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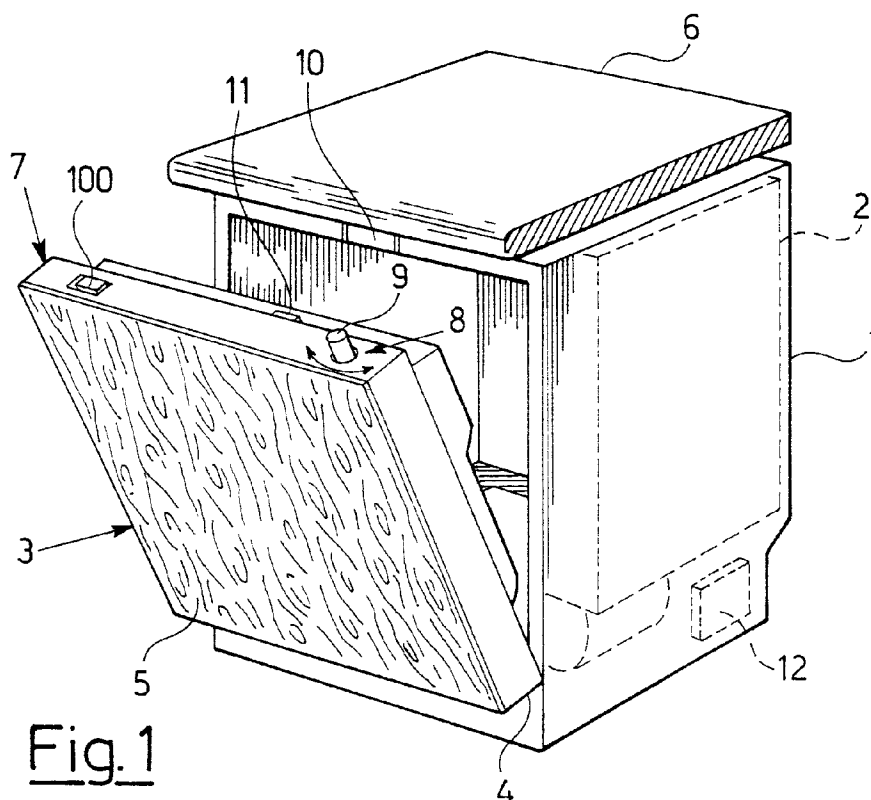
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**AL LT LV MK RO SI**(30) Priority: **14.01.1997 IT MI970012 U**(71) Applicant: **CANDY S.p.A.****I-20052 Monza (Milano) (IT)**(72) Inventor: **Fumagalli, Silvano****20052 Monza (MI) (IT)**(74) Representative: **Mittler, Enrico****c/o Mittler & C. s.r.l.,****Viale Lombardia, 20****20131 Milano (IT)****(54) Device for the selection of washing programs in washing machines**

(57) A device for the selection of washing programs for a washing machine comprising an access door (3) to a washing tank (2) hinged at its lower edge to a frame (1) of said washing machine. The selection device comprises a turning knob (9) with an axis of rotation substantially orthogonal to an upper edge (7) of the door (3)

and coupled to a driving shaft (13) of a rotary selector (14) operatively connected a programmer (12) mounted within said frame (1), the rotation of the knob (9) enabling to set the rotary selector (14), a seating (77) being provided in the upper edge (7) of the door (3) suitable to accommodate said knob (9).

**Fig.1****EP 0 857 454 A1**

## Description

The present invention refers to a device for the selection of washing programs for washing machines, in particular, though not exclusively, dishwashers of the integrally built-in type.

In dishwashers of the so called "integrally built-in" type, that must be embedded in unit type kitchen furniture, there is usually present a frontal covering, generally consisting of a full height covering panel on the access door of the washing tank, which has aesthetic features that are homogeneous with the rest of the kitchen furniture.

In these dishwashers it is therefore not possible to locate the control panel (which typically comprises a device for the selection of the operating program, and a number of other switches, among which a master switch to start the machine) on the front face of the appliance door.

Conventionally such problem has been solved by locating the controls on the upper edge of the door (that as known is hinged to the appliance at the lower edge thereof); said upper edge, when the door is closed, is covered by a front projection of the appliance or, more often, by the continuous worktop which is part of the kitchen furniture in which the appliance is embedded. In other words, since it is not possible to create a control panel on the door front, which has to be coated by the covering panel, a control panel is made on the upper edge of the door.

