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(11) **EP 1 374 753 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
02.01.2004 Bulletin 2004/01

(51) Int Cl.7: **A47L 15/42**

(21) Application number: **02425406.2**

(22) Date of filing: **20.06.2002**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR**
Designated Extension States:
AL LT LV MK RO SI

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

(57) A built-in domestic appliance has a door provided with a vertically mobile decorative panel applied to the door through pegs integral with the rear side of the panel which engage vertical guides (A) formed in the door, and is provided as well with a supporting mechanism which controls the sliding of the panel through supporting means suitable to engage a further peg integral with the rear side of the panel and with actuator means

to automatically disengage said peg so as to cause the lowering by gravity of the panel. In this way the panel can be lowered automatically without requiring an intervention by the user, and at the top of the door there may be formed a grid (G) for discharging air coming from the tank through a duct (D) under the action of a fan (DF), which is activated only upon checking by a proper sensor of the lowered position of the panel.

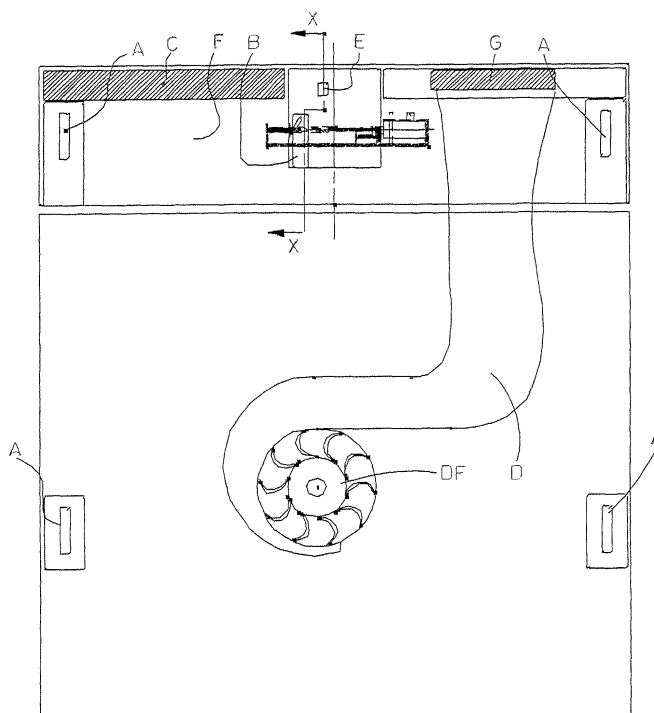


Fig. 1

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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 a domestic appliance provided with a mechanism for the automatic lowering of said panel. 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 its door, 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] However, this solution, though fully satisfactory from the aesthetical point of view, 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] In order to overcome this drawback there have been developed panel mounting devices which allow the vertical sliding thereof also 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-744142, EP-819404 and EP-873715 which illustrate various embodiments different in structure but substantially all providing the same functionality. In brief, there are provided pegs integral with the rear side of the panel which engage vertical guides formed in the door, as well as a supporting mechanism which controls the sliding of the panel through coupled members respectively secured to the door and to the panel.

[0005] However all these known devices require a manual operation which is not always easy, particularly downwards, depending on the type of panel handle and on how much the kitchen top projects out. Moreover, when the panel weight changes it is necessary to change the adjustment of the device to have it work smoothly, without requiring an excessive effort by the user nor allowing an unintentional descent of the panel.

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

[0007] This object is achieved by means of a domestic appliance wherein the mechanism controlling the panel descent includes an actuator suitable to disengage the panel so as to cause the lowering thereof without a user intervention.

[0008] The main advantage of the domestic appliance

with the panel moving mechanism according to the present invention is exactly the possibility of automatically lowering the panel, without requiring any user intervention nor any adjustment according to the panel weight.

