamber (20) and extending on all the combustion units (7) of said plurality of combustion units, said ventilation chamber (20) comprising a distribution wall (21) defining a plurality of air outlet openings (22), each connected to a combustion unit (7).

8. The cooktop (1) according to the preceding claim, wherein said base portions (15) of the combustion units (7) form:

- a secondary air distribution chamber (17),
- a gas distribution chamber (16),
- a tubular portion (25) in flow connection with said secondary air distribution chamber (17),

wherein said tubular portion (25) is inserted in or over the edge of said air outlet opening (22) of the distribution wall (21).

9. The cooktop (1) according to claim 7 or 8, wherein said supporting and containing structure (2) comprises a lower wall (26) having outer sides which are upwardly bent and connected to said upper wall (3), wherein said distribution wall (21) of said extended

ventilation chamber (20) comprises outer sides which are downwardly bent and connected to said lower wall (26), so that said lower wall (26) and said distribution wall (21) define said extended ventilation chamber (20).

5

- 10.** The cooktop (1) according to claim 9, wherein said lower wall (26) at least partially defines a seat (27) for said forced suction group (9).

10

- 11.** Cooktop (1) according to claim 7 or one of the claims depending thereon, wherein said extended ventilation chamber (20) comprises:

- a first portion (28) without said air outlet openings (22), 15
 - one or more second portions (29) having said air outlet openings (22), said second portions (29) being in flow communication with the first portion (28) and having a height transversal to 20
- the air flow direction which is lesser than the first portion (28) height, so as to promote an even distribution of the secondary air (10) on all the outlet openings (22).

25

- 12.** The cooktop (1) according to any preceding claim, wherein said gas supply system (30) comprises:

- a main gas supply duct (31) connectable to an external fuel gas source, 30
 - one or more partial ducts (32) connecting said main duct (31) to each of said combustion units (7),
 - a regulating valve (33) so configured as to regulate the gas passage through said partial duct (32) between a closed position and a maximum 35
- opened position.

