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

Einbauhaushaltsgerät mit einer an der Gerätetür befestigten dekorativen Platte

Appareil ménager intégré avec un panneau décoratif fixé sur la porte

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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 installed in kitchen furniture which completely encloses them (so-called "fully integrated"). 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 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, 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.

[0003] This solution which is fully satisfactory from the aesthetical point of view however has the drawback that it is not possible to check the operating cycle of the machine, e.g. checking which washing phase has been reached or detecting possible visual indications. Moreover, it is not possible to modify the cycle without stopping the operation of the machine due to the opening of the door.

[0004] To overcome this drawback there have been developed panel mounting devices which allow the vertical sliding thereof even when the door is closed, so that the user can raise and lower the panel without interrupting the operating cycle. Examples of these devices are disclosed in EP-744152, EP-819404 and EP-873715 which illustrate various embodiments different in structure but all substantially providing the same functionality. In brief, there are provided pins integral with the rear face of the panel which are engaged in vertical guides formed in the door, as well as a supporting device which controls the sliding of the panel through coupled elements respectively secured to the door and to the panel.

[0005] However these known devices are inadequate in the case of "fully integrated" appliances since the presence of the vertically sliding panel generates a problem of interference with the plinth which is positioned flush with the panel. In fact in this kind of installation the free space which is usually available below the panel for the vertical sliding thereof is taken up by the plinth, thus making impossible the lowering of the panel.

[0006] Therefore the object of the present invention is to provide a domestic appliance provided with a moving system for the decorative panel suitable to overcome the aforementioned drawbacks.

[0007] This object is achieved by means of a domestic appliance in which the mechanism which controls the panel movement includes a releasable hinge top coupling and a bottom connection with hinge means and

actuator means suitable to produce an outward movement of the bottom portion of the panel which takes on an angle with respect to the door prior to the descent movement.

[0008] The main advantage of the domestic appliance with the panel moving system according to the present invention is the possibility of having the panel perform a rotational-translational descent motion, so as to avoid the interference with the underlying plinth.

[0009] A further advantage of the present system stems from its extreme structural simplicity which makes it cheap and reliable.

[0010] 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 sectional side view showing a dishwasher according to the invention with an enlarged detail of the top coupling;

Figs.2, 3 and 4 are views similar to the preceding one showing the panel lowering sequence; and Figs.5, 6 and 7 are enlarged side views of the bottom members of the panel moving system, in the positions corresponding to said sequence.

[0011] With reference to Figs.1 and 2, there is seen that a dishwasher introduced inside a piece of furniture includes a decorative panel P applied to the door D, the distance between the bottom edge of panel P and the furniture bottom being covered by a plinth Z. Panel P is applied to the dishwasher through a mechanism including a top coupling T and a bottom connection B, illustrated in detail further on, in addition to the conventional pins integral with the rear face of the panel and engaged in vertical guides (not shown in the figures) formed in the door.

[0012] More specifically, the top coupling T consists of a peg R integral with panel P and abutting on the end of a horizontal rod A which is pushed forward by a spring M located at the opposite end. The push of spring M can be overcome by the action of an electric mechanism E suitable to retract rod A until it disengages peg R.

[0013] In the view of Fig.5 there is illustrated in detail the bottom connection between panel P and the door (not shown) which carries at about one third of its height a support C on which there are mounted a horizontal actuator F, a cushioned end stop H and a pair of rods J, K pivoted at their bottom ends on support C through respective pins V', U'.

[0014] In particular, the outer rod J is pivoted higher and forward with respect to the inner rod K, and at their top ends there is in turn pivoted a lever L, through respective pins V and U, which is connected through a pin N to a bracket S integral with panel P. It should be noted that when panel P is raised, lever L and rods J, K are substantially vertical, and also that lever L is abutting on

actuator F which is in the retracted position.

[0015] The simple and effective operation of the present moving mechanism for panel P is readily understood from the description above with the help of the other figures.

[0016] In the first phase of the movement, illustrated in Figs.3 and 6, actuator F is activated and extends to push lever L which rotates around pins N, U and V also causing a little backward rotation of rods J, K. In this position panel P takes on an angle of a few degrees (e.g. 2,5°-3°) with respect to the door, thanks to the play between the slide pins and the relevant guides and to the top hinge coupling between peg R and rod A. This small angle is however sufficient to take the bottom edge of panel P outside with respect to plinth Z, as clearly shown in Fig.3.

