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

Eingebautes Haushaltsgerät mit an seiner Tür angebrachter dekorativer Vorsatzplatte

Appareil domestique encastré avec panneau décoratif attaché sur la porte

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(73) Proprietor: **Bonferraro S.p.A.**
37060 Bonferraro (VR) (IT)

(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)

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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 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] EP-0772996-A2 discloses a household appliance with a decorative panel that is rigidly mounted on the appliance door so that a pull on the panel handle results in a deformation of the outer sheet metal of the door that allows an unlocking lever secured on the back of the panel to disengage the door lock, possibly through a microswitch. Such an arrangement is obviously unsuitable for a modern design kitchen as described above, in that it does not work by push and it requires a quite strong pull in order to deform the door enough to disengage the lock.

[0005] 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.

[0006] 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 by push by having the panel mounted on the door through a horizontal bottom hinge, 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.

[0007] The main advantage of the domestic appliance

with the device according to the present invention is therefore the possibility of opening the door by push 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.

[0008] 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.

[0009] 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.

[0010] 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 by the user allows for a small oscillation of panel 1 around a bottom horizontal hinge 3.

[0011] 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.

[0012] The strength of these springs 7 is selected such that a push 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 thanks to the rotation of the whole panel 1 around the bottom hinge 3.

[0013] 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 a possible pull movement by pressing microswitch 9.

[0014] 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 proximity sensors, load cells or the like. Moreover, it would obviously be possible to provide the movement only by push, thus dispensing with one of the movement sensors.

[0015] 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.

[0016] In the light of the above description, the operation of the present domestic appliance is readily understood.

[0017] 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.

[0018] 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.

[0019] 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.

[0020] 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 by push, and a panel movement sensor detects said relative movement and activates the actuator..

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), said appliance further including 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, **characterized in that** said mounting system allows the relative movement through a push on the panel (1) that is mounted on the door (2) so as to perform a small oscillation around a horizontal bottom hinge (3).
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** 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 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).
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.

Patentansprüche

1. Einbau-Haushaltsgerät mit einer Tür (2), die mit einer Dekorplatte (1) versehen ist, die an der Tür durch ein Befestigungssystem angebracht ist, welches eine Relativbewegung zwischen der Platte (1) und der Tür (2) erlaubt, welches Gerät ferner mindestens einen Bewegungssensor für die Platte (1) enthält, der dafür ausgelegt ist, die Relativbewegung zu erfassen und ein entsprechendes Signal abzugeben, sowie einen Aktuator, der dafür ausgelegt ist, einen Verschlussmechanismus der Tür (2) bei Empfang des Signals zu öffnen, **dadurch gekennzeichnet, dass** das Befestigungssystem die Relativbewegung durch Druck auf die an der Tür (2) befestigte Platte (1) ermöglicht, um so eine kleine Schwenkbewegung um ein horizontales unteres Scharnier (3) zu erlauben.
2. Einbau-Haushaltsgerät nach Anspruch 1, **dadurch gekennzeichnet, dass** die Bewegung der Platte (1) durch mindestens einen Mikroschalter (8, 9) erfasst wird, der durch einen an der Tür (2) befestigten und gegen die Platte (1) elastisch vorgespannten Stift (10, 11) geschaltet wird.
3. Einbau-Haushaltsgerät nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** das Bewegungssignal nicht direkt an den Aktuator gesendet wird, sondern eine Elektronikplatine (20) erreicht, welche den Aktuator aktiviert und ihn für eine definierte Zeitdauer aktiv hält.
4. Einbau-Haushaltsgerät nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** die Platte (1) mit dem oberen Abschnitt der Tür (2) durch ein Paar Haken (4) gekoppelt ist, die an der Rückseite der Platte (1) befestigt sind und dafür ausgelegt sind, in entsprechende C-förmige vertikale Kupplungsplatten (5) einzugreifen, die in der Tür (2) gebildeten Vertiefungen (6) untergebracht sind, welche Kupplungsplatten (5) durch Blattfedern (7) in den Vertiefungen (6) in einer zentralen Ruheposition gehalten sind.
5. Einbau-Haushaltsgerät nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** der Verschlussmechanismus der Tür (2) eine schwenkbare Klinke (13) aufweist, die für den Ein-

griff in einen Riegel (15) ausgelegt ist, wobei die Drehung der Klinke (13) durch einen Schwenkarm (16) verhindert wird, und der Aktuator, der dafür ausgelegt ist, den Verschlussmechanismus außer Eingriff zu bringen, ein elektromagnetischer Aktuator (19) ist, der eine Stange (18) hat, die in einem Sitz des Schwenkarms (16) in Eingriff steht, um so dessen Verschwenken und somit das Entriegeln der Klinke (13) zu verursachen, wenn der Aktuator (19) aktiviert wird.

