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(54) **Built-in domestic appliance with decorative panel applied to the door**

(57) In a built-in domestic appliance with a door (2) hinged along its bottom side and provided with a front decorative panel (1) applied to the appliance through a mounting system including a sliding coupling between the panel (1) and the door (2) with sliding direction orthogonal to the rotation axis of the door, the panel (1) is also pivoted to the machine frame through a telescopic rod (11, 11') connected by a kinematic chain to the hinge

of the door (2) so as to achieve an automatic upward and downward sliding of the panel (1) during the opening and closing of the door (2) respectively. In this way it is possible to mount panels higher than 900 mm, whose bottom edge (14) extends nearly to the floor, on the same machines manufactured for the application of standard panels, since the opening and closing movement of the door (2) also causes the automatic movement of the panel (1) with respect to the door (2).

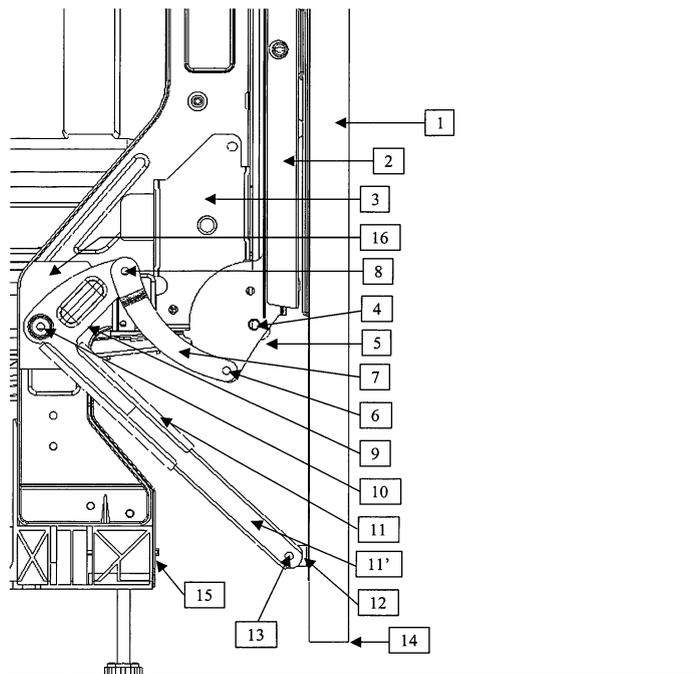


Fig.1

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## Description

**[0001]** The present invention relates to built-in domestic appliances having the door lined with a decorative panel, and in particular to domestic appliances in which the panel slides with respect to the door. Reference will be made hereafter to a dishwasher while it is clear that what is said applies to any other domestic appliance having a similar door hinged along its bottom side, e.g. a washing machine.

**[0002]** This type of decorative panel is known to be used to camouflage a built-in appliance so that it blends with the kitchen furniture. This is achieved by applying to the door of said appliance, by various means, a panel having the same appearance of the other doors. In this way there is no visible element allowing to distinguish the appliance from the other members which make up the kitchen, its controls being accessible only when the door is open. Examples of panel mounting systems including a sliding coupling between the panel and the door are disclosed, for instance, in EP-A-744152 and EP-A-1364609.

**[0003]** However, the presence of this panel poses a particular problem when it has a height greater than the standard height of 720/760 mm (respectively for a dishwasher height of 820/860 mm) since this would result in the interference of the panel with the dishwasher base at the end of the door opening, i.e. the door could not open completely to 90°.

**[0004]** To overcome this problem there are presently dishwashers specifically manufactured with more room in the lower portion in order to be able to receive higher panels. However this solution has the double drawback of reducing the room available inside the machine to house the members arranged in the lower portion of the dishwasher, as well as the need to manufacture a specific version only for those few markets where higher panels are used.