[0009] A further advantage of the present appliance stems from the fact that this automatic movement allows the combination of the panel descent with the final drying step, by forming a grid to discharge damp air at an area of the front piece which becomes accessible only when the panel is lowered.

[0010] Still another advantage of this appliance results from the greater simplicity of the mechanism performing the door lock blocking when the panel is lowered, said mechanism being integrated in the above-mentioned automatic mechanism.

[0011] 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 front view showing a dishwasher according to the invention, in which the decorative panel has been removed;

Fig.2 is a schematic enlarged view from inside the machine showing in detail the mechanism with the panel engaged in the raised position;

Fig.3 is a schematic top plan view similar to fig.2;

Fig.4 is a schematic vertical sectional view taken along line X-X of fig.1, still with the panel engaged in the raised position;

Figs.5, 6 and 7 are views respectively similar to figs. 2, 3 and 4 illustrating the panel descent movement; and

Figs. 8 and 9 are views respectively similar to figs. 2 and 3 showing how the panel can be re-engaged in the raised position even if the disengaging actuator is still active.

[0012] With reference to Fig.1, there is seen that a dishwasher according to the invention includes four vertical guides A where the panel mounting pegs slide, so as to allow to make the top of the front piece F accessible. In this area there are formed the control panel C and a grid G for discharging the air coming from the tank, through a duct D, under the action of a fan DF. In the front piece F there are also formed, at a substantially central position, an opening E and a vertical slot B through which the panel interacts with the mechanism which controls the panel movement and the door locking.

[0013] Figures 2 to 4 illustrate said mechanism in the position of raised panel, when the door can be opened without risk of interference with the underlying plinth.

[0014] A peg P having a shaped profile is mounted on panel Q and through slot B enters a housing H enclosing the mechanism, which mechanism can be divided into

a part for supporting and releasing panel Q and a part for controlling the door lock.

[0015] The supporting and releasing part includes a latch R shaped so as to extend on both sides of peg P and pushed into engagement position by a spring S'. On the other side with respect to said spring, latch R is in contact with a pusher N which can be activated by an actuator M by overcoming the resistance of a similar spring S. Also, at the bottom of slot B there is provided a shock-absorber T which acts as an end stop to cushion the impact at the end of the descent of panel Q.

[0016] The door lock controlling part essentially consists of a driving lever L, a door-locking hook K connected to a rod U, and a pair of microswitches W, W' with normally closed contacts. More specifically, lever L is pivoted on an axis I and includes a central body from which an arm La extends forward to enter opening E, while a rear arm Lb extends up to microswitch W.

[0017] Hook K is pivoted on axis Y and includes a hooking portion for engagement with abutment J (integral with the machine body) and a sector Ka, which in the illustrated position is free to rotate and enter between the central body and the forward arm of lever L. A rod U is pivoted at the lower end of hook K through a pin V and extends up to microswitch W', being in turn pivoted on an axis O.

[0018] In this position of raised panel Q, arm La is pushed upward and thus causes the rotation of lever L and the opening of microswitch W by arm Lb to indicate said raised position. Moreover, the rotation of lever L also allows the rotation of hook K and therefore its disengagement from abutment J, so as to unlock the door and to allow the opening thereof as indicated by the slightly open position of fig.4.

[0019] In the light of the above description and with reference also to figs.5-7, the operation of the present dishwasher is readily understood.

[0020] At the beginning of the operating cycle, or at any desired time, actuator M is activated so that, through pusher N, it moves latch R (by overcoming the resistance of springs S, S') enough to disengage peg P and have it slide down by gravity along slot B until it abuts on shock-absorber T. Upon deactivation of actuator M, spring S moves back pusher N to its rest position and spring S' moves back latch R into abutment with said pusher N.

[0021] In this way the control panel C and grid G are no longer covered by panel Q and the forward arm La can project through opening E, while the rear arm Lb allows microswitch W to close and the central body of lever L forbids the rotation of sector Ka so as to prevent the disengagement of the door lock (fig.7).

