



(51) International Patent Classification:
H05B 6/12 (2006.01)

(21) International Application Number:
PCT/EP201 1/003407

(22) International Filing Date:
8 July 2011 (08.07.2011)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10007089.5 9 July 2010 (09.07.2010) EP

(71) Applicant (for all designated States except US): **ELECTROLUX HOME PRODUCTS CORPORATION N. V.** [BE/BE]; Raketstraat 40, B-1130 Brussels (BE).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **CORLEONI, Francesco** [IT/IT]; Via Rossini, 6, I-47014 Meldola (IT). **REINHARD-HERRSCHER, Fabienne** [DE/DE]; Beethovenstrasse 40, 74582 Gerabronn (DE). **TISSELLI, Filippo** [IT/IT]; Via Achille Grandi, 8, I-47014 Forlimpopoli (IT).

(74) Agent: **BAUMGARTL, Gerhard**; c/o Electrolux Dienstleistungs GmbH, Group Intellectual Property, 90327 Nurnberg (DE).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

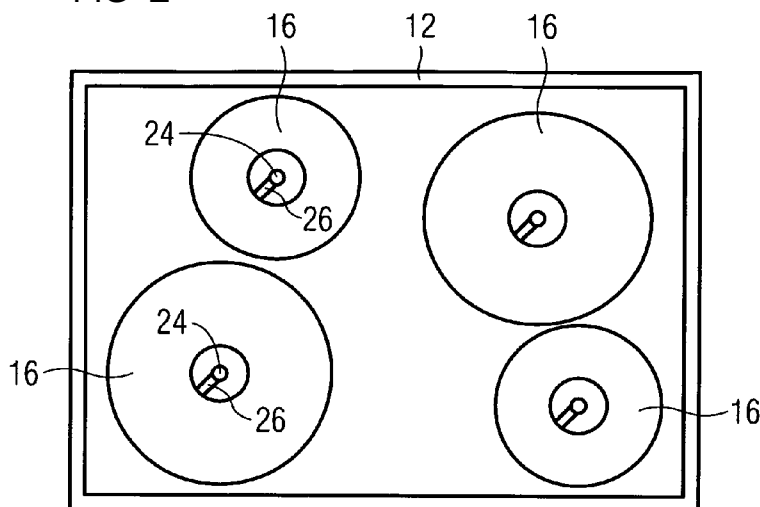
Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(H))
- of inventorship (Rule 4.17(iv))

[Continued on next page]

(54) Title: AN INDUCTION COOKING HOB WITH ILLUMINATION EQUIPMENT

FIG 1



(57) Abstract: The present invention relates to an induction cooking hob with illuminating equipment. The induction cooking hob includes a panel (10) arranged at the top side of said induction cooking hob, and a chassis (12) forming a substructure of said induction cooking hob. The panel (10) comprises at least one heating zone (14). The chassis (12) comprises at least one induction coil (16). The heating zone (14) corresponds with at least one induction coil (16). The induction cooking hob includes at least one intermediate layer (18, 20) between the panel (10) and the chassis (12). The intermediate layer (18) comprises a plurality of cut-outs (22) arranged according to a predetermined pattern within the heating zone (14). The chassis (12) comprises at least one light emitting diode (24) arranged in a central portion of the induction coil (16).

Published:

— *with international search report (Art. 21(3))*

Description

An induction cooking hob with illumination equipment

5 The present invention relates to an induction cooking hob with illumination equipment according to the preamble of claim 1.

On the induction cooking hob the heating elements, i.e. the inductions coils, are arranged within a chassis and below a panel
10 of said induction cooking hob. The heating elements and the corresponding heating zones are not visible by the user. Thus, the user cannot see the positions and sizes of the heating zones. Further, since the inductions coils do not radiate any heat, the user cannot determine if the heating elements are activated or
15 not .

In known induction cooking hobs with illumination equipment the light sources are installed in a very complex way. For example, light sources with reflectors are used below the panel of the
20 induction cooking hob. In other solutions, illuminating rings made out of light guiding material or multiple single light emitting diodes enclose the heating zones.