[0017] In the second phase of the movement, illustrated in Figs.4 and 7, the electric mechanism E is activated and overcomes the push of spring M to retract rod A until peg R is disengaged. At this moment the restraint between the panel and the door is limited to the slide pins and to the bottom parallelogram hinge and the panel slides down under the action of its own weight. The length of the descent travel is defined by the end stop H which absorbs the impact of rod K with elastic or pneumatic means.

[0018] It should be noted that in order to prevent damages there is provided a system for preventing the door opening when the panel is lowered, e.g. a sensor on the end stop H or on rod A to detect the position of the panel. To return the panel to the raised position it is sufficient for the user to push it upward until peg R engages rod A, thanks to the opposite beveling formed on said elements.

[0019] 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 top coupling T may be made in other ways and the same applies to the bottom connection as long as the latter allows to move panel P outside the furniture prior to the descent movement.

[0020] For example, the top coupling T could be any of the supporting systems described in the above-mentioned European patents which require the user's intervention to lower the panel. In other words, after the first phase of outward inclination the descent of the panel would not be automatic by gravity, upon disengagement of peg R, but manually controlled by the user.

Claims

1. A built-in domestic appliance with a door (D) provided with a vertically mobile decorative panel (P), **characterized in that** said panel (P) is applied to said door (D) through a mounting system including a releasable hinge top coupling (T) and a bottom connection (B) with a hinge means and an actuator

means suitable to produce an outward movement of the bottom portion of the panel (P) which takes on an angle of a few degrees with respect to the door (D) prior to the descent movement, the bottom portion of the panel not being aligned with respect to an underlying plinth prior to the panels descending movement.

2. A built-in domestic appliance according to claim 1, **characterized in that** it further includes a system which prevents the opening of the door (D) when the panel (P) is lowered, thanks to at least one sensor suitable to detect the position of the panel (P).

3. A built-in domestic appliance according to claim 1 or 2, **characterized in that** the top coupling (T) consists of a peg (R) integral with the panel (P) and abutting on the end of a horizontal rod (A) pushed into engagement position by a spring (M), as well as of an electric mechanism (E) suitable to move said rod (A) to disengage said peg (R) by overcoming the push of said spring (M).

4. A built-in domestic appliance according to claim 3, **characterized in that** the peg (R) and the corresponding engagement end of the rod (A) have opposite beveling suitable to allow the re-engagement of said members through an upward push.

5. A built-in domestic appliance according to one or more of the preceding claims, **characterized in that** the hinge means of the bottom connection (B) consist of a lever (L) pivoted between a bracket (S) integral with the panel (P) and a parallelogram hinge which is in turn pivoted on the door (D), the actuator means being arranged so as to be able to push said lever (L) when the panel (P) is in the raised position.

6. A built-in domestic appliance according to claim 5, **characterized in that** the parallelogram hinge is pivoted at about one third of the height of the door (D) and is made up of an outer rod (J) pivoted higher and forwardly with respect to an inner rod (K).

7. A built-in domestic appliance according to one or more of the preceding claims, **characterized in that** it includes cushioned end stop means (H).

8. A built-in domestic appliance according to claim 7 when appendant on claim 6, **characterized in that** said end stop means (H) are arranged so as to absorb the impact of the inner rod (K).

9. A built-in domestic appliance according to one or more of the preceding claims, **characterized in that** the top coupling (T) includes a support system for the panel (P) which requires the intervention of

the user to lower the panel (P) after the latter has been moved outward by the actuator means.