[0022] When the panel is lowered it is therefore possible to end the cycle with a drying step with vapour discharge through grid G, and microswitch W is exactly deputed to checking that this is possible. In fact if for any reason panel Q does not move down (mechanism failure, jammed panel or other), in order to avoid sending

vapour to areas where damages from moisture may occur, fan DF is not activated and the drying takes place by internal condensation. The microprocessor which controls the machine will however indicate that a malfunctioning occurred yet without keeping from going on with the washing cycles.

[0023] The other microswitch W' is deputed to checking the correct locking of the door to start the machine: when hook K rotates to engage abutment J it consequently rotates also rod U around axis O, through pin V, thus causing the closure of microswitch W'.

[0024] At the end of the cycle to return the panel to the raised position, so as to be able to open the door, it is sufficient for the user to push the panel upward so that peg P moves sideways latch R, by overcoming the resistance of spring S', until the latter moves back latch R to the engagement position of fig.2. The opposite chamferings on the top side of peg P and on the bottom side of latch R, at the area of contact between the two members, facilitates such a re-engagement action.

[0025] However it should be noted that if the user wishes to open the dishwasher at any time during the cycle he can do that even if actuator A is activated, as shown in figs.8 and 9. In fact in this case the rising peg P will meet with pusher N projecting into slot B and will rotate it slightly upward so as to disengage latch R, which is then free to return to the engagement position under the push of spring S'. Upon opening of the door actuator M is thus deactivated, so that spring S returns pusher N to its rest position, and is then re-activated upon closing of the door to lower the panel again.

[0026] 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 exact shape and arrangement of the members can be somewhat changed according to manufacturing needs as long as the panel supporting mechanism is automatically disengageable upon command from the microprocessor.

Claims

1. Built-in domestic appliance with a door provided with a vertically mobile decorative panel (Q) applied to the door through pegs integral with the rear side of said panel (Q) and engaged in vertical guides (A) formed in the door, and having as well a supporting mechanism which controls the sliding of the panel (Q) through supporting means suitable to engage a further peg (P) integral with the rear side of the panel (Q), **characterized in that** said mechanism includes actuator means to automatically disengage said peg (P) so as to cause the lowering by gravity of the panel (Q).
2. Built-in domestic appliance according to claim 1, **characterized in that** at the top of the door there

is formed a grid (G) for discharging air coming from the tank through a duct (D) under the action of a fan (DF), which is activated only upon checking by a proper sensor of the lowered position of the panel (Q).

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to a microswitch (W'), said rod (U) being pivoted on an axis (O) so that when the hook (K) rotates to engage an abutment (J) it consequently rotates also the rod (U) thus causing the closure of said microswitch (W').

3. Built-in domestic appliance according to claim 2, **characterized in that** the sensor consists of a microswitch (W) which is acted on by the rear arm (Lb) of a lever (L) centrally pivoted on an axis (I) and including a forward arm (La) projecting through an opening (E) formed at the top of the door so as to be arranged on the path of the panel (Q). 10
4. Built-in domestic appliance according to claim 3, **characterized in that** it further comprises a system to prevent the opening of the door when the panel (Q) is lowered thanks to a sector (Ka) of a door-locking hook (K), the rotation of said sector (Ka) being forbidden by the central body of the lever (L) when the forward arm (La) projects through the opening (E). 15 20
5. Built-in domestic appliance according to one or more of the preceding claims, **characterized in that** the mechanism for supporting and disengaging the peg (P) includes a latch (R) shaped so as to extend on both sides of the peg (P) and pushed into engagement position by a relevant spring (S'), on the opposite side with respect to said spring (S') there being provided in contact with said latch (R) a pusher (N) which can be driven by an actuator (M) by overcoming the resistance of a relevant spring (S). 25 30 35
6. Built-in domestic appliance according to claim 5, **characterized in that** the peg (P) and the corresponding engagement end of the latch (R) have opposite chamferings suitable to allow the re-engagement of said members through an upwards push. 40
7. Built-in domestic appliance according to claim 5, **characterized in that** when the actuator (M) is activated the pusher (N) is arranged on the rising path of the peg (P) and can be rotated by the latter through an amount sufficient to cause the disengagement of the latch (R) from the pusher (N). 45
8. Built-in domestic appliance according to one or more of the preceding claims, **characterized in that** it includes a shock-absorber (T) acting as end stop for the peg (P). 50
9. Built-in domestic appliance according to one or more of the preceding claims, **characterized in that** it includes a system for checking the door lock through a rod (U) pivoted at the bottom of the door-locking hook (K) through a pin (V) and extending up 55