Obviously in this way the controls of the dishwasher can be reached only when the door is at least partially open.

In a known solution, the selection of the washing programs is accomplished by means of a knurled dial with axis orthogonal to the door front face, mortised on the driving shaft of a conventional electromechanical timer, that is also oriented in such a way as to have the driving shaft perpendicular to the door front face. A window in the upper edge of the door allows to reach by hand the cylindrical outer surface of the dial, which bears numerical or symbolic references enabling to visualise the selection being made.

Due to the reduced depth of the door, it is critical to house the electromechanical timer inside the control panel.

In view of the state of the art described above, an object of the present invention is to provide for a device for the selection of washing programs for an integrally built-in washing appliance, in particular for an integrally built-in dishwasher, that solves the problem encountered with the known devices, and in particular the problem dealing with housing the programmer inside the door.

According to the present invention, such object is attained by means of a device for the selection of washing programs for a washing appliance comprising an access door to a washing tank that is hinged at its lower

edge to a frame of said washing appliance, characterised in that it includes a turning knob with an axis of rotation substantially orthogonal to an upper edge of the door and coupled to a driving shaft of a rotary selector operatively connected to a programmer mounted within said frame, the rotation of the knob allowing to set the rotary selector, a housing suitable to contain said knob being provided on the upper edge of the door.

The characteristics of the present invention will be rendered more evident by the following detailed description of some embodiments thereof, that are illustrated as non-limiting examples in the enclosed drawings, wherein:

Figure 1 is a schematic axonometric view of an integrally built-in dishwasher with a device for the selection of washing programs according to the present invention, with loading door partially open; Figure 2 is a sectional view of the door according to a plane orthogonal to the same, showing a device for the selection of washing programs according to a first embodiment of the present invention; Figure 3 is a sectional view of the door according to a plane parallel to the front face of the same, when the door is close; Figure 4 is an analogous view to that of Figure 2, but it shows a variation of the device for the selection of washing programs according to the first embodiment of the present invention; Figure 5 is an analogous view to that of Figure 2, but shows a device for the selection of washing programs according to a second embodiment of the present invention; Figure 6 is an analogous view to that of Figure 3, but with the device for selection according to the second embodiment of the invention; Figure 7 is an enlarged plan view of the upper edge of the door equipped with the device for the selection of washing programs according to the second embodiment of the invention; and Figure 8 is a sectional view analogous to that in Figure 2 of a device for the selection of washing programs according to a third embodiment of the present invention.

With reference to the drawings, Figure 1 shows in a schematic axonometric view a dishwasher of the so-called integrally built-in type. The dishwasher comprises a frame 1 to be embedded in a specifically designed space in a kitchen furniture. Inside frame 1 a washing tank 2 is housed. Frame 1 and washing tank 2 have a front opening acceding to the same washing tank. Said front opening is closed by means of a door 3 hinged to the frame 1 in correspondence of its lower edge 4. The door 3 is frontally coated with a full height covering panel 5. Above the frame 1 lays a worktop 6 belonging to the kitchen furniture. The worktop 6 abuts frontally with respect to the frame 1, in such a way that when the door

3 is close, its upper edge 7 remains totally covered by the worktop 6.

Inside the upper edge 7 of the door 3 a control panel is provided which comprises a device for the selection of the washing programs 8 of the dishwasher, comprising a retractable knob 9, that will be described in greater details later. The device for the selection of washing programs 8 controls a programmer 12 that, unlike what is done conventionally, is not located within the door 3, but in a more spacious zone of the dishwasher, as for example inside the frame 1 under the washing tank 2; obviously other positions are also possible. The device for the selection of washing programs 8 is operatively connected to a programmer 12, in such a manner that the selection of the program made by means of the device for selection 8 is communicated to the programmer 12 which governs the operation of the dishwasher. In the control panel on the upper edge 7 of the door 3 a master switch 100 is also located, in a known manner, which controls the start and switch off of the dishwasher.

