



(11) **EP 1 935 313 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
25.06.2008 Bulletin 2008/26

(51) Int Cl.:
A47L 15/42^(2006.01) F25D 23/10^(2006.01)

(21) Application number: **06425844.5**

(22) Date of filing: **19.12.2006**

(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 NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

(72) Inventor: **Ambrosi, Andrea**
37052 Casaleone VR (IT)

(74) Representative: **Concone, Emanuele et al**
Società Italiana Brevetti S.p.A.
Via Carducci 8
20123 Milano (IT)

(71) Applicant: **Bonferraro S.p.A.**
37060 Bonferraro (VR) (IT)

Remarks:

Amended claims in accordance with Rule 137(2) EPC.

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

(57) A built-in domestic appliance has a door (2) provided with a decorative panel (1) applied through a mounting system that allows for a relative movement between the panel (1) and the door (2), as well as sensors (8,9) suitable to detect said relative movement and to emit a corresponding signal, and an actuator (19) suitable to disengage a closing mechanism of the door (2) upon receipt of said signal. In this way, it is possible to open the door (2) without obliging the user to apply a greater force than that required to open any other door in the kitchen, whereby also the panel (1) lining the dishwasher door (2) can be handleless as required by the design of modern kitchens.

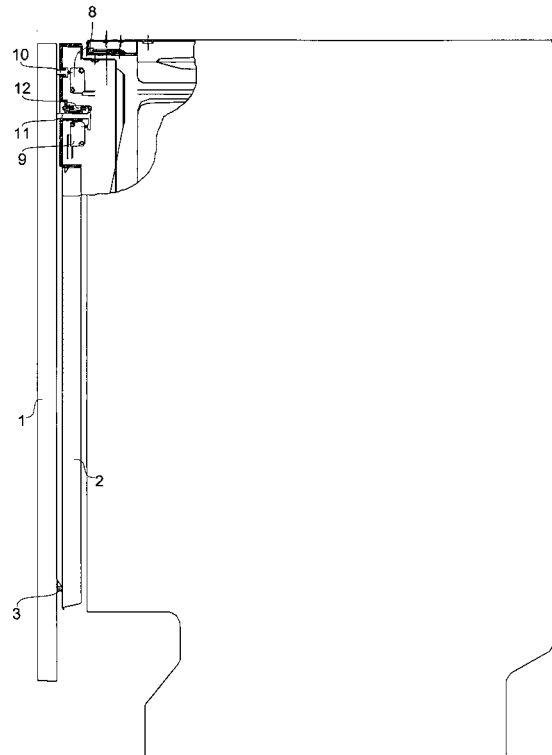


Fig.1

EP 1 935 313 A1

Description

[0001] The present invention relates to built-in domestic appliances having the door lined with a decorative panel, and in particular to a domestic appliance provided with a device for the assisted opening of said door. Specific reference will be made hereafter to a dishwasher while being clear that what is said also applies to any other appliance having a similar door provided with a decorative panel, 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, through 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.

[0003] For design reasons, modern kitchens are often made without handles on the doors, that are opened by means of a push-pull mechanism or by using a small recess formed at the door top as a grip point. This solution though fully satisfactory from the aesthetical point of view however has the drawback that it can be easily applied only to drawers and cupboards, but it is quite difficult to apply it to the decorative panel of the dishwasher. In fact, in order to open the door of the latter a "strong" hold is required since the door of a dishwasher is much harder to open due to the closing mechanism that is designed for a strong lock of the door against the outward push of the peripheral watertight seal.

[0004] Therefore the object of the present invention is to provide a domestic appliance provided with a device for the assisted opening of the door that overcomes the aforementioned drawback.

[0005] This object is achieved by means of a domestic appliance wherein the decorative panel is mounted on the door through a mounting system that allows for a relative movement between the door and the panel, and the opening assist device includes a panel movement sensor suitable to detect said relative movement and to emit a corresponding signal, and an actuator suitable to disengage the closing mechanism upon receipt of said signal.

[0006] The main advantage of the domestic appliance with the device according to the present invention is therefore the possibility of opening the door without obliging the user to apply a greater force than that required to open any other door in the kitchen. As a consequence, also the panel lining the dishwasher door can be handleless as all the other doors in the kitchen.

[0007] A further advantage of the present appliance stems from the fact that this device is quite simple, since it employs members commonly used in domestic appliances, and it does not require a substantial modification of the door closing mechanism, whereby its addition does not involve a significant increase in the manufacturing

cost.