Revendications

1. Appareil domestique encastré ayant une porte (2) pourvue d'un panneau décoratif (1) appliqué sur la porte par le biais d'un système de montage qui permet un mouvement relatif entre ledit panneau (1) et la porte (2), ledit appareil comprenant en outre au moins un capteur de mouvement de panneau (1) approprié pour détecter ledit mouvement relatif et pour émettre un signal correspondant, et un actionneur approprié pour débloquer un mécanisme de fermeture de la porte (2) après réception dudit signal, **caractérisé en ce que** ledit système de montage permet le mouvement relatif par le biais d'une poussée sur le panneau (1) qui est monté sur la porte (2) afin de réaliser une petite oscillation autour d'une charnière inférieure horizontale (3).
2. Appareil domestique encastré selon la revendication 1, **caractérisé en ce que** le mouvement du panneau (1) est détecté par le biais d'au moins un micro commutateur (8, 9) qui est commuté par une broche (10, 11) fixée sur la porte (2) et élastiquement sollicitée contre le panneau (1).
3. Appareil domestique encastré selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le signal de mouvement n'est pas directement envoyé à l'actionneur mais atteint une carte électronique (20) qui active l'actionneur et le maintient actif pendant une période définie de temps.
4. Appareil domestique encastré selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le panneau (1) est couplé à la partie supérieure de la porte (2) par le biais d'une paire de crochets (4) fixés à l'arrière du panneau (1) et appropriés pour mettre en prise des plaques de couplage verticales en forme de C (5) correspondantes logées dans des niches (6) formées dans la porte (2), lesdites plaques de couplage (5) étant maintenues dans une position de repos centrale dans lesdites niches (6) par des ressorts à lames (7).
5. Appareil domestique encastré selon l'une quelconque des revendications précédentes, **caractérisé**

en ce que le mécanisme de fermeture de la porte (2) comprend un verrou rotatif (13) approprié pour mettre en prise un cliquet de verrouillage (15), la rotation dudit verrou (13) étant empêchée par un bras rotatif (16), et l'actionneur approprié pour débloquer ledit mécanisme de fermeture est un actionneur électromagnétique (19) supportant une tige (18) mise en prise dans un siège dudit bras rotatif (16) afin de provoquer sa rotation et par conséquent le déverrouillage du verrou (13) lorsque ledit actionneur (19) est activé.

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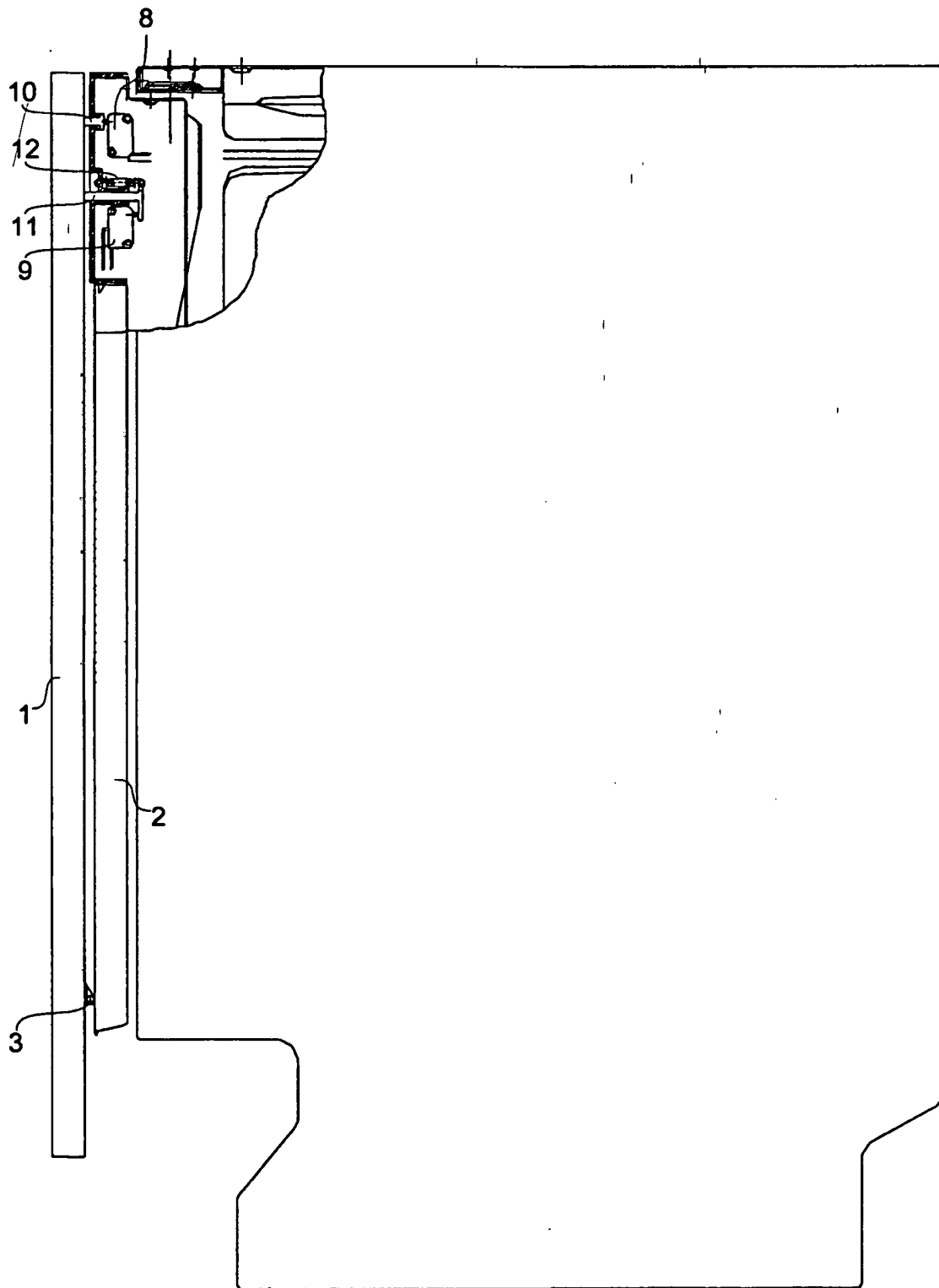