In Figure 1 another switch, provided for safety, is schematically shown comprising a micro-switch 10 placed on a frontal upper edge of the frame 1 and an actuator pin 11 placed on an internal wall of the door 3 in correspondence of the upper edge 7. When the door 3 is open, the micro-switch 10 and the actuator pin 11 are kept at a distance and the dishwasher cannot operate, even if the master switch 100 is in an on position. When the door 3, after having selected the requested program by means of the device for the selection of programs 8 and having brought the master switch 100 into an on position, gets closed, the switch 10 is activated by the pin 11 and the dishwasher starts working according to the selected program.

Figure 2 shows, in section according to a plane orthogonal to the panel 5 and to the upper edge 7 of the door 3, a portion of the latter in which a housing 77 is created for accommodating a device for the selection of washing programs 8 according to a first embodiment of the present invention. The device 8 comprises a turning knob 9, housed in a seating created in the upper edge 7 of the door 3. The knob 9 is mortised on a driving shaft 13 of a rotary selector 14 known per se, as for example the "resistive switch" produced and marketed, among others, by REMCO. The rotary selector 14 is fixed to a flange 15 projecting at square angle from a front wall 16 of the door 3 on which the covering panel 5 is applied, and has power terminals 17 connected, by means of respective conducting wires 18, to the programmer 12 housed for example in frame 1, under the washing tank 2, or in any case located in a different position with respect to the selection device 8, in any position where there is enough space to accommodate it. The programmer 12 is a traditional electromechanical timer, for example of the kind known on the market as EATON model ECR, or ELBI series 5000 or CROUZET model TMX, with two motors (one of quick rotation for the selection of washing programs, and the other with normal rotation

speed during the execution of a program), or with one single double-speed motor providing for the quick selection of the washing programs and the normal rotation speed during the execution of a program.

The knob 9 comprises an external body 19 substantially of cylindrical shape, and an internal body 20. The internal body 20 is mortised on a shaft 13 of the rotary selector 14; the external body 19 is sliding along the internal body 20 between two extreme positions, a position completely retracted (shown by dots and dashes in Figure 2 and as a continuous line in Figure 3) in which the upper surface of the external body 19 is substantially at the same level of the upper edge 7 of the door 3, and an extended position in which the external body 19 partially projects from the upper edge 7 of the door 3, in such a way as to enable the user to grab the external body 19 and to rotate it in order to select the desired washing program. The external body 19 and the internal body 20, though slidable with respect to each other in the direction of their common axis, are fixedly mounted with respect to the rotation, in such a way that when the external body 19 is extended and the user determines its rotation, such rotation is transmitted to the internal body 20 and therefore to the driving shaft 13 of the rotary selector 14. As visible in Figure 3, when the external body 19 of the knob 9 is in the completely retracted position, the door 3 can be closed, as the knob 9 does not interfere with the edge of the worktop 6 above the dishwasher. Inside the external body 19 of the knob 9 there are located elastic bias means that bias the external body in the extended position of Figure 2, and means for the locking/unlocking located on the external body 19 and on the internal body 20 that, when the external body 19 is pressed against the bias force of the elastic means, block the external body 19 in the retracted position, and when the external body 19 is pressed again, they disengage and let that the external body 19 is pushed by the elastic means in the extended position. Neither the elastic means, nor the locking/unlocking means are shown in the Figures since they are known per se.

The external body 19 comprises in addition a cylindrical band 21 on which indexes 22 are created that, when the external body 19 is extended, co-operate with a fixed index 23 located on the upper edge 7 of the door 3 in order to visualise the selection being made.

For the selection of the washing programs, the user must previously open the door 3 thus making the upper edge 7 of the door 3 accessible, then must press the external body 19 of the knob 9 in such a way that the locking/unlocking means mutually disengage and the elastic means determine the exit of the external body 19; at this point, acting with a rotation of the knob 9, and with the aid of the indexes 22 and the fixed index 23, the user can select the required washing program. Then, by pressing again the external body 19 of the knob 9 determines its retraction, and the locking/unlocking means block the external body 19 in the retracted position. The

user must therefore press the master switch 100. By closing the door, the connections 10, 11 of the dishwasher starter switch get closed and the dishwasher can start operating, under the control of the programmer 12, according to the selected washing program.