**[0005]** EP-A-1529482 discloses another solution devised by the same applicant in which a mounting system for the panel includes a sliding coupling between the panel and the door with sliding direction orthogonal to the rotation axis of the door, and the panel is so high that it comes in contact at its bottom end with the dishwasher base at the end of the door opening, said sliding coupling including an elastic member suitable to push the panel toward said rotation axis.

**[0006]** In this way, by means of a simple and reliable mounting system, it is possible to mount higher panels on the same machines manufactured for the application of standard panels.

**[0007]** However, these known systems have the drawback of allowing the mounting of panels only slightly higher than a standard panel, indicatively 30/40 mm more. A need arises now for being able to mount panels even significantly higher (beyond 900 mm) in order to meet the requests of furniture makers that tend to manufacture higher kitchens and to integrate the plinth into the deco-

rative panel, which therefore extends downwards nearly to the floor.

**[0008]** Therefore the object of the present invention is to provide a domestic appliance provided with a mounting system for the decorative panel that overcomes the aforementioned drawbacks.

**[0009]** This object is achieved by means of a domestic appliance in which the panel is mounted through a sliding coupling between the panel and the door with sliding direction orthogonal to the rotation axis of the door, said panel being also pivoted to the machine frame through a telescopic rod connected by a kinematic chain to the door hinge so as to achieve an automatic sliding of the panel.

**[0010]** The main advantage of the domestic appliance with the panel mounting system according to the present invention is the possibility of being able to mount panels higher than 900 mm on the same machines manufactured for the application of standard panels, without requiring any modification of the machine base.

**[0011]** Still another advantage of the present system stems from its structural simplicity which makes it cheap and reliable.

**[0012]** These and other advantages and features of the domestic appliance according to the present invention will be evident to those skilled in the art from the following detailed description of an embodiment thereof, with reference to the attached drawings, wherein:

**Fig.1** is a diagrammatic side view showing the moving mechanism for the panel of a dishwasher according to the invention, with the door in the closed position;

**Fig.2** is a view similar to the preceding one with the door in an intermediate position at about 45°; and

**Fig.5** is a view similar to the preceding one with the door fully open.

**[0013]** With reference to figure 1, there is seen that a dishwasher according to the present invention includes a decorative panel 1 applied to the door 2 so as to slide vertically, for example through hooks arranged on the back of panel 1 that engage corresponding slots formed in the door 2, as described in the above-mentioned application EP-A-1529482 to which reference is made for further details.

**[0014]** The door 2 is mounted on the dishwasher frame through a hinge consisting of a bracket 3, integral with the frame, provided with a bottom pin 4 on which there is centrally pivoted a rotating sector 5 integral with door 2. At the bottom end of the rotating sector 5 there is pivoted, through a pin 6, the bottom end of an arcuate tie-rod 7 that at its top end is in turn connected, through a pin 8, to an L-shaped arm 9, pin 8 being located at the end of the short side of the L.

**[0015]** The L-shaped arm 9 is also pivoted, through a pin 10 located at the vertex of the L, on a bracket 16 integral with the frame, said pin 10 being arranged at a

position lower and more to the inside with respect to pin 8.

**[0016]** The long side of the L of arm 9 consists of a telescopic rod made up of a first member 11 integral with the short side of the L, and a second member 11' sliding within the first member 11 and pivoted on a bracket 12 of panel 1 through a pin 13.

**[0017]** The simple and effective operation of the present mounting system for the panel is readily understood from the description above with the help of figures 2 and 3.

**[0018]** In the initial phase of the opening of door 2, illustrated in fig.2, the rotation of sector 5 around pin 4 pushes tie-rod 7 upwards and inwards through pin 6. In turn, tie-rod 7 through pin 8 causes the rotation of arm 9 around pin 10, counterclockwise in the illustrated figures, pulling upwards the telescopic rod 11, 11'.