[0008] 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 schematic side view, with a cutaway portion, showing a dishwasher according to the invention in which the decorative panel is hinged to the door at the bottom;

Fig.2 is a schematic enlarged view similar to the preceding one showing in detail the door closing mechanism and the relevant actuator, the door being in the closed position;

Fig.3 is a view similar to the preceding one showing the activated actuator and the disengaged closing mechanism, the door being thus ajar and ready to be fully opened;

Fig.4 is a schematic front view of the top portion of the door showing the panel coupling system and the position of the opening assist device; and

Fig.5 is a schematic view, partially horizontally sectioned along line V-V of fig.4, with the panel coupled to the door.

[0009] With reference to figures 1, 4 and 5 there is seen that a dishwasher according to the invention includes a decorative panel 1 mounted on the door 2 through a mounting system that in case of push or pull by the user allows for a small oscillation of panel 1 around a bottom horizontal hinge 3.

[0010] More specifically, panel 1 is coupled to the top portion of door 2 through a pair of hooks 4 secured at the rear of the panel and suitable to engage corresponding C-shaped vertical coupling plates 5. Said plates 5 are housed in specific niches 6 formed in door 2, and they are held at a central rest position by leaf springs 7.

[0011] The strength of these springs 7 is selected such that a push or pull by the user as that normally applied to open a door is sufficient to provoke the shifting of the top portion of panel 1 inwards or outwards, respectively, thanks to the rotation of the whole panel 1 around the bottom hinge 3.

[0012] The shifting of panel 1 is detected through one or more movement sensors that in the illustrated embodiment consist of a pair of microswitches 8, 9 that are pressed by corresponding pins 10, 11. More specifically, the first pin 10 is secured on door 2 and biased into abutment against the rear of panel 1 by a spring (not illustrated) so as to detect the push movement by pressing microswitch 8, while the second pin 11, substantially T-shaped, is similarly biased by a spring 12 so as to detect the pull movement by pressing microswitch 9.

[0013] It is clear that both types of movement could be detected through a single pin suitably shaped and arranged between two properly located microswitches, or through other types of movement sensors such as prox-

imity sensors, load cells or the like. Moreover, it would obviously be possible to provide the movement only by push or pull, thus dispensing with one of the movement sensors.

[0014] Referring now to figures 2 and 3, there is seen that the closing mechanism of door 2 includes a latch 13 rotatable around an axis 14 and suitable to engage a catch 15 integral with the machine frame. The rotation of latch 13 is prevented by a lock arm 16 rotatable around a second axis 17 and substantially U-shaped. A first limb 16a of arm 16 engages latch 13, while the second limb 16b has a seat for the engagement of a rod 18 mounted on an electromagnetic actuator 19.

[0015] In the light of the above description, the operation of the present domestic appliance is readily understood.

[0016] In the case of pull of panel 1, pin 11 pulled by spring 12 presses microswitch 9 causing the switching thereof and activating actuator 19 that pulls rod 18 downward and consequently, through limb 16b, causes the rotation of the lock arm 16 around axis 17. In this way, limb 16a moves away from latch 13 that is thus free to rotate around axis 14 due to the push of the peripheral seal of door 2 (or of a suitable spring mechanism), and is therefore disengaged from catch 15 as shown in fig.3. At this moment, the user can easily grip door 2 at the top and open it completely, while in the closure phase the user's push is sufficient to restore the door lock.

[0017] A similar operation takes place in the case of push of panel 1 that results in the switching of microswitch 8 through pin 10, with the difference that the movement signal is not directly sent to actuator 19 but it reaches an electronic board 20 (fig.4) that activates actuator 19 and keeps it active for a definite period of time, so as to give the user sufficient time to interrupt the push and allow the opening of door 2. Also in this case the closure takes place thanks to the push of panel 1, but the electronic board 20 does not activate actuator 19 in this phase since it can detect that door 2 is open by checking the status of a microswitch arranged on the lock that is present as standard equipment on all dishwashers.

[0018] As for the movement sensors, also for the actuator there are several possible solutions different from the above-described electromagnetic actuator, such as shape memory alloy wires, properly geared-down synchronous motors, etc. Moreover, the door opening can be automatically provided at the end of the cycle by a direct signal from the dishwasher electronic unit, or by a signal received from a remote control that replaces the movement sensors.