Fig. 1

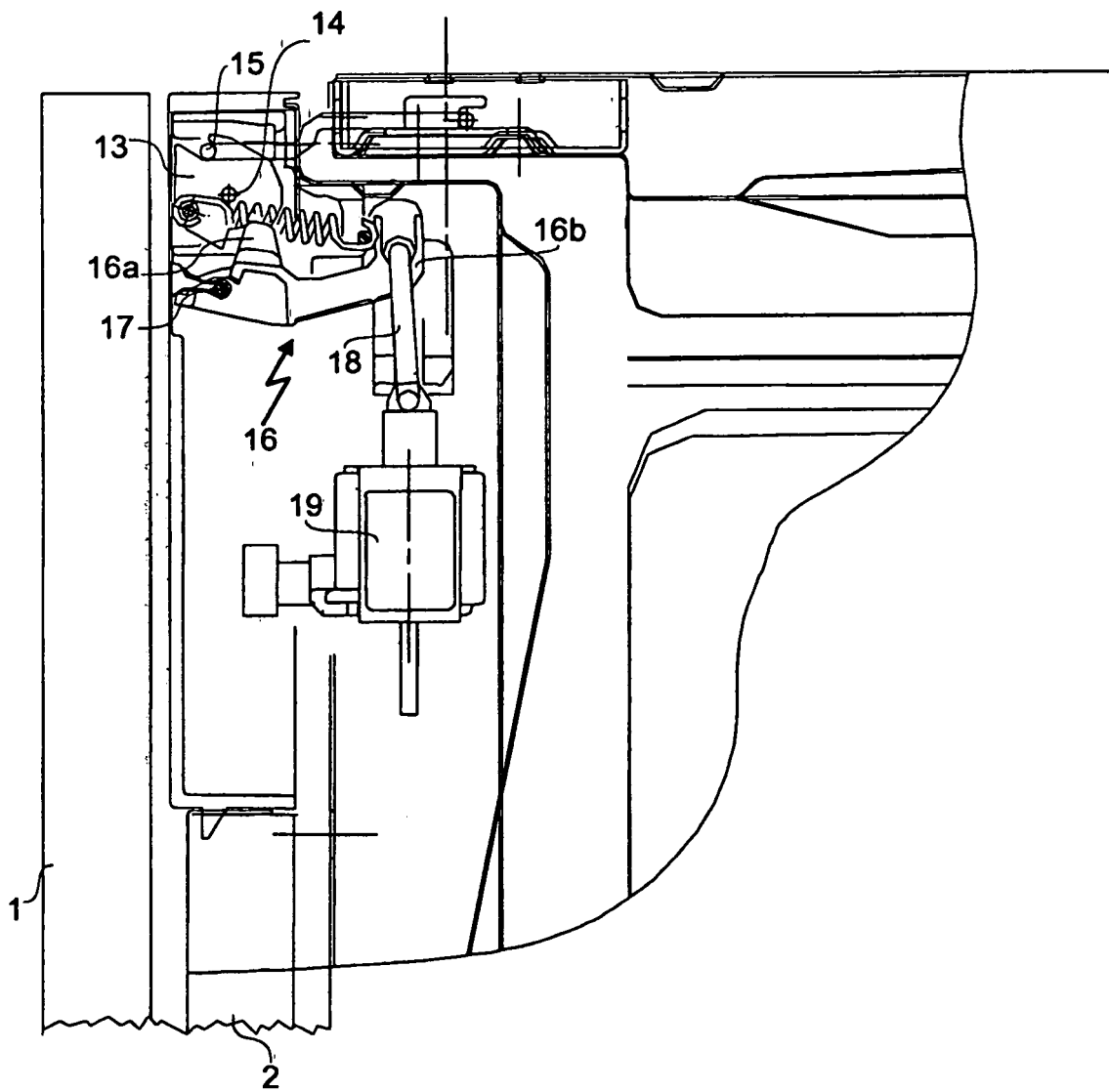


Fig. 2

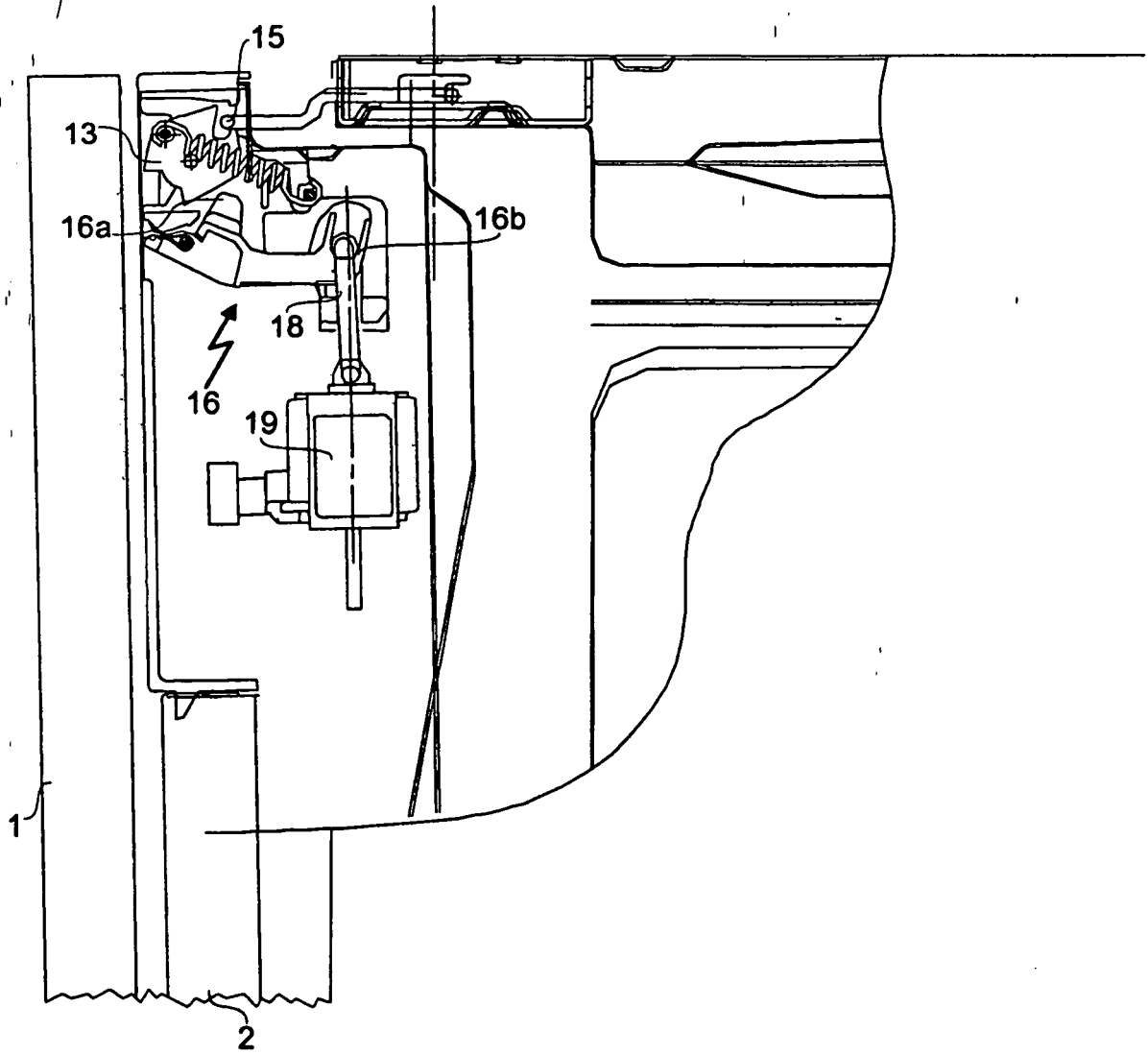


