

(12)

EUROPEAN PATENT APPLICATION

(43)

Date of publication:  
**05.03.2008**   **Bulletin 2008/10**

(51)

Int Cl.:  
**A47L 15/42** <sup>(2006.01)</sup>   **D06F 39/14** <sup>(2006.01)</sup>

(21)

Application number: **06425603.5**

(22)

Date of filing: **31.08.2006**

|                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                        |
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| <div>(84)</div> <div>           Designated Contracting States:<br/> <b>AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR</b><br/>           Designated Extension States:<br/> <b>AL BA HR MK YU</b> </div> | <div>(72)</div> <div>           Inventors:<br/>           • <b>Ambrosi, Andrea</b><br/>              <b>37052 Casaleone VR (IT)</b><br/>           • <b>Binco, Davide</b><br/>              <b>37060 Sorgà VR (IT)</b> </div>                                                          |
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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 connected to the machine frame through an articulated lever system (9, 10) connected by an arcuate tie-rod (7) 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 800 mm, whose bottom edge (15) 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).

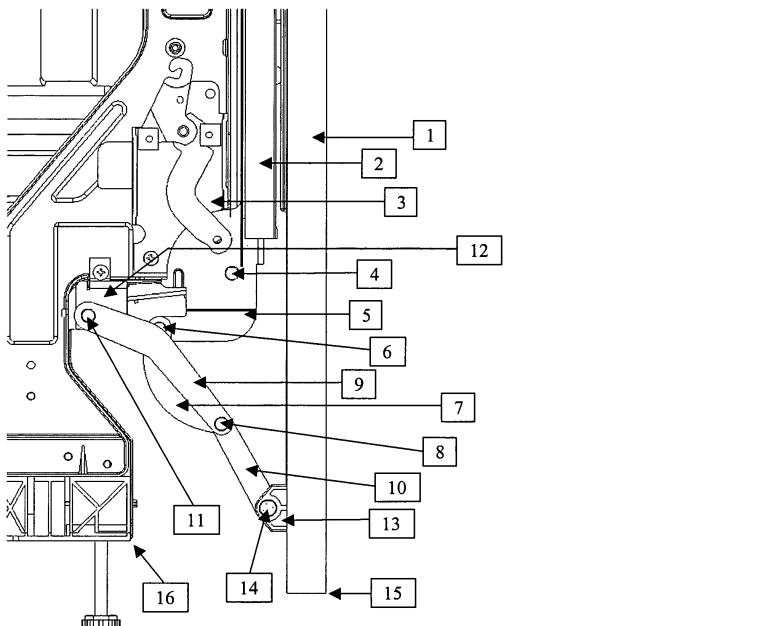


Fig.1

## 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 said panel slides with respect to the door. Specific 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 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 800 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 connected to the machine frame through an articulated lever system 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 800 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 in an initial phase of the door opening;

Fig.3 is a view similar to the preceding one with the door in an intermediate position at about 20°;

Fig.4 is a view similar to the preceding one in a final phase of the opening with the door at about 50°; 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 top end of an arcuate tie-rod 7 that at its bottom end is in turn connected, through a pin 8, to a rod 9 and to an arm 10. Said pin 8 acts as a joint

between the bottom end of rod 9, extending upwards and inwards with a slightly arcuate shape, and the top end of arm 10 extending downwards and outwards with a straight shape.

[0015] The rod 9 is also pivoted, through a pin 11 located at the top end thereof, on a bracket 12 integral with the frame, said pin 11 being arranged at a position higher and more to the inside with respect both to pin 8 and to pin 6. Also arm 10 is pivoted at its bottom end on a bracket 13 of panel 1, through a pin 14.

[0016] 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 from 2 to 5.

[0017] 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 rod 9 around pin 11, counter-clockwise in the illustrated figures, pulling arm 10 upwards.