It is an object of the present invention to provide an induction
25 cooking hob with illumination equipment, which has low complexity and low cost of materials.

The object of the present invention is achieved by the induction cooking hob according to claim 1.

30 According to the present invention the intermediate layer between the induction coils and the stove top material comprises a plurality of cut-outs arranged according to a predetermined pattern within the heating zone, and the chassis comprises at least
35 one light emitting diode arranged in a central portion of the

induction coil, wherein the light emitting diode corresponds with at least one cut-out.

The main idea of the present invention is the arranging of the light emitting diode (LED) in the centre of the induction coil and the one or more corresponding cut-outs. This constellation allows an illumination of the heating zone on the induction cooking hob from below. The inventive induction cooking hob has a low complexity, since only the light emitting diode and a corresponding transmitting portion are required.

According to a preferred embodiment of the present invention the intermediate layer represents a printed layer applied at the lower side of the panel. The printed layer may be realized by low cost of materials.

Preferably, the printed layer is a dark coloured layer, in particular a black coloured layer. In this case, the cut-outs may be formed as blank portions of the printed layer. The dark or black coloured layer and the blank portions increase the contrast between the cut-outs and the remaining area of the panel. It should be noted, that this layer described in this context as printed, might be applied in any other feasible way.

Alternatively or additionally, the intermediate layer comprises or includes a sheet arranged between the panel and the chassis. In this case the positions of the cut-outs are independent of the panel. The panel can be designed independent of the sizes and positions of the heating zones.

In particular, the sheet is made of at least one dielectric material.

According to a preferred embodiment of the present invention the sheet is or comprises a mica layer. The mica layer is a sheet made of dielectric material.

Preferably, the cut-outs in the mica layer may be filled by a transparent dielectric material. For example, the cut-outs in the mica layer are filled by a foil or layer made of polyimide.

5

Further, the light emitting diode is fastened by a support element having low heat conductivity. Advantageously already present support elements are used, for example the support element of a temperature sensor. The support element may be used as an optical device and guide the light emitted by the LED more efficiently to the panel.

In particular, the cut-outs are shaped as slots, wherein said slots are arranged according to a predetermined pattern. For example the slots form a symbol.

15

Preferably, the panel is a glass ceramic panel.

Novel and inventive features of the present invention are set forth in the appended claims.

20

The present invention will be described in further detail with reference to the drawings, in which

FIG 1 illustrates a schematic top view of a chassis for an induction cooking hob according to a first embodiment of the present invention,

25

FIG 2 illustrates a schematic top view of the chassis for the induction cooking hob with a sheet according to the first embodiment of the present invention,

30

FIG 3 illustrates a schematic top view of the induction cooking hob with a panel according to a second embodiment of the present invention, and

35

FIG 4 illustrates a sectional partial side view of the induction cooking hob according to a third embodiment of the present invention.

5 FIG 1 illustrates a schematic top view of a chassis 12 for an induction cooking hob according to a first embodiment of the present invention. The chassis 12 is open, wherein a panel 10 and a sheet 20 are missing.

10 The chassis 12 comprises four induction coils 16 arranged as a two-by-two matrix. The induction coils 16 are formed as circular disks. In the centre of each induction coil 16 there is a circular hole. The induction coils 16 have different sizes.

15 The chassis 12 comprises further electronic circuits 28 for generating high frequency currents for the induction coils 16. The electronic circuits 28 are arranged below the induction coils 16.

20 In the circular hole in the centre of each induction coil 16 there is a light emitting diode 24. The light emitting diode 24 is fastened at the chassis 12 by a support element 26. The support element 26 has such a geometric structure, that only a little heat is transferred to the light emitting diode 24. Further,
25 the support element 26 is made of a material with low heat conductivity. These properties of the support element 26 prevent a destruction of the light emitting diode 24.

In this example, only one light emitting diode 24 is arranged
30 within the circular hole in the centre of each induction coil 16. In general, one or more light emitting diodes 24 may be arranged within the circular hole in the centre of the induction coil 16. Further, light emitting diodes 24 with different colours may be provided. Moreover, one or more RGB light emitting
35 diodes 24 may be arranged within the circular hole.