Figure 4 shows a variation of the device shown in Figures 2 and 3; the upper surface 26 of the external body 19 is rounded, and frontally to the dishwasher a plate with a rounded projection 25 extends. In this way, it is possible to close the door 3 even when the external body 19 of the knob 9 is in the extended position: when the rounded surface 26 comes into contact with the rounded projection 25, the latter determines automatically the retraction of the external body 19 of the knob 9. By means of a proper sizing, it can also be provided that upon opening the door the external body 19 of the knob 9 automatically comes out.

Figures 5, 6 and 7 show a device for the selection of washing programs 8 according to a second embodiment of the present invention. Unlike the device of Figures 2, 3 and 4, the knob 9 consists of a single piece, substantially of cylindrical shape, that is mortised directly on the driving shaft 13 of the rotary selector 14. The shaft 13 is solidly fixed to a shaft 27 of a switch 28. More precisely, on the lower edge of the shaft 27 a support 29 is fixed on the lower side of which a conducting plate 30 is applied. To the flange 15 of the wall 16 of the door 3 a support 31 is mounted from which two contact plates 32 extend which are connected to two power terminals 33. The shaft 13 and the shaft 27 are sliding in the direction of their common axis, between two extreme positions in one of which (shown in Figure 5) the knob 9 protrudes with respect to the upper edge 7 of the door 3 and simultaneously the support 29 is far from the two contact plates 32 of the switch, while in the other position (shown in Figure 6) the knob 9 is retracted and at the same time the support 29 is near the two contact plates 32, in such a way that the latter can be electrically connected through the conducting plate 30 establishing a power connection between the terminals 33 of the switch 28, that is therefore close. In this case also, the invention provides for elastic bias means of the knob 9 in the extended position, and locking/unlocking devices that, when the knob is pressed, maintain the latter in a retracted position, while when the knob 9 is pressed again release the knob which can protrude from the edge under the thrust of the elastic means.

Thanks to the present device, it is not necessary any longer to provide for a master switch 100 on the control panel, which is in fact substituted by the switch 28.

In this embodiment of the invention, a portion 50 of the outer cylindrical surface of the knob 9 is toothed, and it engages with a rack 51 mounted on a bracket 52 extending below the lower edge 7 longitudinally to it; the bracket 52 bears some indexes 53 corresponding to the different washing programs, and that can be read by the user through a window 54 located in the upper edge 7 of the door 3; on the latter there is also a fixed index 55