[0018] The movement of the latter, due to the fixed position of pins 4 and 11 and to the changing position of pins 8 and 14, results in a clockwise rotation of arm 10 until it abuts against panel 1, as well as in an upward sliding of panel 1 with respect to door 2. In this way, the contact between the bottom edge 15 of the panel and the base 16 of the dishwasher is prevented.

[0019] 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 raising where rod 9 has reached an end-of-travel position with the three pins 4, 8 and 11 aligned, and arm 10 has performed a small counter-clockwise rotation with respect to the position of fig.2.

[0020] From this point, the opening movement proceeds with the rotation of door 2 around pin 4 and of panel 1 around pin 8, which in turn rotates around pin 11 (fig.4), until the complete opening position illustrated in fig.5 is reached.

[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 9, 10 of the articulated lever system and to the kinematic chain that connects the latter to the door hinge, that may be more complicated than the mere tie-rod 7, as long as there is retained the automatic movement of the panel during the opening and closing movement of the door.

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 connected to the machine frame through an articulated lever system (9, 10) 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 articulated lever system (9, 10) to the hinge of the door (2) consists of an arcuate tie-rod (7) connected at its top end, through a first pin (6), to the hinge of the door (2) and at its bottom end to an intermediate point of said articulated lever system through a second pin (8) that acts as a joint of the latter.
3. A built-in domestic appliance according to claim 2, **characterized in that** the articulated lever system (9, 10) consists of a rod (9) extending upwards and inwards with a slightly arcuate shape from said joint pin (8), and of an arm (10) extending downwards and outwards with a straight shape from said joint pin (8), said rod (9) being pivoted on the machine frame through a third pin (11) located at the top end thereof at a position higher and more to the inside with respect to the joint pin (8), and said arm (10) being pivoted at its bottom end on the panel (1) through a fourth pin (14).
4. A built-in domestic appliance according to one of the preceding claims, **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.
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.