**[0019]** The movement of the latter, due to the fixed position of pins 4 and 10 and to the changing position of pin 13, results in an inward sliding of the second member 11' within the first member 11, as well as in an upward sliding of panel 1 with respect to door 2. In this way, the contact between the bottom edge 14 of the panel and the base 15 of the dishwasher is prevented.

**[0020]** In the second phase of the opening, illustrated in fig.3, panel 1 completes its sliding movement with respect to door 2 reaching the position of complete opening where the telescopic rod 11, 11' has taken an almost horizontal position and the length thereof is slightly greater than the length in the position of fig.2.

**[0021]** Obviously, when the door is closed the mechanism operates in reverse taking panel 1 and door 2 back to the starting position illustrated in fig.1.

**[0022]** It is clear that the above-described and illustrated embodiment of the domestic appliance according to the invention is just an example susceptible of various modifications. In particular, the sliding coupling between the panel and the door may be made in any known way and the same applies to the two members of the telescopic rod and to the other components of the kinematic chain that connects the telescopic rod to the door hinge, as long as there is retained the automatic movement of the panel during the opening and closing movement of the door.

## Claims

1. A built-in domestic appliance with a door (2) hinged along its bottom side and provided with a front decorative panel (1) applied to the appliance through a mounting system including a sliding coupling between the panel (1) and the door (2) with sliding direction orthogonal to the rotation axis of the door (2), **characterized in that** the panel (1) is also pivoted to the machine frame through a telescopic rod (11, 11') connected by a kinematic chain to the hinge of the door (2) so as to achieve an automatic upward and downward sliding of the panel (1) during the

opening and closing of the door (2) respectively.

2. A built-in domestic appliance according to claim 1, **characterized in that** the kinematic chain connecting the telescopic rod (11, 11') to the hinge of the door (2) includes an arcuate tie-rod (7) connected at its bottom end, through a first pin (6), to the hinge of the door (2) and at its top end, through a second pin (8), to an L-shaped arm (9), said second pin (8) being located at the end of the short side of the L, said L-shaped arm (9) being pivoted to the machine frame through a third pin (10) located at the vertex of the L in a position lower and more to the inside with respect to the second pin (8), and said telescopic rod (11, 11') forming the long side of the L of the arm (9).
3. A built-in domestic appliance according to claim 1 or 2, **characterized in that** the hinge of the door (2) consists of a bracket (3) integral with the frame and provided with a bottom pin (4) on which there is centrally pivoted a rotating sector (5) integral with the door (2), the kinematic chain being pivoted on said rotating sector (5) at the bottom end of the latter.
4. A built-in domestic appliance according to claim 2 or 3, **characterized in that** the telescopic rod is made up of a first member (11) integral with the short side of the L, and a second member (11') sliding within said first member (11) and pivoted on a bracket (12) of the panel (1) through a pin (13).
5. A built-in domestic appliance according to one of the preceding claims, **characterized in that** the sliding coupling is achieved through a plurality of hooks arranged on the back of the panel (1) and engaged in corresponding slots formed in the door (2), within which the sliding can take place.