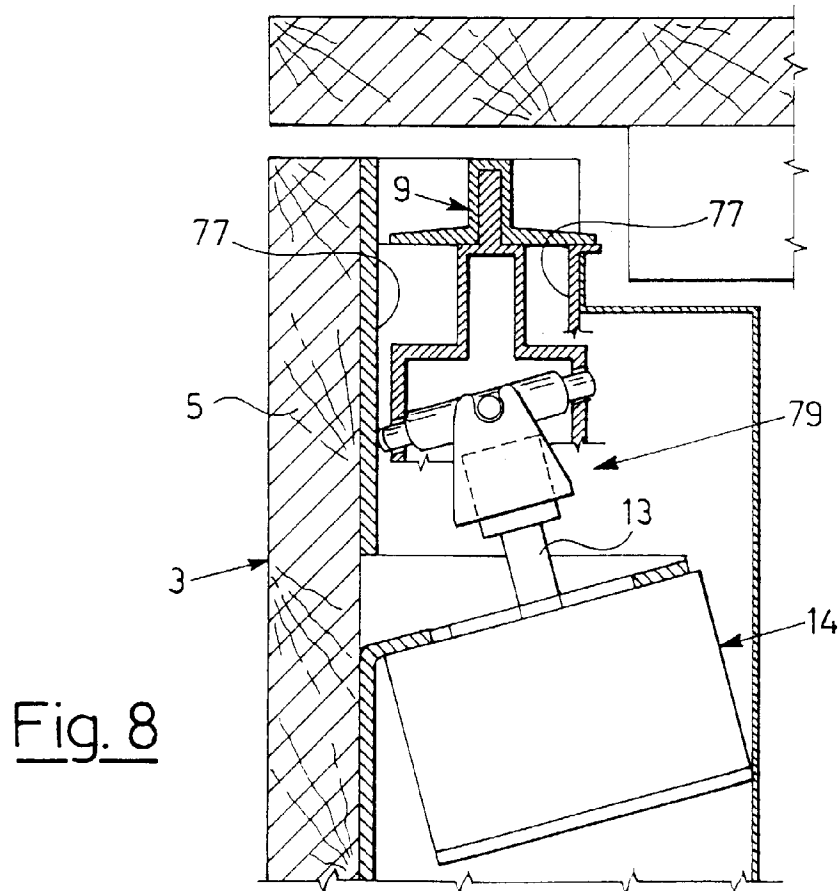
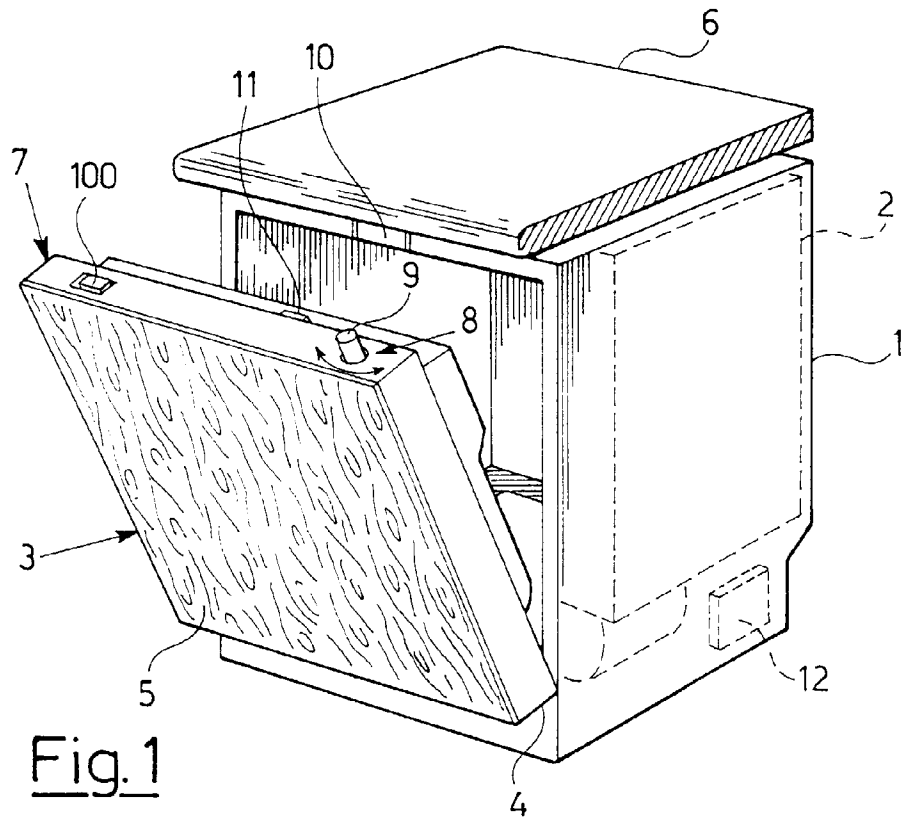
that co-operates with the indexes 53 on the bracket 52 in order to indicate the selected program. Turning the knob 9, determines the slide of the bracket 52 and therefore the displacement of the indexes 53 with respect to the fixed index 55. This system of visualisation of the selected programs could naturally be used also in combination with selection device 8 according to the previously described first embodiment. In addition, also in this case the upper surface of the knob 9 could be rounded, and could be provided with the rounded projection 25 shown in Figure 4, in such a way that the knob would retract automatically when the door 3 gets closed.

Finally, Figure 8 shows a device according to a third embodiment of the present invention. In this embodiment, the device comprises a turning knob 9 with axis substantially orthogonal to the upper edge 7 of the door 3. The knob 9 is housed in a seating 77 made in the edge 7, and it is coupled, by means of a pin joint 79 of the type described in the European Patent application No. 95200392.9 in the name of the same Applicant, to a driving shaft 13 of a rotary selector 14; as it can be seen from the Figure, the selector 14 is mounted inside the door at an inclined position, fact that allows to reduce the volume taken up transversally by the selector 14, and its driving shaft 13 is inclined with respect to the axis of rotation of the knob 9. However, thanks to the pin joint 79, it is possible to operate the selector 14 through the knob 9.