Fig. 3

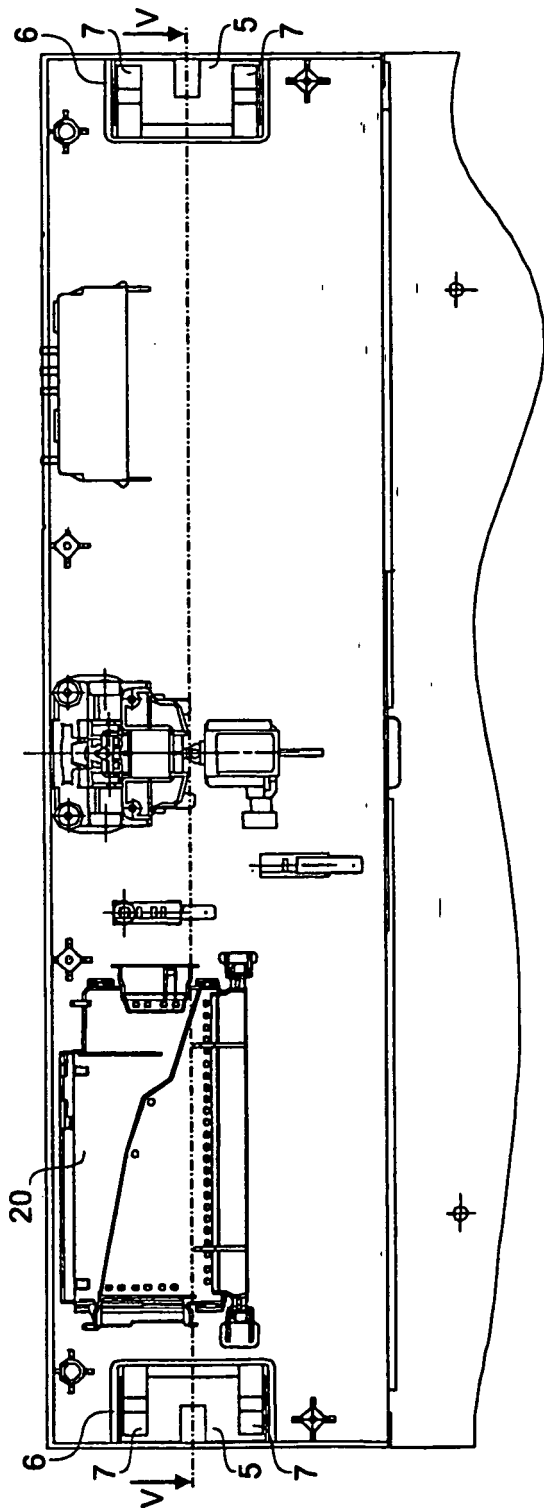


Fig. 4

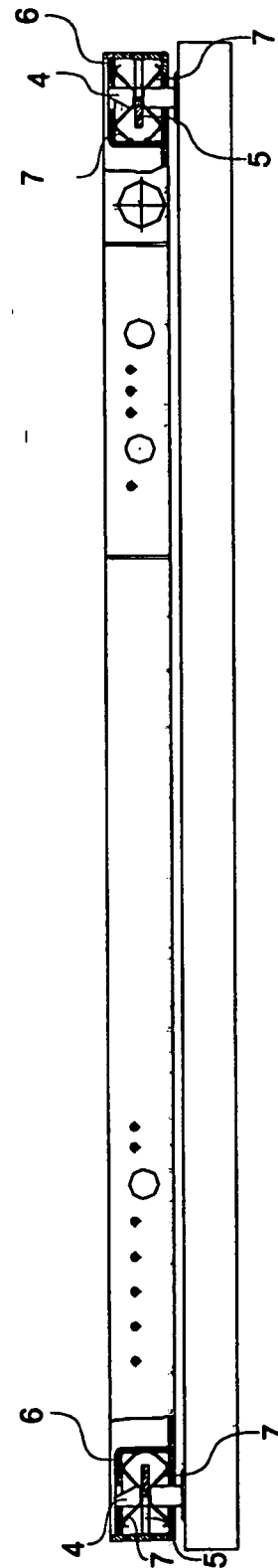


Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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