FIG 2 illustrates a schematic top view of the chassis 12 for the induction cooking hob with the sheet 20 according to the first embodiment of the present invention. The chassis 12 in FIG 2 is the same as in FIG 1, wherein additionally the sheet 20 is arranged on the upper side of the chassis 12.

In this example, the sheet 20 is a mica layer. In general, the sheet 20 is made of a dielectric material. The cut-outs 22 in the mica layer 20 are filled by a transparent dielectric material. In particular the cut-outs 22 in the mica layer 20 are filled by a foil made of polyimide. For example, the cut-outs 22 in the mica layer 20 are filled by Kapton®.

The sheet 20 comprises a plurality of cut-outs 22. In this example, the cut-outs 22 are formed as slots. There are four groups of eight cut-outs 22 in each case. The eight cut-outs 22 of each group form a star-shaped arrangement. Each group of cut-outs 22 corresponds with one of the heating zones 14.

FIG 3 illustrates a schematic top view of the induction cooking hob with a panel 10 according to a second embodiment of the present invention. Preferably, the panel is a glass ceramic panel. The induction cooking hob of the second embodiment has the same structure as in the first embodiment. However, there are four groups of four cut-outs 22 in each case according to the second embodiment .

Additionally, the panel 10 is arranged on the chassis 12 in FIG 3. The light from the light emitting diodes 24 radiates through the cut-outs 22 and through the panel 10, so that the heating zones 14 are illuminated. The user recognizes the positions of the heating zones 14 and the corresponding induction coils 16.

Further, the size of the cut-out 22 may indicate the size and/or the power of the corresponding heating zone 14 and induction coil 16. This can be realized by a relative long cut-out 22 rep-

resenting a big heating zone 14. In a similar way, a relative short cut-out 22 may represent a small heating zone 14.

Additionally, one or more ferrite elements may be arranged below the induction coils 16. For example, said ferrite elements have elongated forms and extend radially with respect to the induction coils 16.

Further, an outer light guide element may be arranged outside the induction coil 16 in order to indicate the size of said induction coil 16 and/or for design reasons. In this case, at least one connecting light guide element may be arranged between the light emitting diode 24 and said outer light guide. In a special case the outer light guide element has a circular form and encloses the induction coil 16. The at least one connecting light guide element may be arranged between the ferrite elements, for example.

FIG 4 illustrates a sectional partial side view of the induction cooking hob according to a third embodiment of the present invention. FIG 4 shows the panel 10 and the chassis 12 as the sectional partial side view.

The panel 10 is arranged above the chassis 12 and covers said chassis 12. At the lower side of the panel 10 a printed layer 18 is applied. The induction cooking hob of the third embodiment comprises no sheet 20, but the printed layer 18 at the lower side of the panel 10 has the same function as said sheet 20.

The printed layer 18 in the third embodiment has a similar pattern as the sheets 20 in the first and second embodiments. The printed layer 18 is obtained by applying a dark colour, preferably a black colour, at the lower side of the panel 10. The cut-outs 22 are realized by blank portions in the printed layer 18.

The chassis 12 comprises induction coils 16. One of the induction coils 16 is shown in FIG 4. Further, the chassis 12 comprises electronic circuits 28 arranged below the induction coils 16. The electronic circuits 28 are provided for generating high frequency currents for the induction coils 16.

In the centre of the induction coil 16 there is a circular hole with the light emitting diode 24. The light emitting diode 24 is fastened at the chassis 12 by the support element 26. The support element 26 is formed in such a way, that only a little heat is transferred to the light emitting diode 24. The support element 26 is made of a material with low heat conductivity. These properties of the support element 26 prevent a destruction of the light emitting diode 24.

In particular, the support element 26 is an elongated and thin element extending horizontally within or below the circular hole of the induction coil 16. The support element 26 may be fastened below the circular hole of the induction coil 16 or below the induction coil 16 itself. The elongated support element 26 can be fastened either at its both ends or at one of its ends. In said first case the light emitting diode 24 may be attached at a central portion of the elongated support element 26. In said latter case the light emitting diode 24 may be attached at the other end of the elongated support element 26.