## Claims

1. Device for the selection of washing programs for an integrally built-in washing appliance comprising an access door (3) to a washing tank (2) hinged at its lower edge to a frame (1) of said washing appliance, characterised in that it includes a turning knob (9) with rotation axis substantially orthogonal to an upper edge (7) of said door (3) and coupled to a driving shaft (13) of a rotary selector (14) operatively connected to a programmer (12) located within said frame (1), the rotation of the knob (9) allowing to set the rotary selector (14), a seating (77) being provided in the upper edge (7) of the door (3) suitable to contain said knob (9).
2. Device according to claim 1, characterised in that said knob (9) is slideable in a direction substantially orthogonal to the upper edge (7) of the door (3) between a first operating retracted position in which the knob (9) is substantially entirely contained in said seating (77) in such a way so as to get at the same level of the upper edge (7) of the door (3), and a second operating extended position in which the knob (9) comes out from that seating (77) and projects from the upper edge of the door in such a way that it can be grabbed by a user and rotated for selecting a program.

3. Device according to claim 2, characterised in that said knob (9) comprises an internal body (20) fixedly coupled to said driving shaft (13) of the rotary selector (14), and an external body (19) rotatable together with the inside body (20) in the direction substantially orthogonal to the upper edge (7) of the door (3) between said first operating position, in which the external body (19) is retracted and substantially at the same level of the upper edge (7) of the door, and said second operating position, in which the external body (19) of the knob (9) projects from the upper edge (7) of the door (3). 5
4. Device according to claim 3, characterised in that said knob (9) comprises elastic bias means that bias the external body (19) to slide with respect to the internal body (20) towards said second operating position, and locking/unlocking devices that, when said external body (19) is brought from said second position to said first operating position, maintain the external body in said first operating position, said locking/unlocking means being releasable by means of the pressure of the external body (19). 10
5. Device according to claim 3, characterised in that said knob (9) comprises elastic bias means that bias the external body (19) to slide with respect to the internal body (20) towards said second operating position, the washing machine comprising contrasting means (25) that, when said door (3) gets closed, determine automatically the retraction of the knob (9) in said seating (77), said means of elastic bias determining, when the door (3) is open, the exit of the knob (9) from said seating. 15
6. Device according to claim 2, characterised in that the driving shaft (13) of the rotary selector is sliding in said direction substantially orthogonal to the upper edge (7) to control the on/off setting of a switch (28) that is opened when the knob is in said second operating position, and is closed when the knob is brought in said first operating position. 20
7. Device according to claim 6, characterised in that it comprises elastic bias means that bias the knob (9) and the driving shaft (13) of the rotary selector (14) to slide in said direction substantially orthogonal to the upper edge (7) towards said second operating position, and locking/unlocking means that, when the knob (9) is brought from that second position to said first operating position, maintain the knob (9) and the driving shaft (13) in said first operating position, said locking/unlocking means being releasable by means of the pressure of the knob (9). 25
8. Device according to claim 4 or 7, characterised in that said knob (9) is substantially cylindrical, and on the external surface of it there is provided a sequence of indexes (23) co-operating with a fixed index (25) located on the upper edge (7) of the door (3) so as to individuate, when the knob (9) is in said second operating position, a washing program currently being selected. 30
9. Device according to claim 4 or 7, characterised in that said knob (9) is substantially cylindrical and has, on one portion (50) of the external surface, a sequence of teeth that engage in a rectilinear sequence of teeth (51) of a bracket (52) that extends longitudinally below the upper edge (7) and that includes a sequence of indexes, said upper edge (7) comprising a window (54) and a fixed index (55) to enable, during the selection of washing programs, the reading through said window (54) of the selected program. 35
10. Device according to claim 1, characterised in that said knob (9) is coupled to said driving shaft of the rotary selector (14) by means of a pin joint (79), in such a way that said driving shaft (13) gets inclined with respect to the orthogonal direction to the upper edge (7) of the door (3). 40