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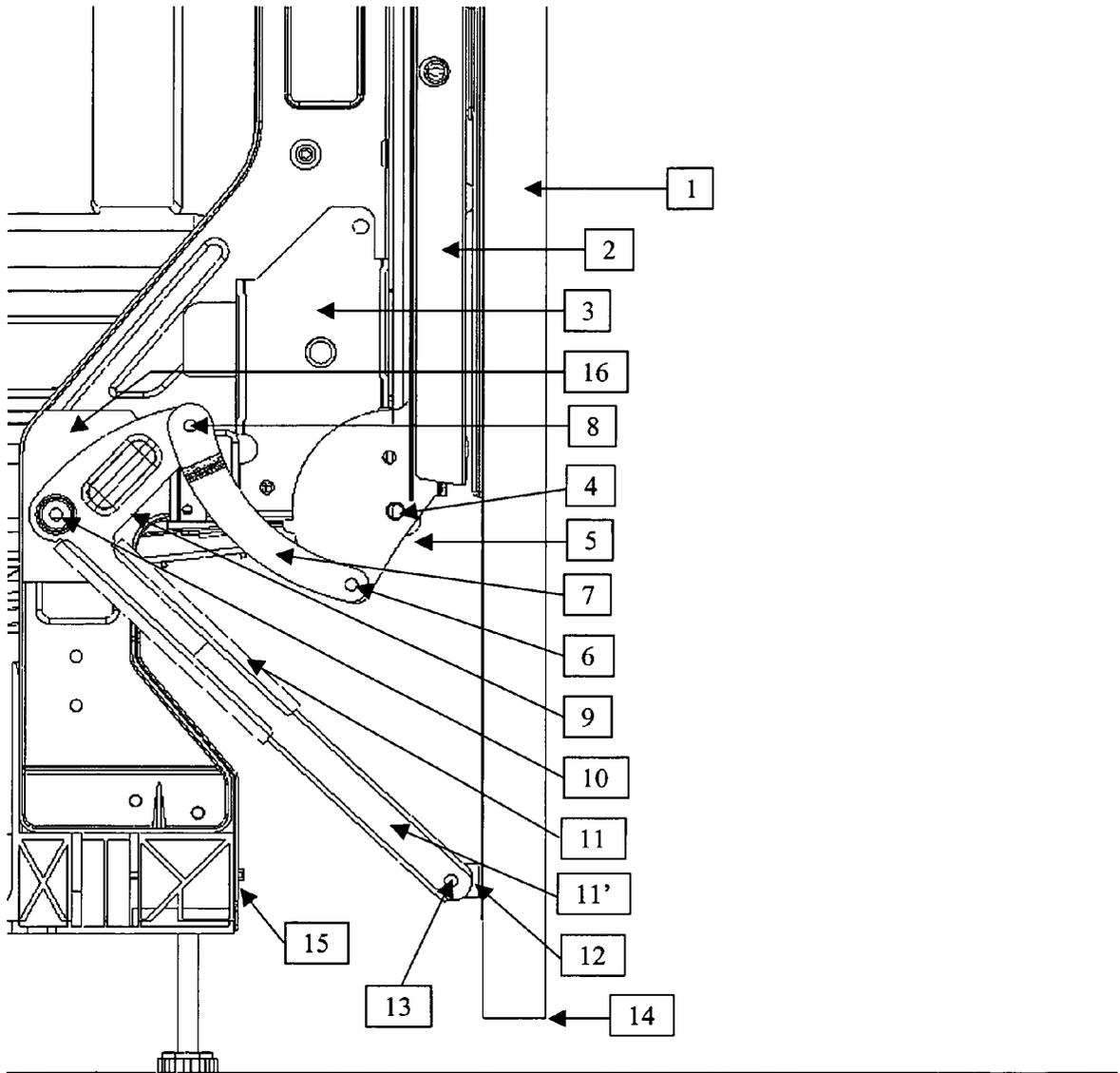