Patentansprüche

1. Einbauhaushaltsgerät mit einer Tür (D), die mit einer vertikal beweglichen dekorativen Platte (P) versehen ist, **dadurch gekennzeichnet, dass** die Platte (P) an der Tür (D) durch ein Befestigungssystem angebracht ist, das eine lösbare obere Scharnierkupplung (T) und eine untere Verbindung (B) mit einer Scharniereinrichtung und einer Betätigungseinrichtung enthält, die geeignet sind, eine nach außen gerichtete Bewegung des unteren Abschnitts der Platte (P) zu erzeugen, die einen Winkel von einigen Grad relativ zu der Tür (D) vor der Absenkbewegung einnimmt, wobei der untere Abschnitt der Platte relativ zu einem darunter liegenden Sockel vor der Absenkbewegung der Platte nicht ausgerichtet ist. 5 10 15 20
2. Einbauhaushaltsgerät nach Anspruch 1, **dadurch gekennzeichnet, dass** es ferner ein System enthält, welches das Öffnen der Tür (D) verhindert, wenn die Platte (P) abgesenkt ist, und zwar dank mindestens eines Sensors, der zum Erfassen der Position der Platte (P) geeignet ist. 25
3. Einbauhaushaltsgerät nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die obere Kupplung (T) aus einem mit der Platte (P) einstückigen Zapfen (R) besteht, der an dem Ende einer horizontalen Stange (A) anliegt, die durch eine Feder (M) in Eingriffsposition gedrückt wird, sowie aus einem elektrischen Mechanismus (E), der dafür ausgelegt ist, die Stange (A) durch Überwinden der Schubkraft der Feder (M) außer Eingriff mit dem Zapfen (R) zu bringen. 30 35 40
4. Einbauhaushaltsgerät nach Anspruch 3, **dadurch gekennzeichnet, dass** der Zapfen (R) und das entsprechende Eingriffsende der Stange (A) eine entgegengesetzte Abfasung haben, die dazu geeignet ist, das erneute Ineinandergreifen der Elemente durch eine nach oben gerichtete Schiebebewegung zu erlauben. 45
5. Einbauhaushaltsgerät nach einem oder mehreren der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** die Scharniereinrichtung der unteren Verbindung (B) aus einem Hebel (L) besteht, der zwischen einem mit der Platte (P) einstückigen Bügel (S) und einem Parallelogrammscharnier schwenkbar gehalten ist, welches wiederum an der Tür (D) schwenkbar gehalten ist, wobei die Betätigungseinrichtung so angeordnet ist, dass sie in der Lage ist, den Hebel (L) zu schieben, wenn die Platte 50

(P) in der angehobenen Position ist.

6. Einbauhaushaltsgerät nach Anspruch 5, **dadurch gekennzeichnet, dass** das Parallelogrammscharnier bei etwa einem Drittel der Höhe der Tür (D) schwenkbar gehalten ist und aus einer äußeren Stange (J), die relativ zu einer inneren Stange (K) höher und weiter vorne schwenkbar gehalten ist, aufgebaut ist. 5
7. Einbauhaushaltsgerät nach einem oder mehreren der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** es gedämpfte Endanschlageinrichtungen (H) enthält. 10
8. Einbauhaushaltsgerät nach Anspruch 7, sofern von Anspruch 6 abhängig, **dadurch gekennzeichnet, dass** die Endanschlageinrichtungen (H) so angeordnet sind, dass sie den Stoß der inneren Stange (K) absorbieren. 15
9. Einbauhaushaltsgerät nach einem oder mehreren der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** die obere Kupplung (T) eine Halterungssystem für die Platte (P) enthält, das den Eingriff des Benutzers zum Absenken der Platte (P) erfordert, nachdem diese durch die Betätigungseinrichtung nach außen bewegt wurde. 20

Revendications

1. Appareil ménager intégré avec une porte (D) pourvue d'un panneau décoratif verticalement mobile (P), **caractérisé en ce que** ledit panneau (P) est appliqué à ladite porte (D) au moyen d'un système de montage comprenant un couplage supérieur à articulation amovible (T) et une connexion inférieure (B) avec des moyens d'articulation et des moyens d'actionneur appropriés pour produire un mouvement vers l'extérieur de la partie inférieure du panneau (P) qui fait un angle de quelques degrés par rapport à la porte (D) avant le mouvement de descente, la partie inférieure du panneau n'étant pas alignée par rapport à une plinthe sous-jacente avant le mouvement de descente du panneau. 35 40
2. Appareil ménagé intégré selon la revendication 1, **caractérisé en ce qu'il** comprend en outre un système qui empêche l'ouverture de la porte (D) lorsque le panneau (P) est abaissé, au moyen d'au moins un capteur adapté à détecter la position du panneau (P). 45
3. Appareil ménagé intégré selon la revendication 1 ou 2, **caractérisé en ce que** le couplage supérieur (T) comprend une cheville (R) monobloc avec le panneau (P) et venant en butée avec l'extrémité 50