## Claims

1. A built-in domestic appliance with a door (2) hinged

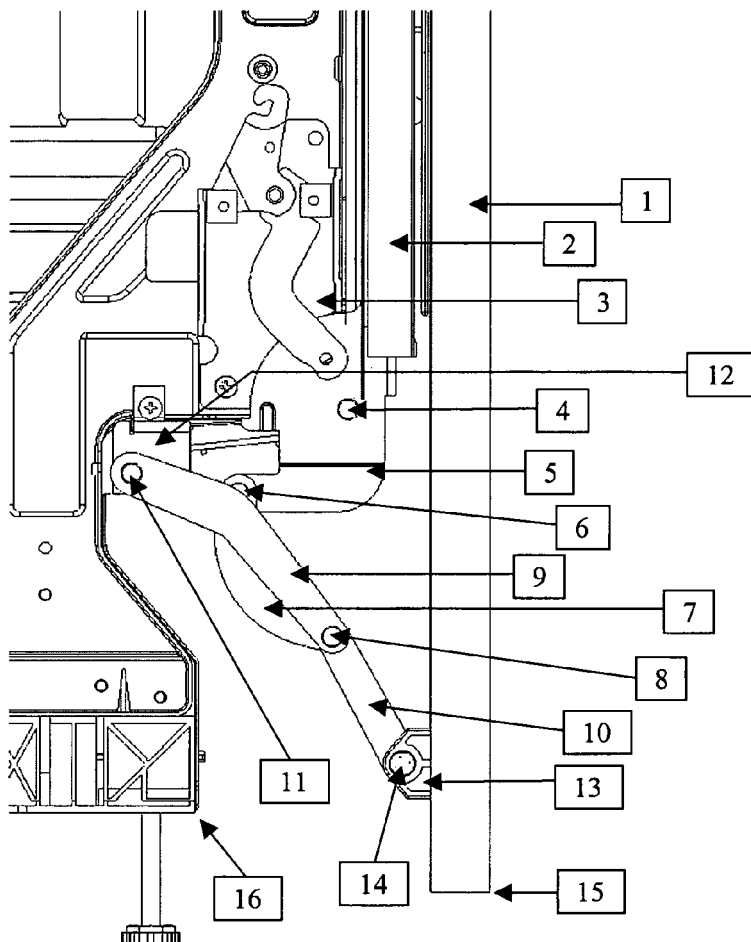


Fig.1

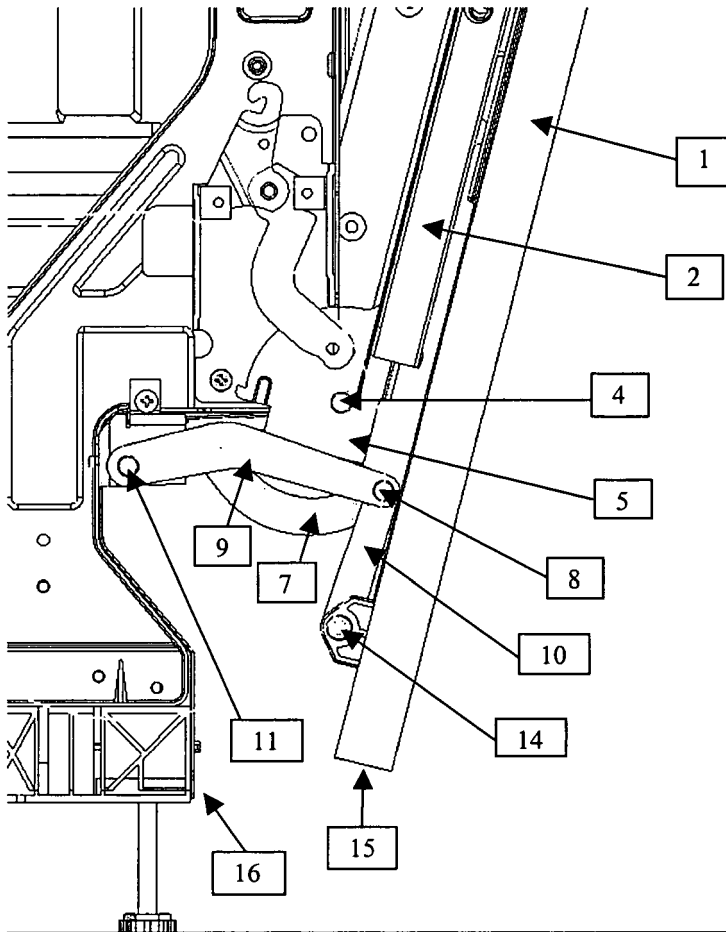


Fig.2

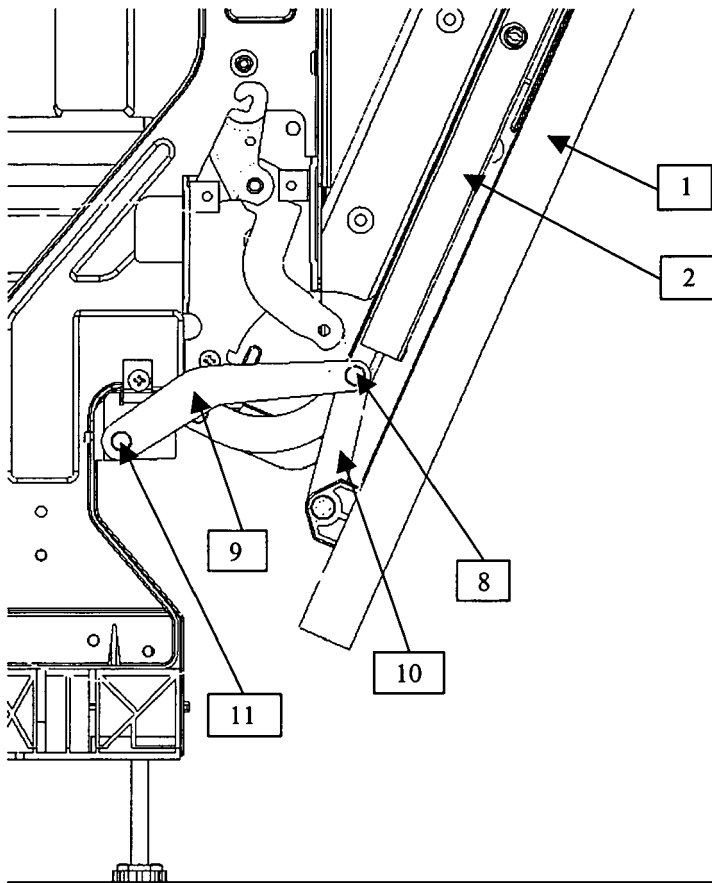


Fig.3

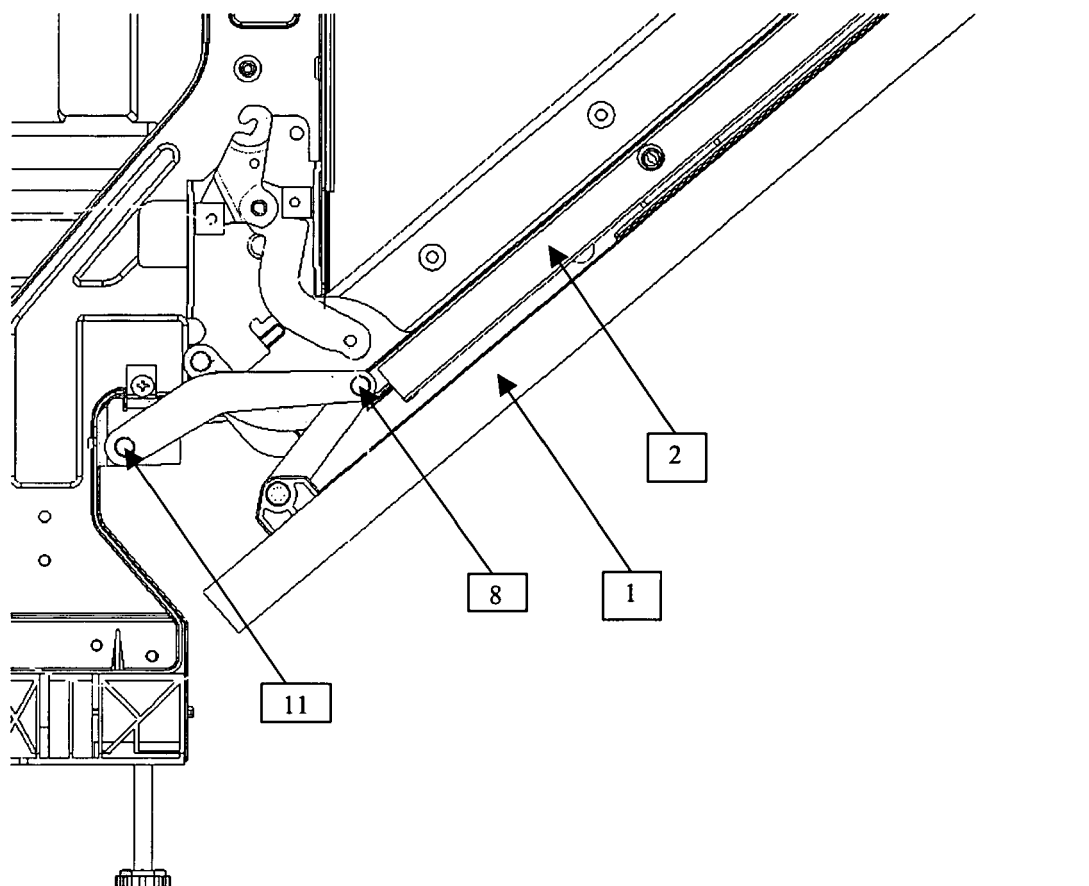


Fig.4

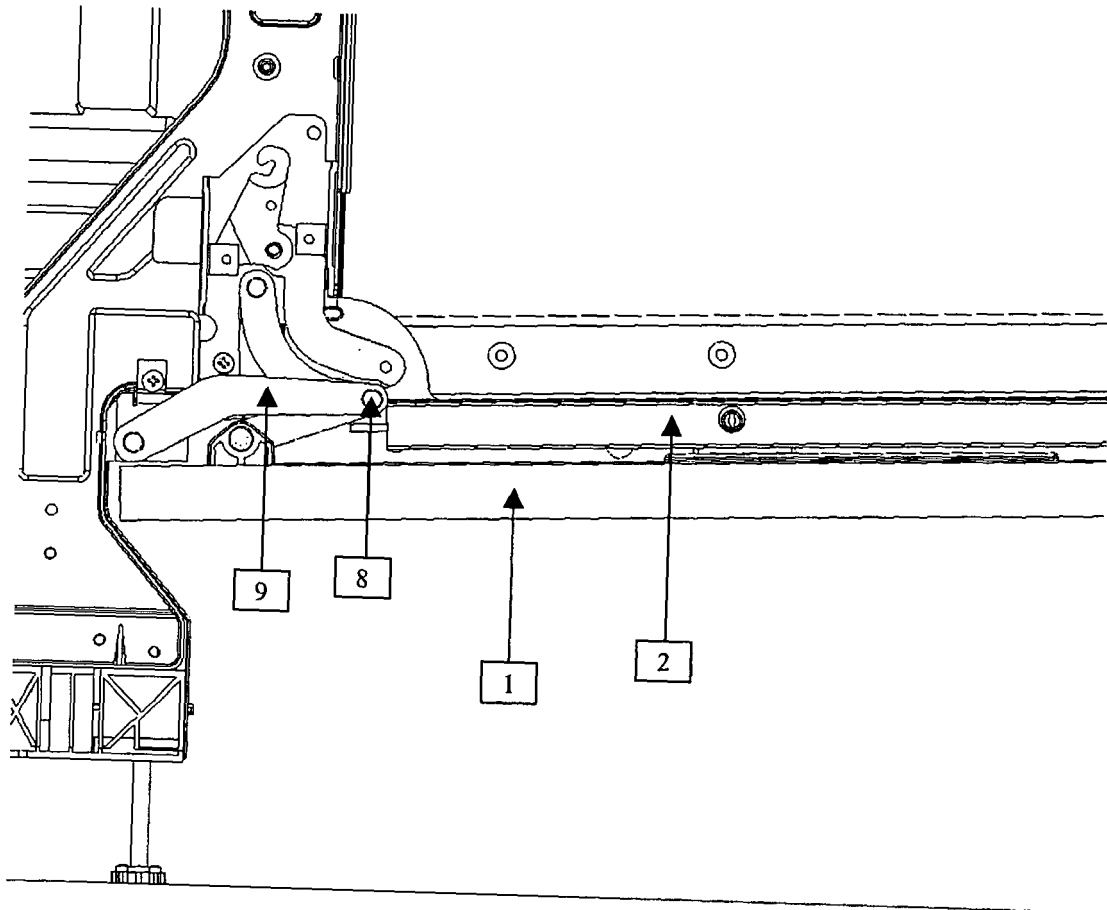


Fig.5



European Patent  
Office

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Application Number  
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| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                             |                                                            |                                         |                                                        |
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| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone<br/>Y : particularly relevant if combined with another document of the same category<br/>A : technological background<br/>O : non-written disclosure<br/>P : intermediate document</p> <p>T : theory or principle underlying the invention<br/>E : earlier patent document, but published on, or after the filing date<br/>D : document cited in the application<br/>L : document cited for other reasons<br/>&amp; : member of the same patent family, corresponding document</p> |                                                                                                                                             |                                                            |                                         |                                                        |

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