40

45

50

55

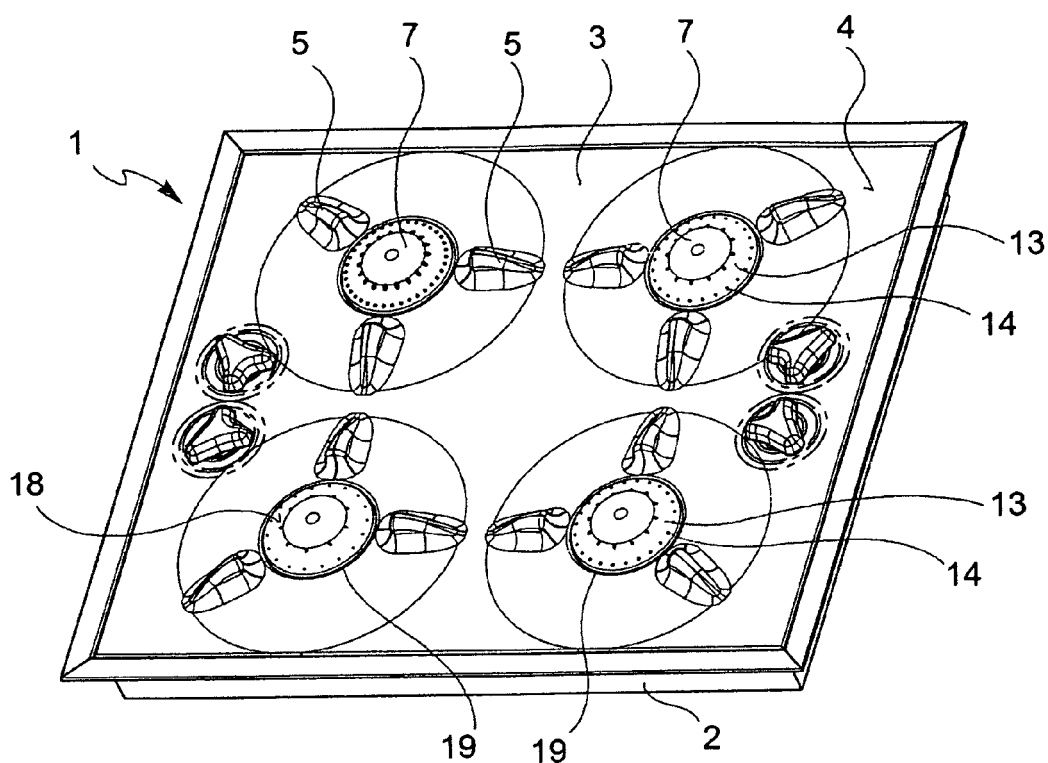


FIG. 1

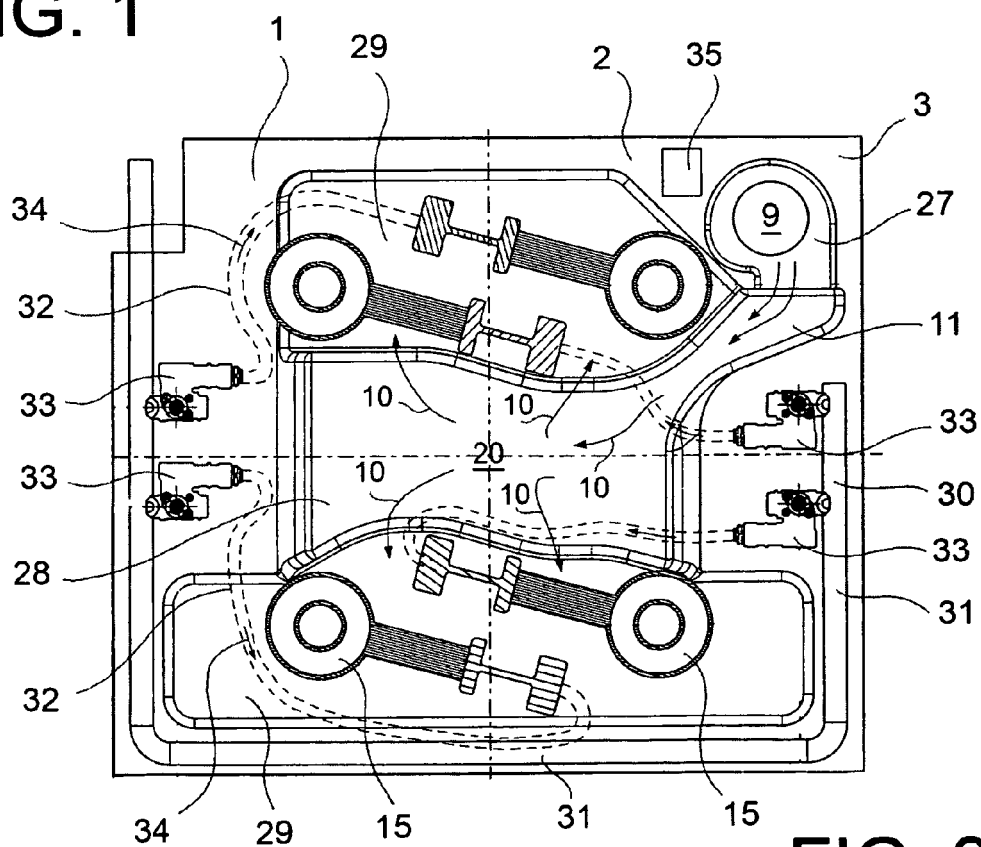


FIG. 3

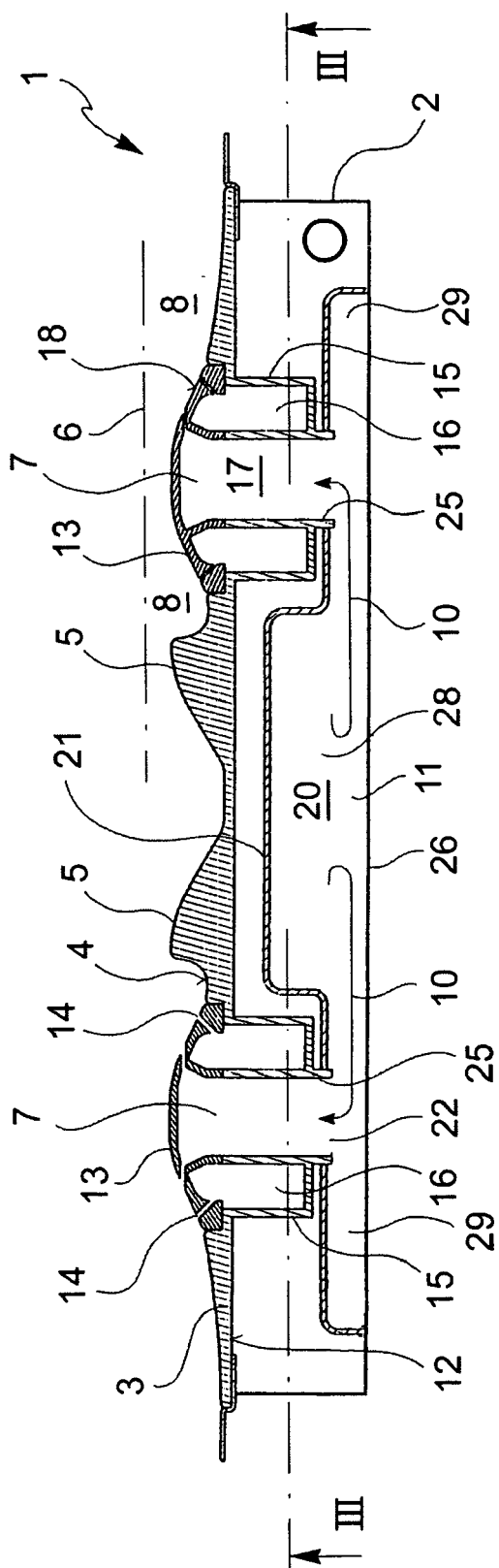


FIG. 2

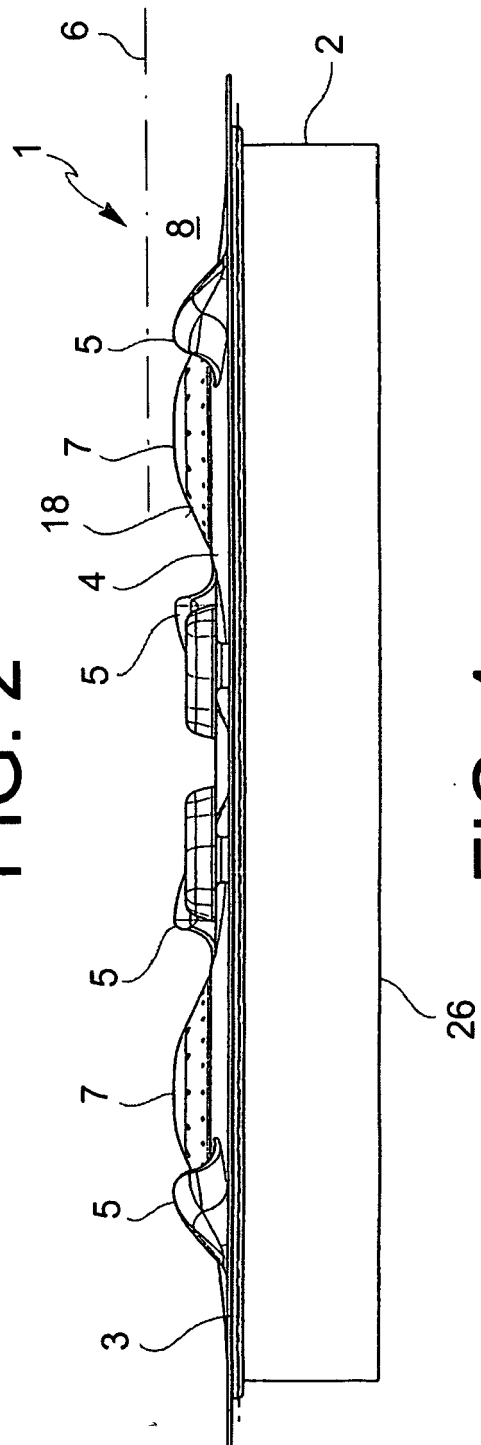


FIG. 4



EUROPEAN SEARCH REPORT

Application Number
EP 07 42 5792

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	JP 02 089917 A (SANYO ELECTRIC CO; TOKYO SANYO ELECTRIC CO) 29 March 1990 (1990-03-29) * abstract; figures *	1,7-9,12	INV. F24C3/08 F24C15/10
Y	----- * abstract; figures *	2,4-6	
X	EP 1 016 823 A (BRANDT COOKING [FR]; BUTAGAZ [FR]) 5 July 2000 (2000-07-05) * abstract; figures *	1	
Y	----- GB 474 256 A (CANNON IRON FOUNDRIES LTD; RICHARD TALBOT CLAYTON; WILFRED ERIC BENTON) 28 October 1937 (1937-10-28) * page 1, line 38 - line 47 * * page 2, line 92 - line 95; figures 1-3 *	2,4,5	
Y	----- EP 1 249 665 A (WHIRLPOOL CO [US]) 16 October 2002 (2002-10-16) * paragraphs [0009], [0014], [0017]; figures *	2	
Y	----- US 6 209 534 B1 (TAPLAN MARTIN [DE]) 3 April 2001 (2001-04-03) * column 3, line 13 - line 17; figures *	6	TECHNICAL FIELDS SEARCHED (IPC) F24C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 19 December 2008	Examiner Verdoodt, Luk
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			

 2
EPO FORM 1503 03.82 (P04C01)

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

EP 07 42 5792

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.

19-12-2008

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
JP 2089917	A	29-03-1990	JP 2074223 C	25-07-1996
			JP 7096928 B	18-10-1995

EP 1016823	A	05-07-2000	DE 69909954 D1	04-09-2003
			FR 2788111 A1	07-07-2000

GB 474256	A	28-10-1937	NONE	

EP 1249665	A	16-10-2002	DE 60122107 T2	08-02-2007
			ES 2269247 T3	01-04-2007

US 6209534	B1	03-04-2001	AT 251291 T	15-10-2003
			DE 19813691 C1	10-06-1999
			EP 0945681 A1	29-09-1999
			JP 4149075 B2	10-09-2008
			JP 11325468 A	26-11-1999

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82