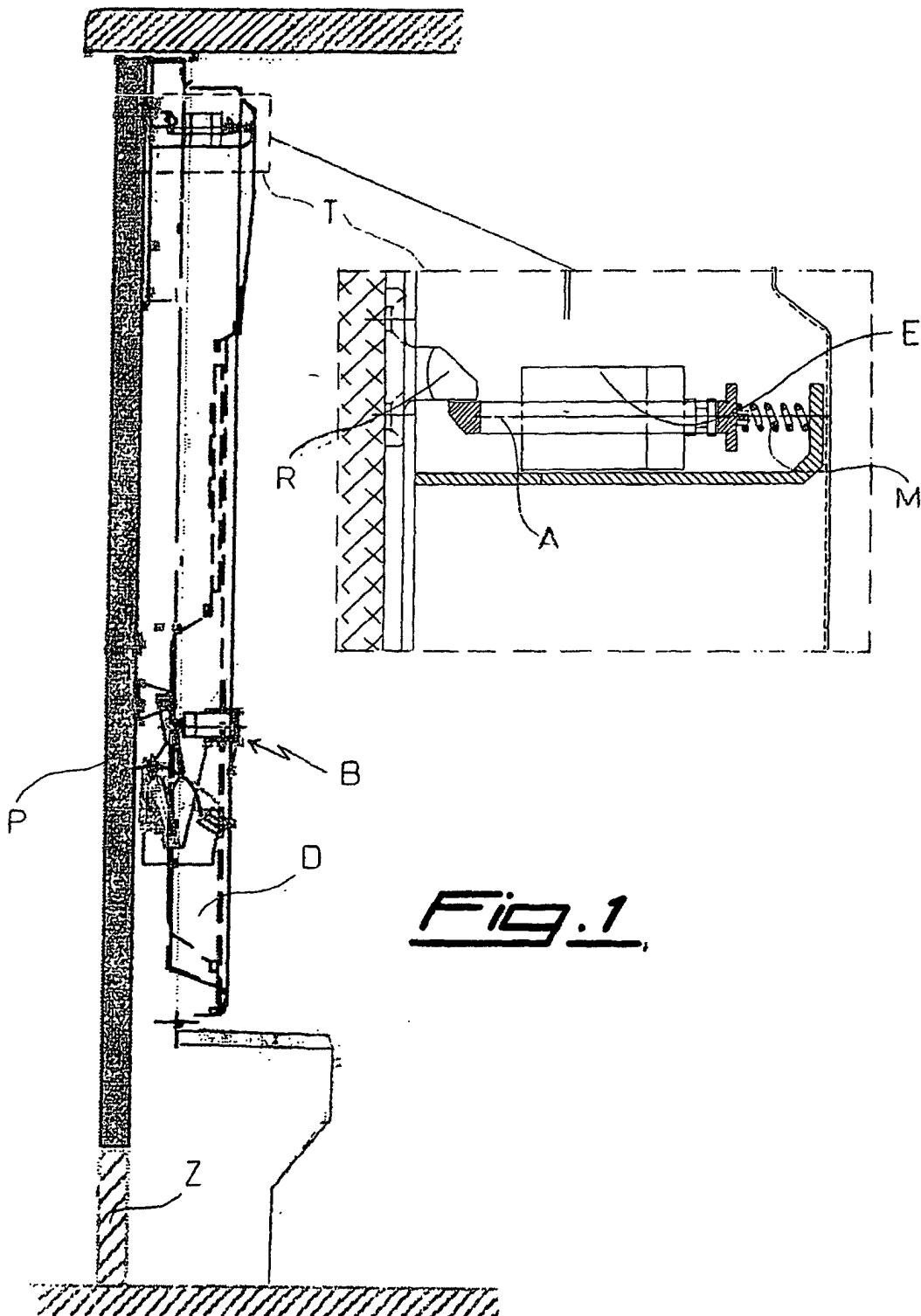
d'une tige horizontale (A) poussée en position d'engagement par un ressort (M) ainsi que d'un mécanisme électrique (E) adapté à déplacer ladite tige (A) pour se désengager de ladite cheville (R) en surmontant la poussée dudit ressort (M).

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4. Appareil ménagé intégré selon la revendication 3, **caractérisé en ce que** la cheville (R) et l'extrémité d'engagement correspondante de la tige (A) ont des chanfreins opposés adaptés à permettre un réengagement desdits éléments au moyen d'une poussée vers le haut. 10
5. Appareil ménagé intégré selon l'une ou plusieurs des revendications précédentes, **caractérisé en ce que** les moyens d'articulation de la connexion inférieure (B) comprennent un levier (L) pivoté entre un support (S) monobloc avec le panneau (P) et une articulation parallélogramme qui est à son tour pivotée sur la porte (D), les moyens actionneurs étant 15
arrangés de telle manière à être capables de pousser ledit levier (L) lorsque le panneau (P) est dans la position élevée. 20
6. Appareil ménagé intégré selon la revendication 5, **caractérisé en ce que** l'articulation parallélogramme est pivotée sur environ un tiers de la hauteur de la porte (D) et est réalisée par une tige externe (J) pivotant plus haut et en avant par rapport à une tige interne (K). 25
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7. Appareil ménagé intégré selon l'une ou plusieurs des revendications précédentes, **caractérisé en ce qu'il** comprend des moyens d'arrêt amortis (H). 35
8. Appareil ménagé intégré selon la revendication 7 lorsqu'elle dépend de la revendication 6, **caractérisé en ce que** lesdits moyens d'arrêt (H) sont arrangés pour absorber l'impact de la tige interne (K). 40
9. Appareil ménagé intégré selon l'une ou plusieurs des revendications précédentes, **caractérisé en ce que** le couplage supérieur (T) comprend un système de support pour le panneau (P) qui nécessite l'intervention de l'utilisateur pour rabaisser le panneau (P) après que ce dernier a été déplacé vers l'extérieur par les moyens actionneurs. 45