[0019] It is therefore 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 exact shape and arrangement of the members can be somewhat changed according to manufacturing needs as long as the panel mounting system allows for a relative movement between panel and door, and a panel movement

sensor detects said relative movement and activates the actuator.

[0020] For example, the panel movement could be in the vertical rather than horizontal direction, by means of a mounting system as that described in the previous application EP-A-1529482 by the same applicant.

Claims

1. Built-in domestic appliance with a door (2) provided with a decorative panel (1) applied to the door through a mounting system that allows for a relative movement between said panel (1) and the door (2), **characterized in that** it further includes at least one panel (1) movement sensor suitable to detect said relative movement and to emit a corresponding signal, and an actuator suitable to disengage a closing mechanism of the door (2) upon receipt of said signal.
2. Built-in domestic appliance according to claim 1, **characterized in that** the decorative panel (1) is mounted on the door (2) through a mounting system that in case of push or pull by the user allows for a small oscillation of the panel (1) around a horizontal bottom hinge (3).
3. Built-in domestic appliance according to claim 2, **characterized in that** the panel (1) is coupled to the top portion of the door (2) through a pair of hooks (4) secured at the rear of the panel (1) and suitable to engage corresponding C-shaped vertical coupling plates (5) housed in niches (6) formed in the door (2), said coupling plates (5) being held at a central rest position in said niches (6) by leaf springs (7).
4. Built-in domestic appliance according to one of the preceding claims, **characterized in that** the movement of the panel (1) is detected through at least one microswitch (8, 9) that is switched by a pin (10, 11) secured on the door (2) and elastically biased against the panel (1).
5. Built-in domestic appliance according to one of the preceding claims, **characterized in that** the closing mechanism of the door (2) includes a rotatable latch (13) suitable to engage a catch (15), the rotation of said latch (13) being prevented by a rotatable arm (16), and the actuator suitable to disengage said closing mechanism is an electromagnetic actuator (19) carrying a rod (18) engaged in a seat of said rotatable arm (16) so as to cause the rotation thereof and consequently the unlocking of the latch (13) when said actuator (19) is activated.
6. Built-in domestic appliance according to one of the preceding claims, **characterized in that** when the

movement of the panel (1) is caused by a push the movement signal is not directly sent to the actuator but reaches an electronic board (20) that activates the actuator and keeps it active for a definite period of time.

Amended claims in accordance with Rule 137(2) EPC.

1. Built-in domestic appliance with a door (2) provided with a decorative panel (1) applied to the door through a mounting system that allows for a relative movement between said panel (1) and the door (2), either by push, pull or in-the-plane shifting, **characterized in that** it further includes at least one panel (1) movement sensor suitable to detect said relative movement and to emit a corresponding signal, and an actuator suitable to disengage a closing mechanism of the door (2) upon receipt of said signal, and **in that** said mounting system is such that the force required to achieve the relative movement is not greater than that required to open any other usual door of the furniture in which the appliance is integrated.

2. Built-in domestic appliance according to claim 1, **characterized in that** the movement of the panel (1) is detected through at least one microswitch (8, 9) that is switched by a pin (10, 11) secured on the door (2) and elastically biased against the panel (1).

3. Built-in domestic appliance according to one of the preceding claims, **characterized in that** when the movement of the panel (1) is caused by a push the movement signal is not directly sent to the actuator but reaches an electronic board (20) that activates the actuator and keeps it active for a definite period of time.

4. Built-in domestic appliance according to one of the preceding claims, **characterized in that** the decorative panel (1) is mounted on the door (2) through a mounting system that in case of push or pull by the user allows for a small oscillation of the panel (1) around a horizontal bottom hinge (3).

5. Built-in domestic appliance according to claim 4, **characterized in that** the panel (1) is coupled to the top portion of the door (2) through a pair of hooks (4) secured at the rear of the panel (1) and suitable to engage corresponding C-shaped vertical coupling plates (5) housed in niches (6) formed in the door (2), said coupling plates (5) being held at a central rest position in said niches (6) by leaf springs (7).

6. Built-in domestic appliance according to one of the preceding claims, **characterized in that** the

closing mechanism of the door (2) includes a rotatable latch (13) suitable to engage a catch (15), the rotation of said latch (13) being prevented by a rotatable arm (16), and the actuator suitable to disengage said closing mechanism is an electromagnetic actuator (19) carrying a rod (18) engaged in a seat of said rotatable arm (16) so as to cause the rotation thereof and consequently the unlocking of the latch (13) when said actuator (19) is activated.