The light emitting diode 24 is cooled by an air stream. Said air stream may be a natural air stream and/or an air stream generated by at least one fan. Usually, the natural air stream and/or the fan are present in the cooking hob. When the light emitting diode 24 is not in a direct contact with the air stream, then the support element 26 is preferably made of metal, so that the thermal conductivity of the metal support element 26 can be used.

In the above examples the light source in the centre of the induction coil 16 is the light emitting diode 24. In general, also other light sources than light emitting diode 24 are suitable.

- 5 The present invention allows that the user can recognize the heating zones 14 by the light from the light emitting diode 24. The cost of materials is relative low. The induction cooking hob according to the present invention has a low complexity.

List of reference numerals

	10	panel
	12	chassis
5	14	heating zone
	16	induction coil
	18	printed layer
	20	sheet
	22	cut-out
10	24	light emitting diode
	26	support element
	28	electronic circuit

Claims

1. An induction cooking hob with illumination equipment,
wherein :

- the induction cooking hob includes a panel (10) arranged
at the top side of said induction cooking hob,
- the induction cooking hob includes a chassis (12) forming
a substructure of said induction cooking hob,
- the panel (10) comprises at least one heating zone (14),
- the chassis (12) comprises at least one induction coil
(16) ,
- the heating zone (14) corresponds with at least one in-
duction coil (16), and
- the induction cooking hob includes at least one interme-
diate layer (18, 20) between the panel (10) and the chas-
sis (12) ,

characterized in, that

the intermediate layer (18) comprises a plurality of cut-outs
(22) arranged according to a predetermined pattern within the
heating zone (14), and the chassis (12) comprises at least
one light emitting diode (24) arranged in a central portion
of the induction coil (16) , wherein the light emitting diode
(24) corresponds with at least one cut-out (22) .

2. The induction cooking hob according to claim 1,
characterized in, that

the intermediate layer includes a printed layer (18) applied
at a lower side of the panel (10) .

3. The induction cooking hob according to claim 2,
characterized in, that

the printed layer (18) is a dark coloured layer, in particu-
lar a black coloured layer.

4. The induction cooking hob according to claim 2 or 3,
characterized in, that

the cut-outs (20) are formed as blank portions of the printed layer (18).

5. The induction cooking hob according to any one of the preceding claims,
5 characterized in, that
the intermediate layer includes a sheet (20) arranged between the panel (10) and the chassis (12) .

10 6. The induction cooking hob according to claim 6,
characterized in, that
the sheet (20) is made of at least one dielectric material.

15 7. The induction cooking hob according to claim 6,
characterized in, that
the sheet (20) is or comprises a mica layer.

20 8. The induction cooking hob according to any one of the preceding claims,
characterized in, that
the cut-outs (22) in the layer (18/20) are filled by a transparent dielectric material.

25 9. The induction cooking hob according to any one of the preceding claims,
characterized in, that
the cut-outs (22) in the layer (18/20) are filled by a foil made of polyimide.

30 10. The induction cooking hob according to any one of the preceding claims,
characterized in, that
the light emitting diode (24) is fastened by a support element (26) having low heat conductivity.

35

11. The induction cooking hob according to any one of the preceding claims,
characterized in, that
the light emitting diode (24) is fastened by a support element (26), which is also used to support a temperature sensor.
12. The induction cooking hob according to any one of the preceding claims,
characterized in, that
the light emitting diode (24) is fastened by a support element (26), which functions as a optical device and guides the light to the panel (10), preferably to the cut-outs (22).
13. The induction cooking hob according to any one of the preceding claims,
characterized in, that
the cut-outs are shaped as slots (20), wherein said slots (20) are arranged according to a predetermined pattern.
14. The induction cooking hob according to any one of the preceding claims,
characterized in, that
the panel is a glass ceramic panel (10).