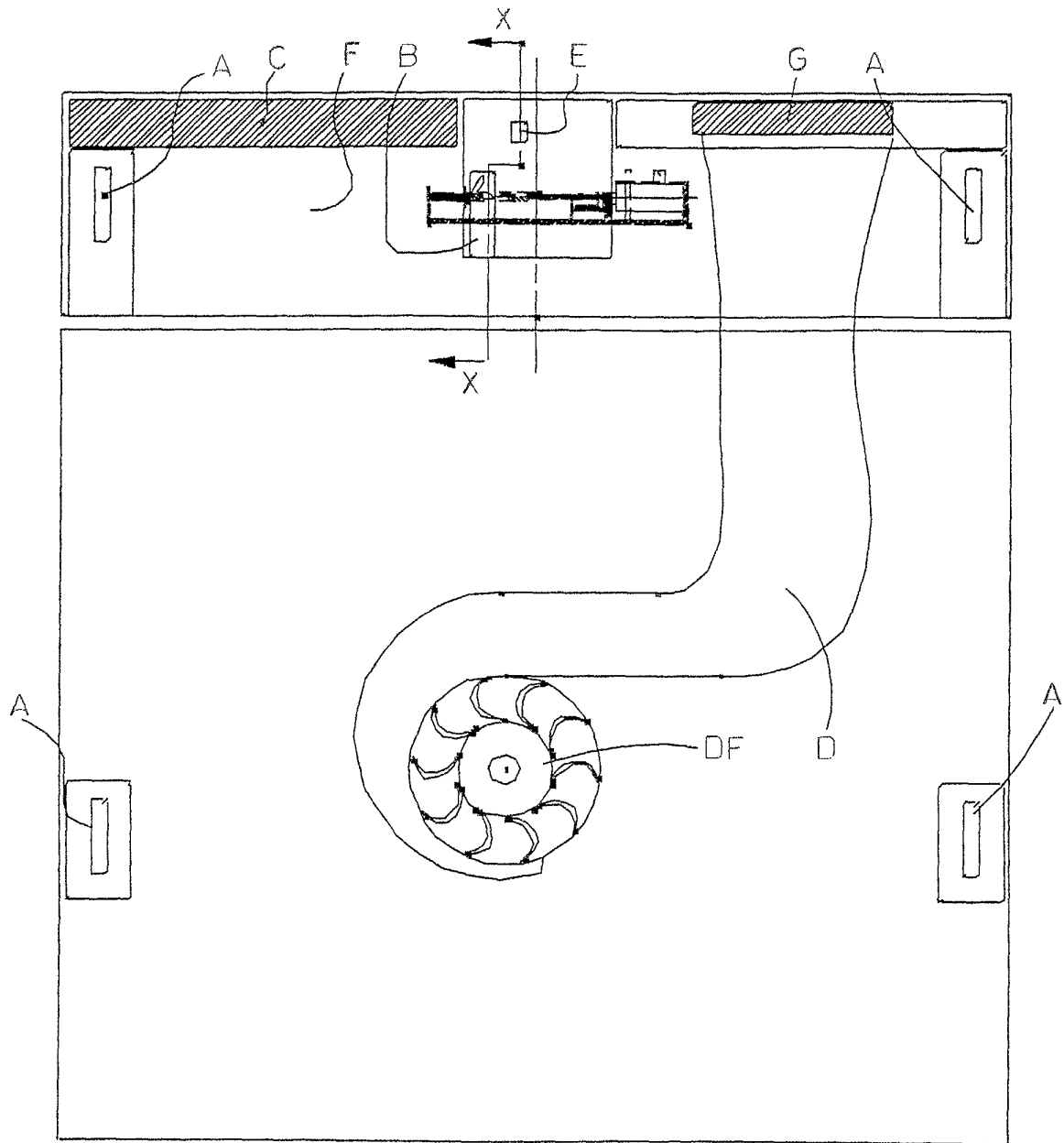


Fig. 1

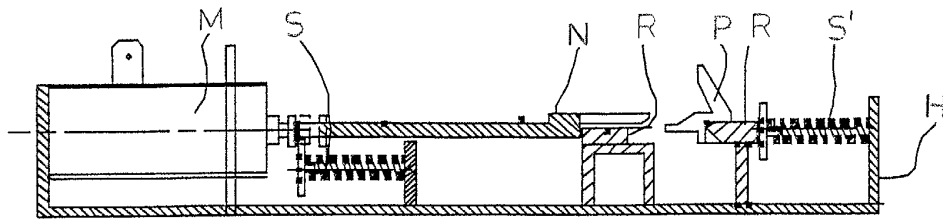


Fig. 2

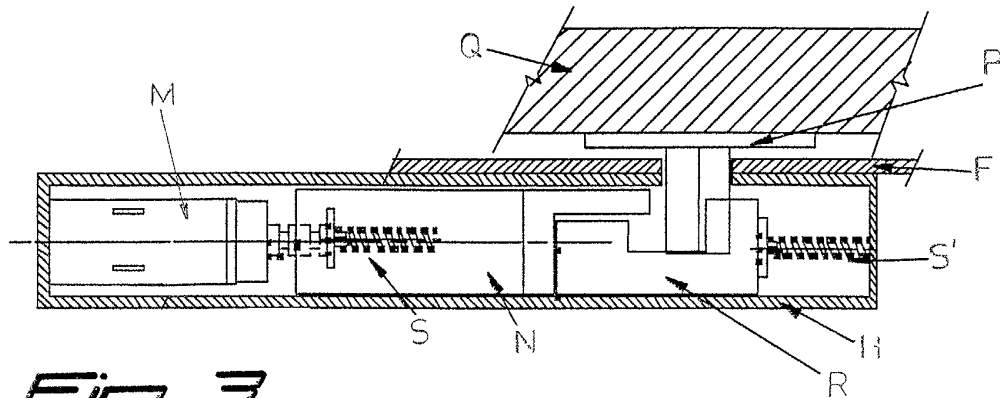