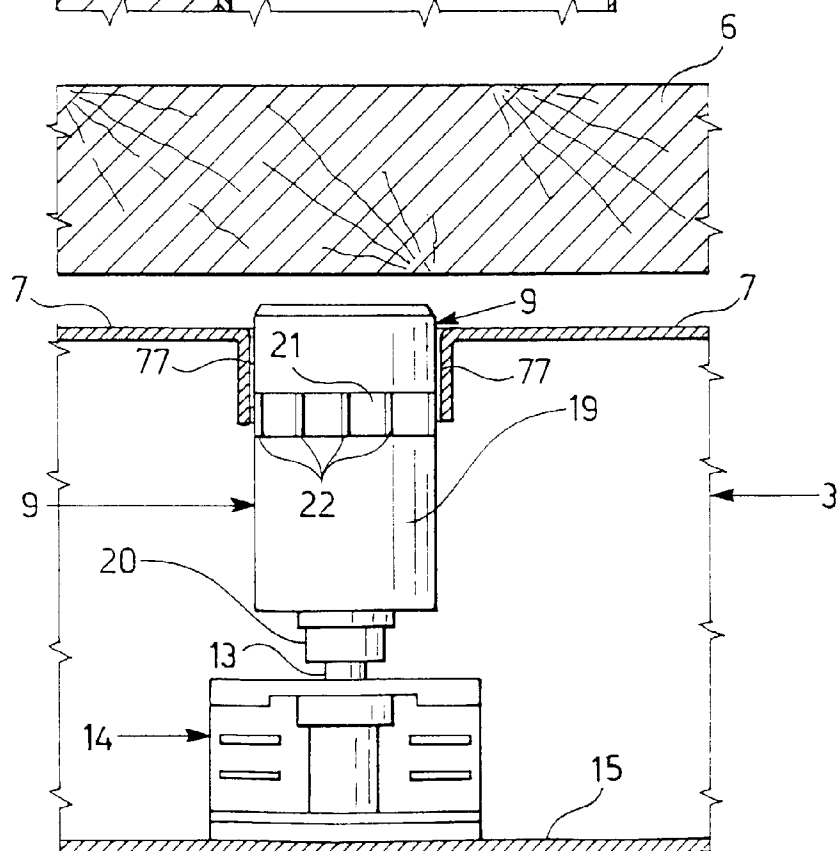
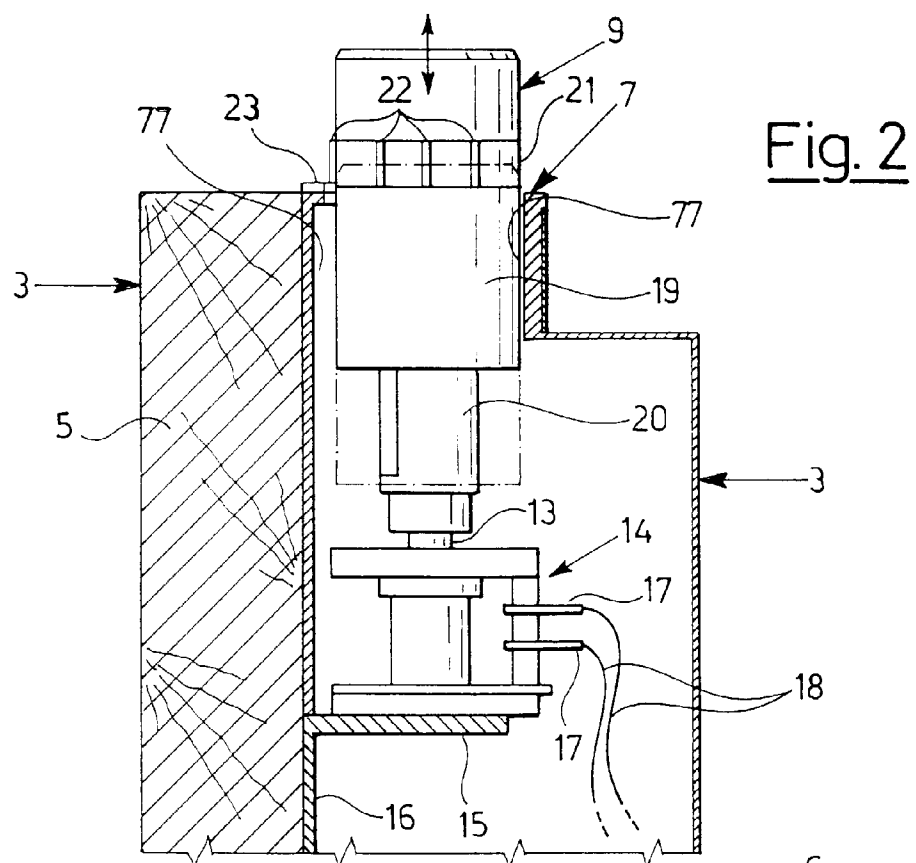