1/2

FIG 1

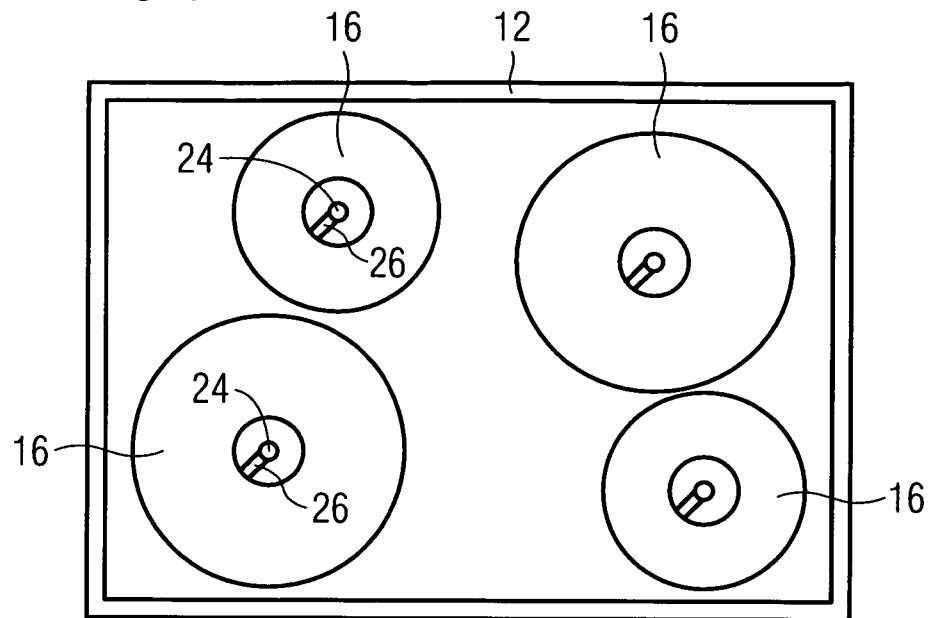
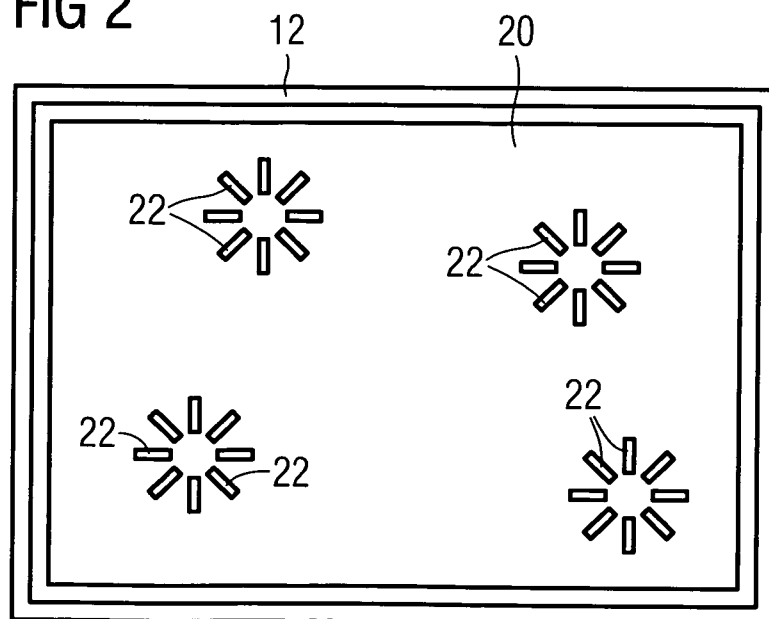