Fig.1

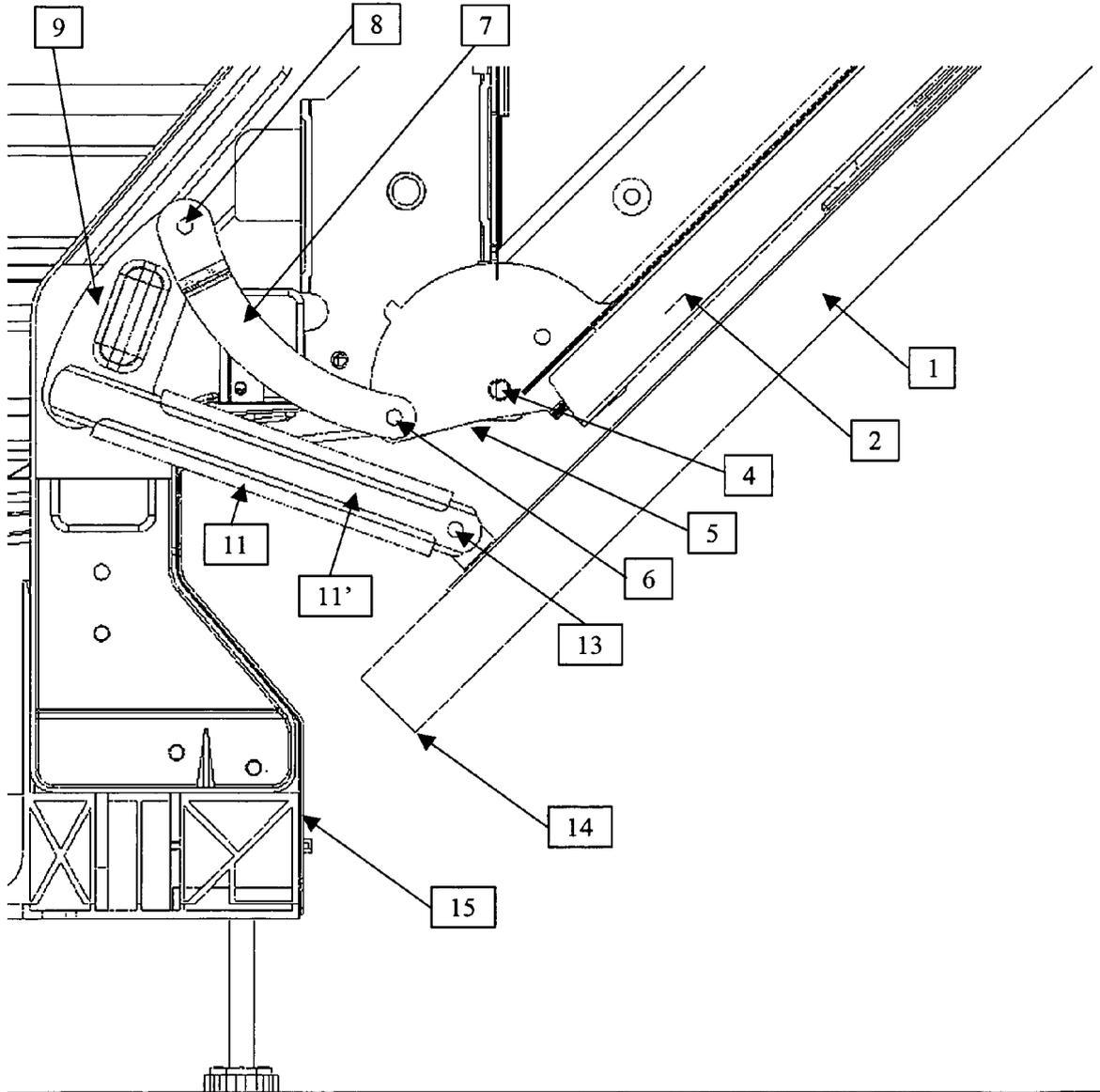


Fig.2

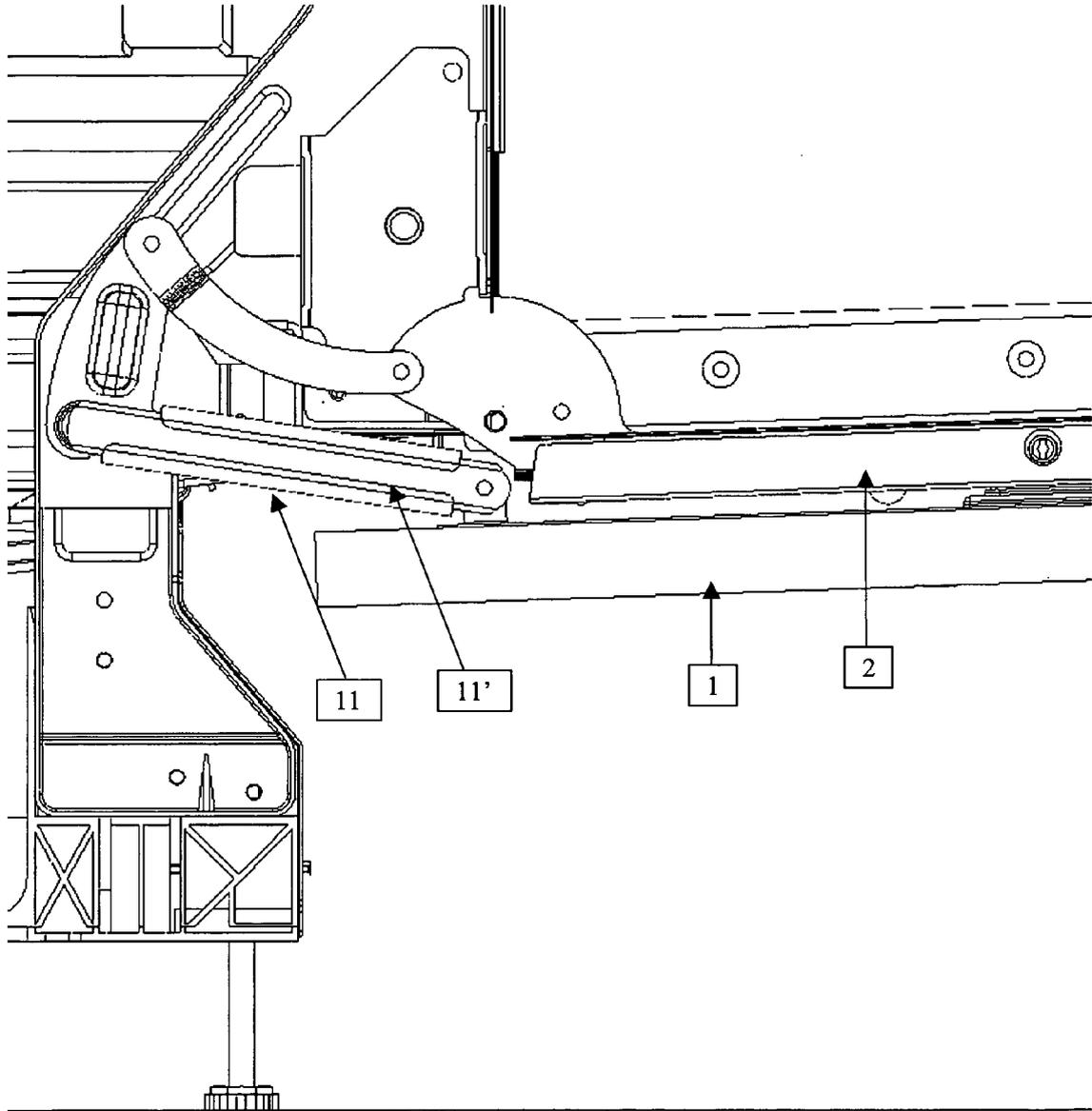


Fig.3



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
D,A	EP 1 364 609 A1 (BONFERRARO S P A [IT]) 26 November 2003 (2003-11-26) * the whole document *	1	INV. A47L15/42 D06F39/14
A	----- DE 32 11 949 A1 (BUDERUS AG [DE]) 16 June 1983 (1983-06-16) * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			A47L A47B D06F
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		3 January 2007	Ureta, Rolando
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	

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EPO FORM 1503 03.02 (P04C01)

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

EP 06 42 5476

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  
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03-01-2007

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			DE 60200204 D1	11-03-2004
			DE 60200204 T2	18-11-2004
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**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- EP 744152 A [0002]
- EP 1364609 A [0002]
- EP 1529482 A [0005] [0013]