Fig. 3

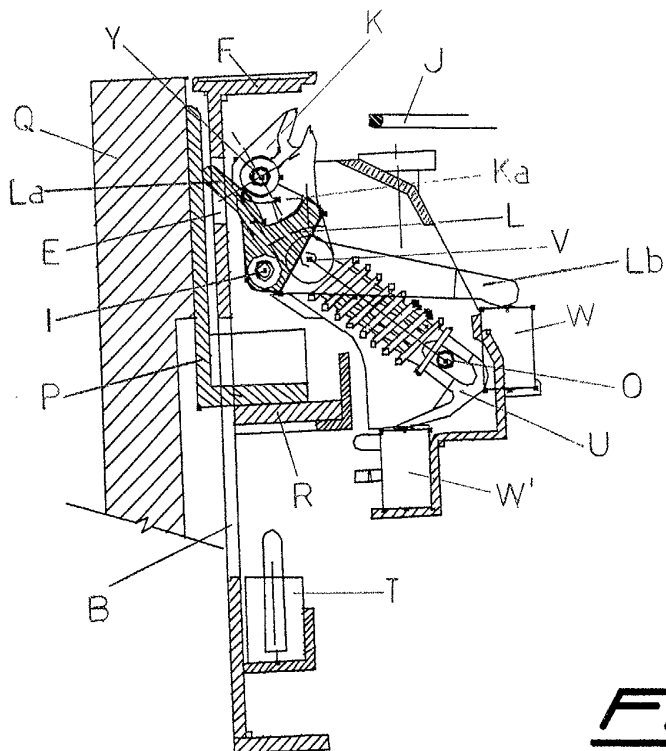


Fig. 4

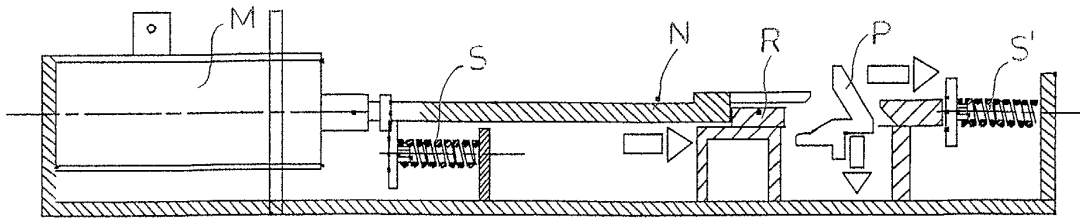


Fig. 5

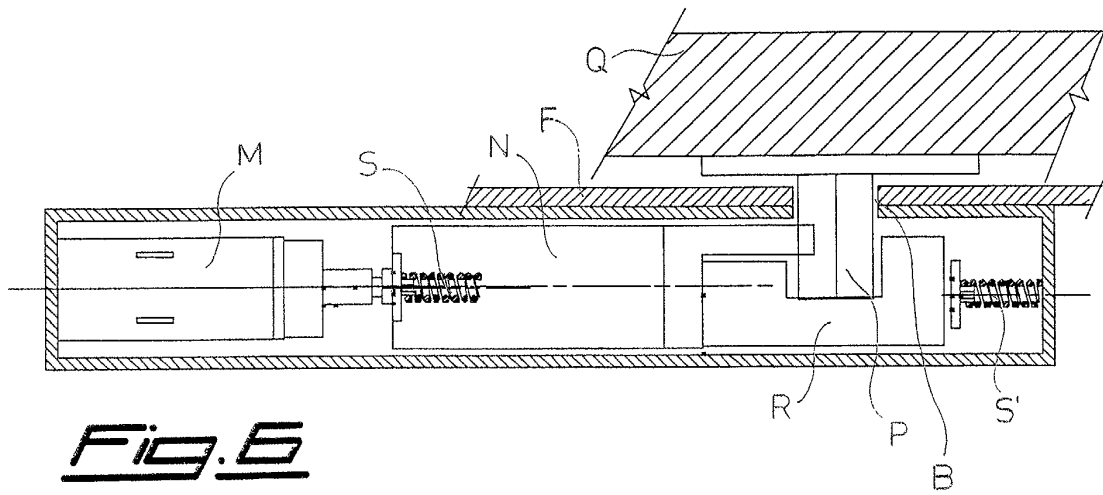