FIG 2



2/2

FIG 3

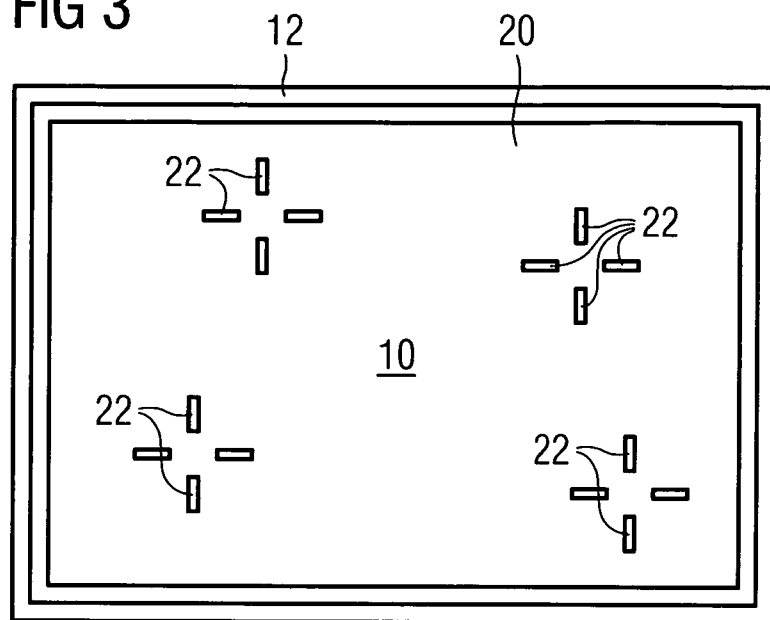
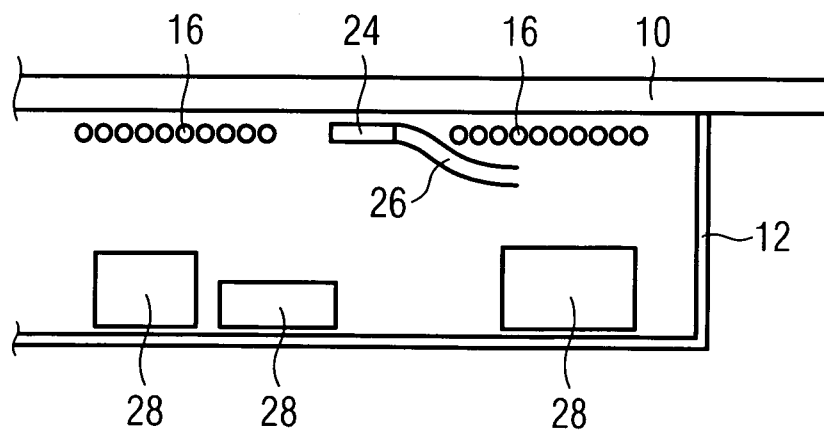


FIG 4



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2011/003407

A. CLASSIFICATION OF SUBJECT MATTER INV. H05B6/12 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) H05B		
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 practical, search terms used) EPO-Internal		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 3 114183 A (MATSUSHITA ELECTRIC IND CO LTD) 15 May 1991 (1991-05-15) abstract; figure 1 -----	1-14
X	JP 3 289086 A (MATSUSHITA ELECTRIC IND CO LTD) 19 December 1991 (1991-12-19) abstract; figure 1 -----	1
A	JP 2003 257601 A (MATSUSHITA ELECTRIC IND CO LTD) 12 September 2003 (2003-09-12) abstract; figures la, lb -----	1
A	EP 1 250 028 A1 (MATSUSHITA ELECTRIC IND CO LTD [JP]) 16 October 2002 (2002-10-16) abstract; figures 10, 11, 13 -----	1
A	EP 0 482 854 A1 (MOORW00D VULCAN LTD [GB]) 29 April 1992 (1992-04-29) abstract; figure 2 -----	1
☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family		
Date of the actual completion of the international search 3 August 2011		Date of mailing of the international search report 16/08/2011
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer Garci a, Jesus

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2011/003407

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
JP 3114183	A	15-05-1991	NONE	

JP 3289086	A	19-12-1991	NONE	

JP 2003257601	A	12-09-2003	JP 3736477 B2	18-01-2006

EP 1250028	A l	16-10-2002	EP 2101544 A2	16-09-2009
			EP 2101545 A2	16-09-2009
			EP 2106196 A2	30-09-2009
			EP 2101546 A2	16-09-2009
			WO 0141510 A l	07-06-2001
			US 2003164370 A l	04-09-2003

EP 0482854	A l	29-04-1992	CA 2053782 A l	23-04-1992
			GB 2249386 A	06-05-1992