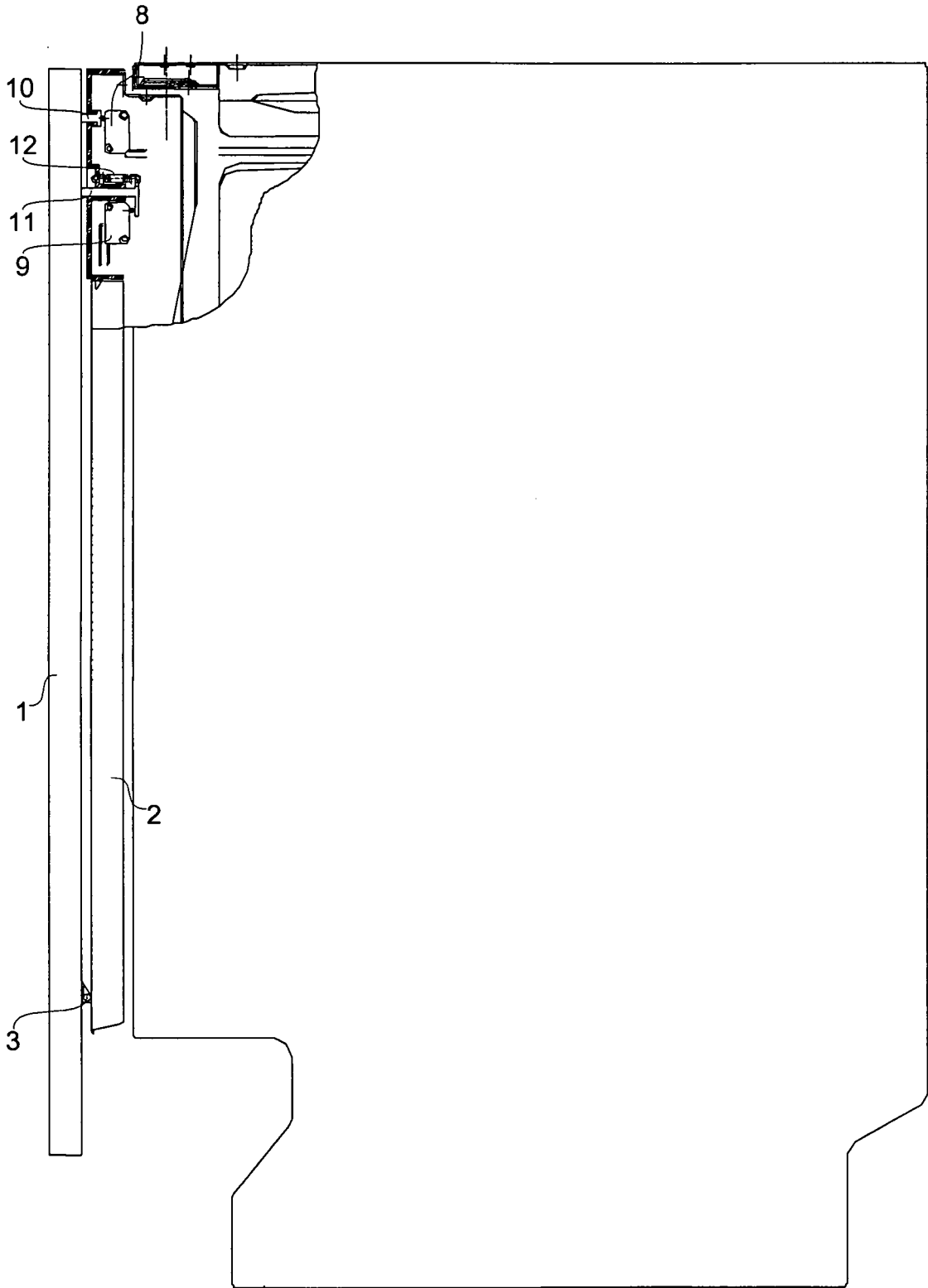


Fig. 1

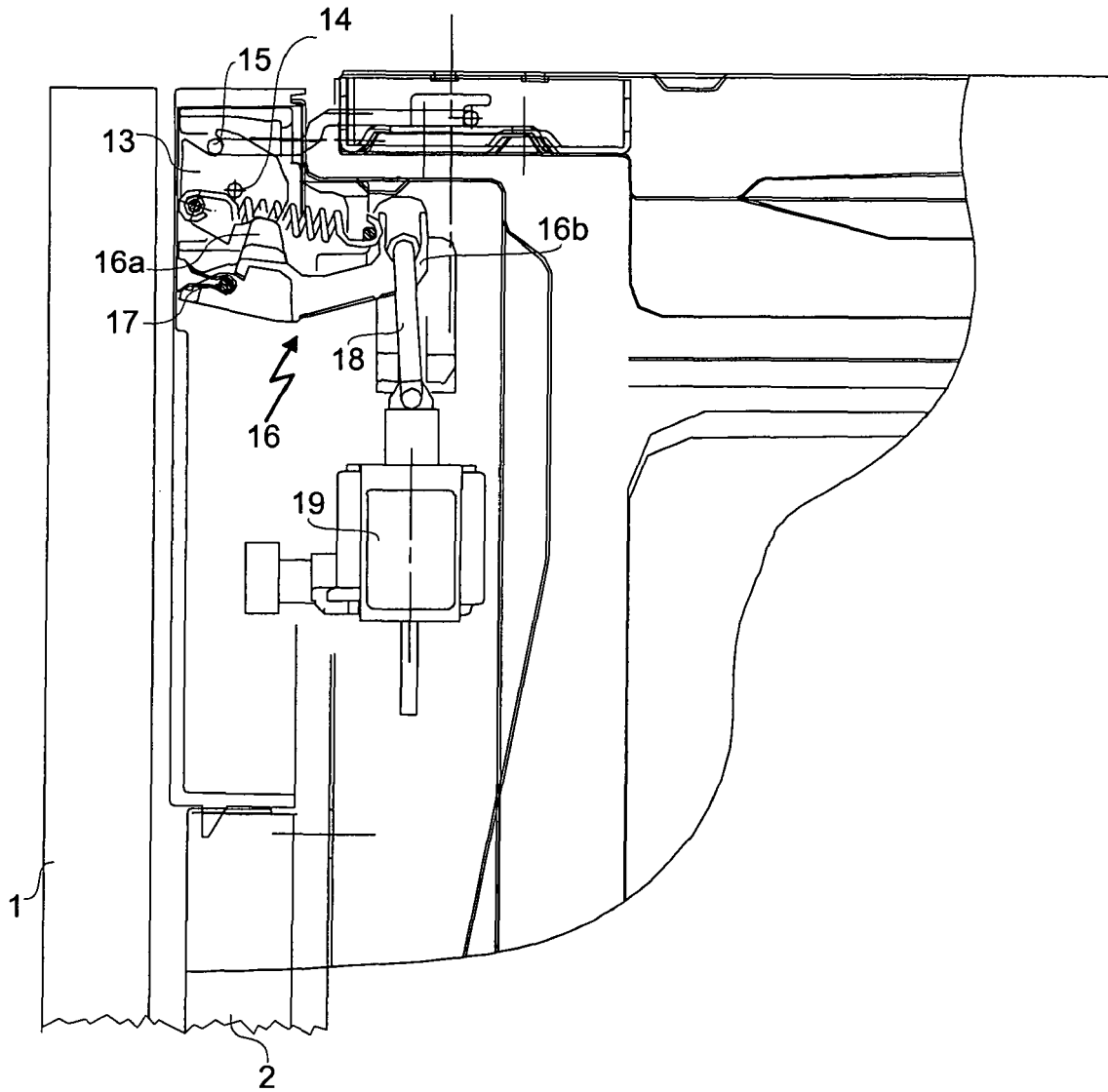


Fig. 2

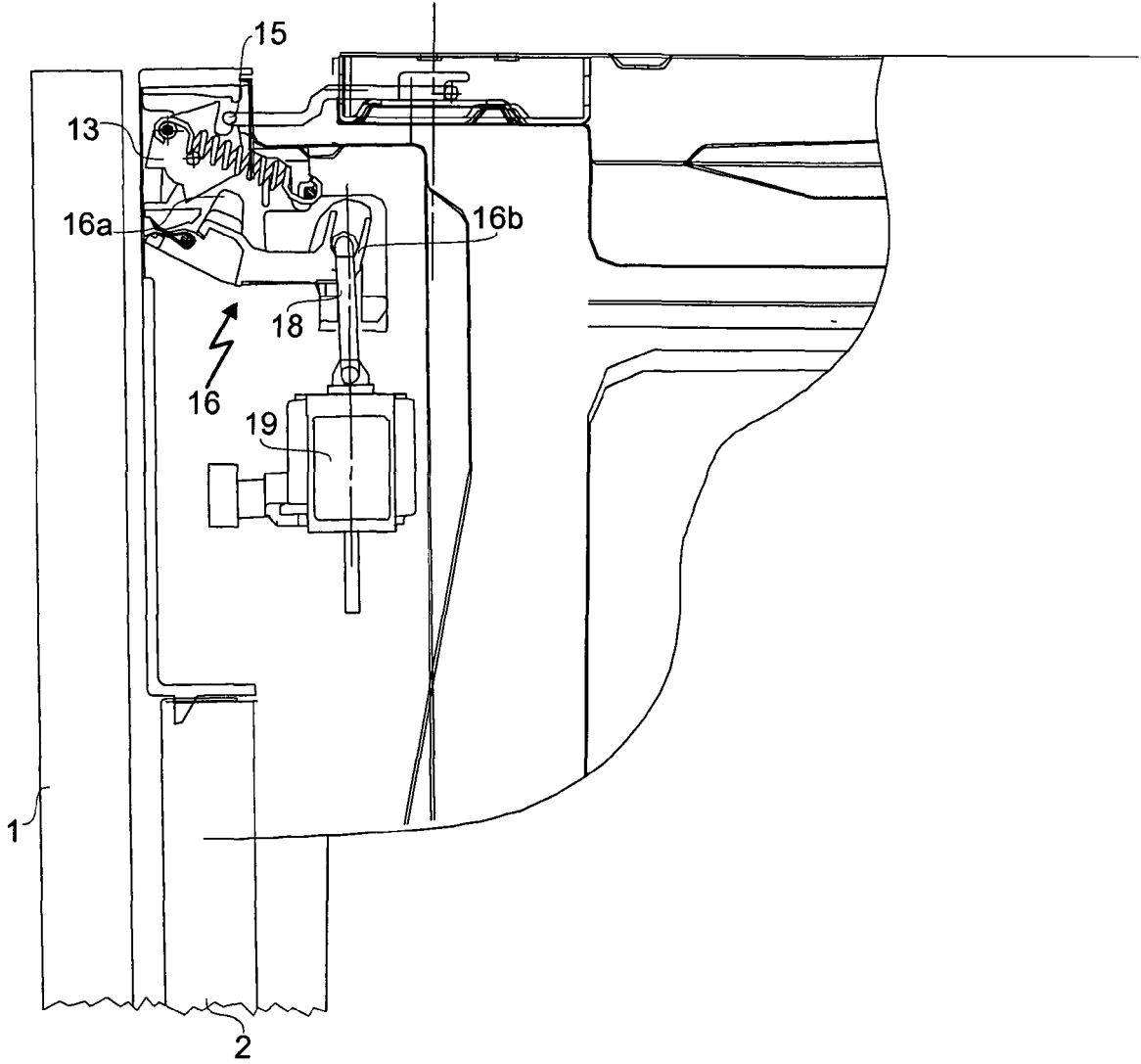


Fig. 3

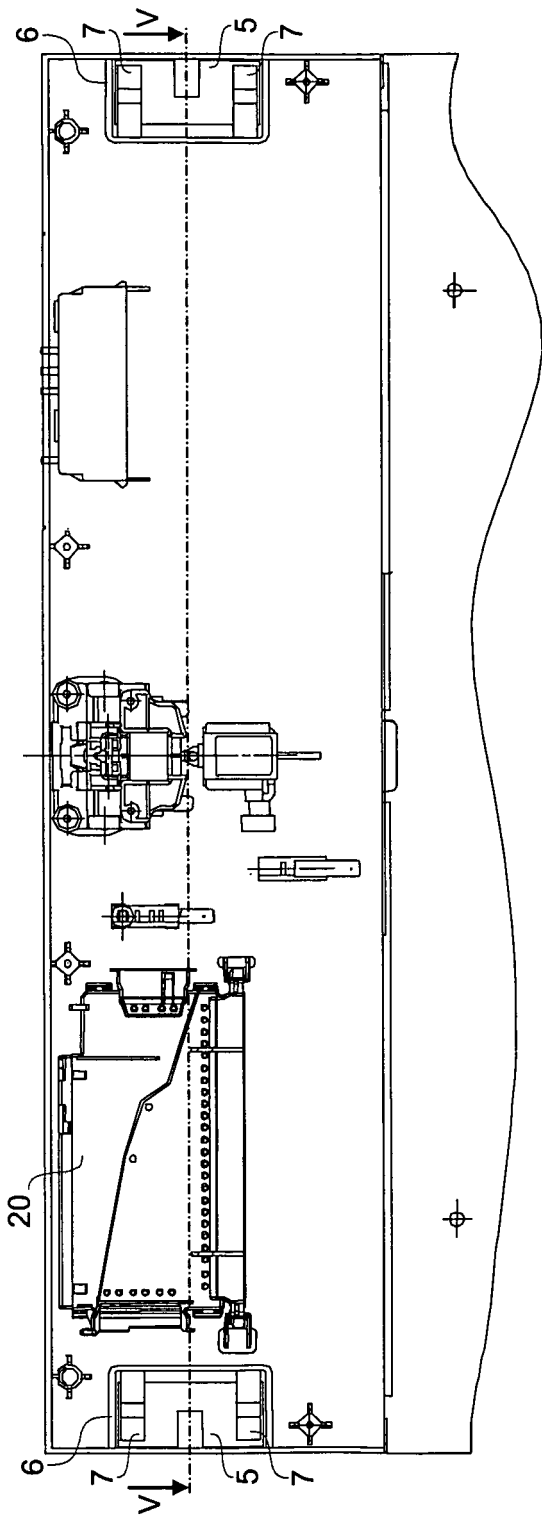


FIG. 4

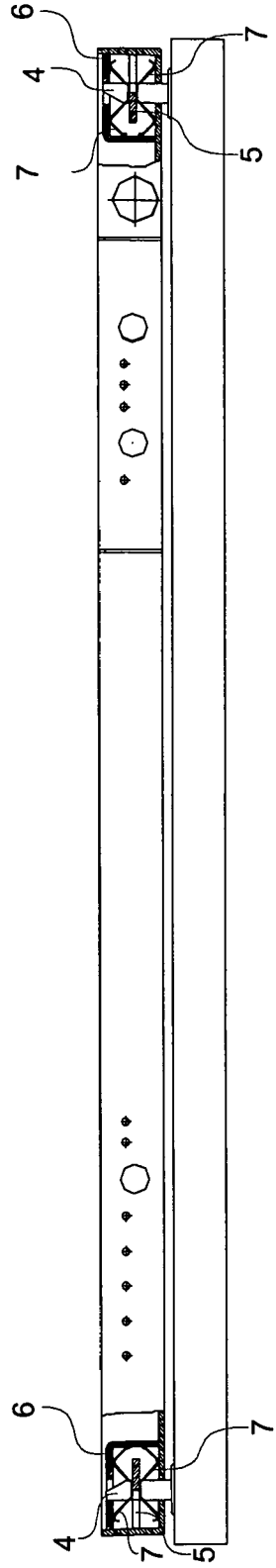


FIG. 5



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	EP 0 772 996 A2 (MIELE & CIE [DE]) 14 May 1997 (1997-05-14) * the whole document *	1,2	INV. A47L15/42
A	EP 0 669 098 A (MERLONI ELETTRODOMESTICI SPA [IT]) 30 August 1995 (1995-08-30) * the whole document *	1,2	ADD. F25D23/10
A	GB 2 238 576 A (ZANUSSI A SPA INDUSTRIE [IT]) 5 June 1991 (1991-06-05) * the whole document *	1,2	
			TECHNICAL FIELDS SEARCHED (IPC)
			A47L F25D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 11 July 2007	Examiner Jeziarski, Krzysztof
CATEGORY OF CITED DOCUMENTS		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	
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			

2
EPO FORM 1503 03/82 (P04C01)

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

EP 06 42 5844

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.

11-07-2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date		
EP 0772996	A2	14-05-1997	AT 206600 T	15-10-2001	
			DE 19541939 A1	15-05-1996	
			DE 59509691 D1	15-11-2001	
			ES 2164748 T3	01-03-2002	

EP 0669098	A	30-08-1995	IT T0940113 A1	23-08-1995	

GB 2238576	A	05-06-1991	DE 9015940 U1	07-02-1991	
			ES 1015704 U	16-08-1991	
			FR 2654914 A1	31-05-1991	
			IT 221381 Z2	16-03-1994	

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 1529482 A [0020]