Fig. 6

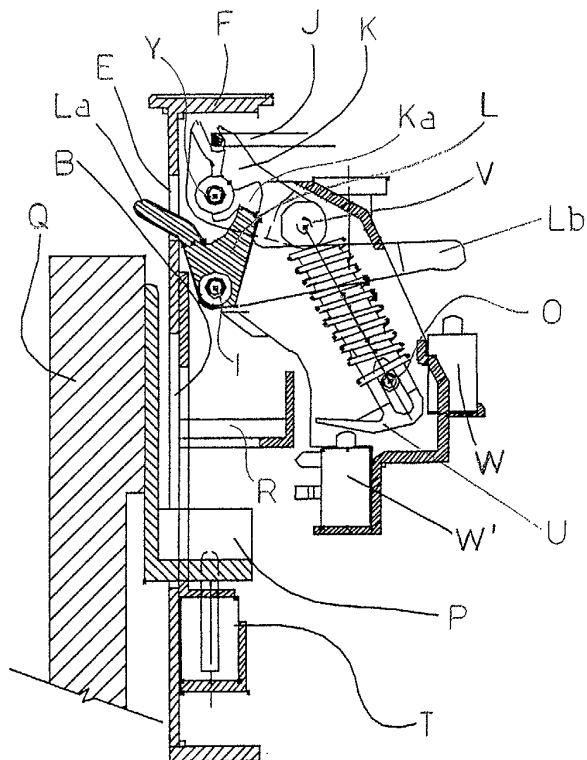


Fig. 7

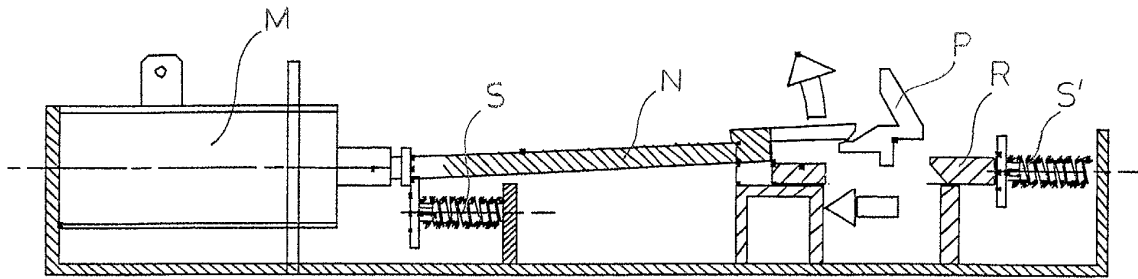


Fig. 8

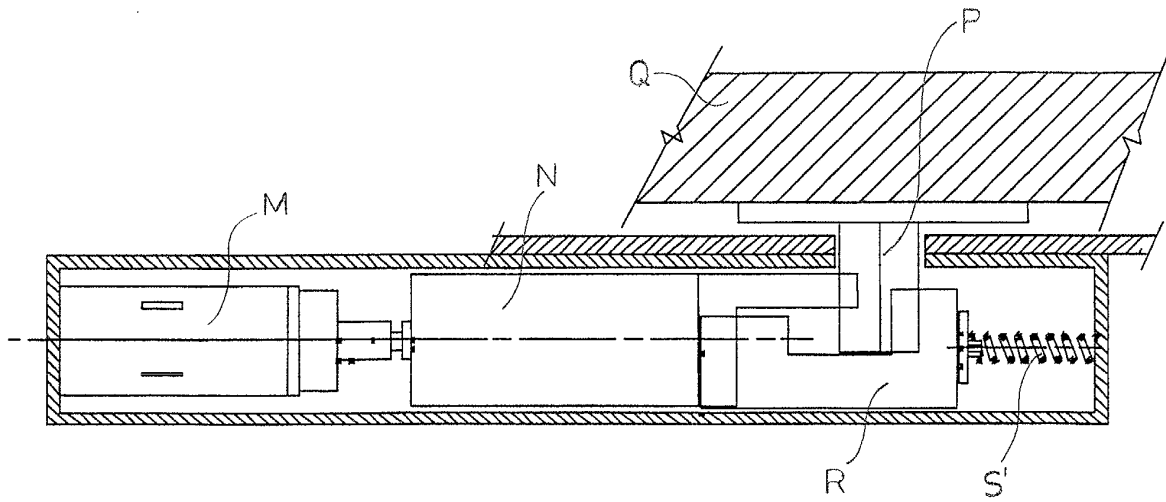


Fig. 9



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Application Number
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