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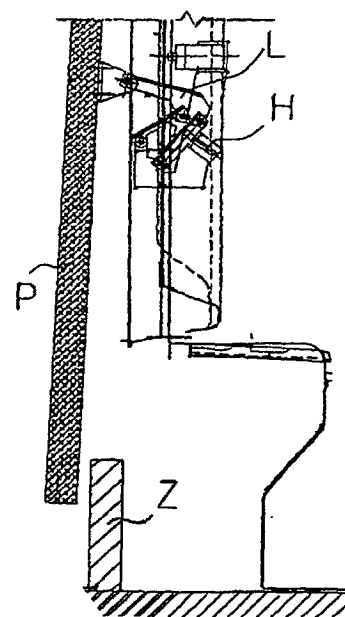
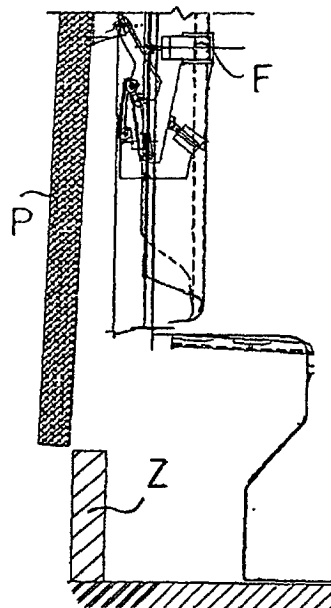
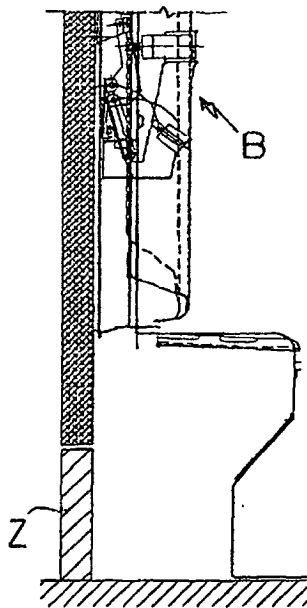
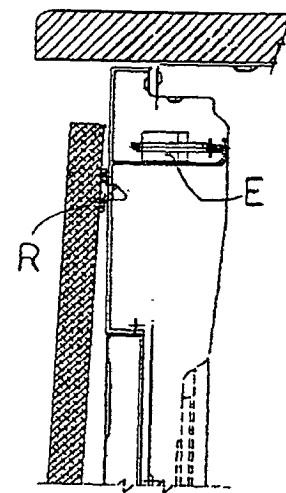
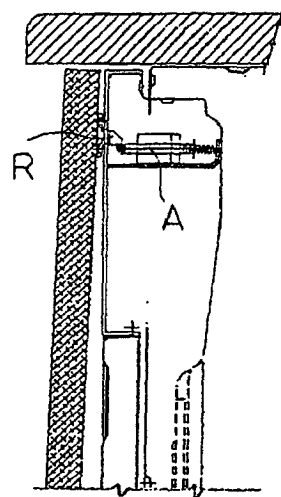
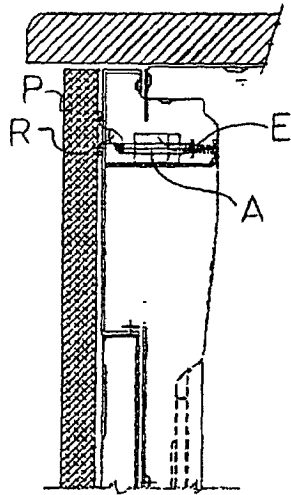


Fig. 2

Fig. 3

Fig. 4