Fig. 4

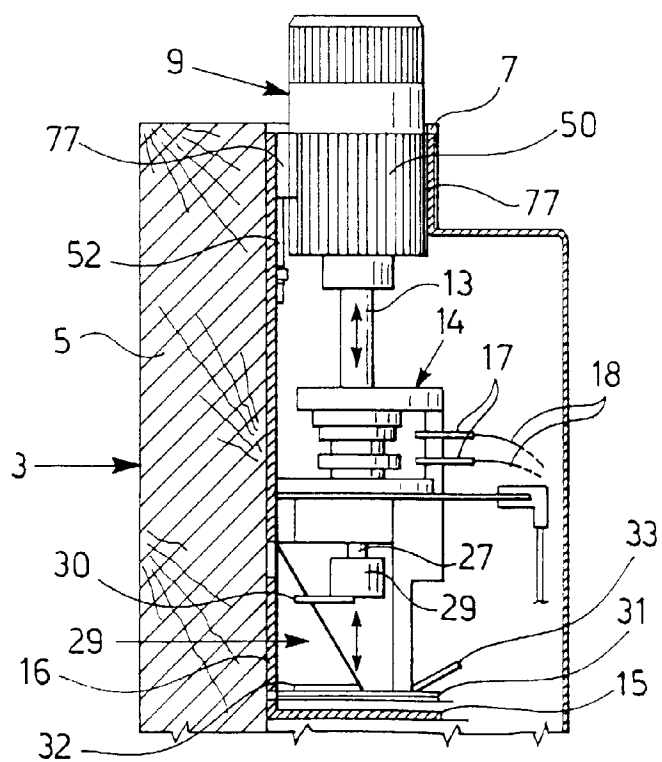
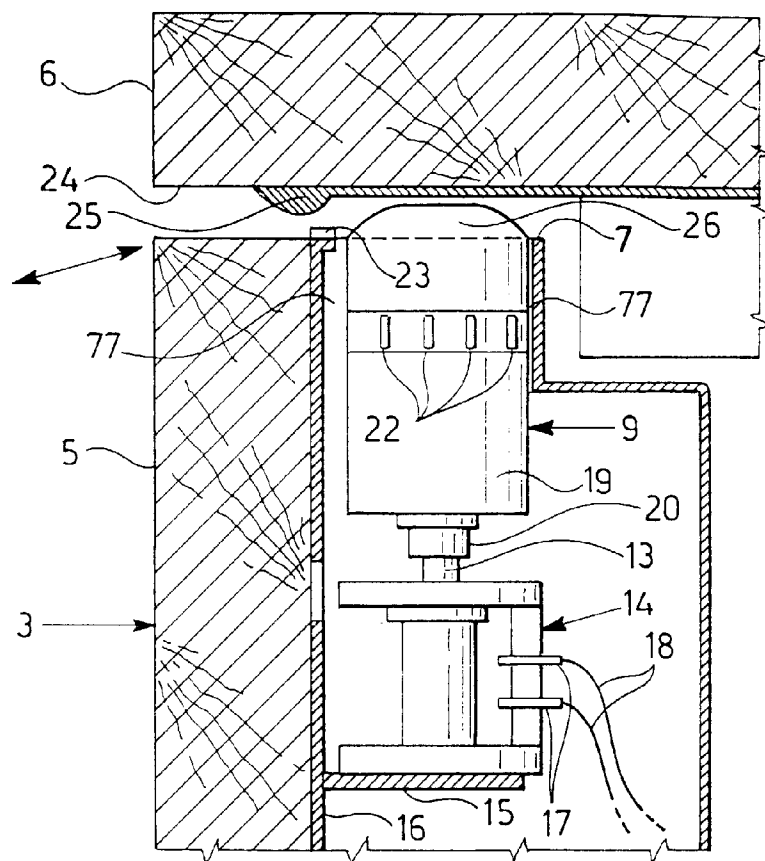


Fig. 5



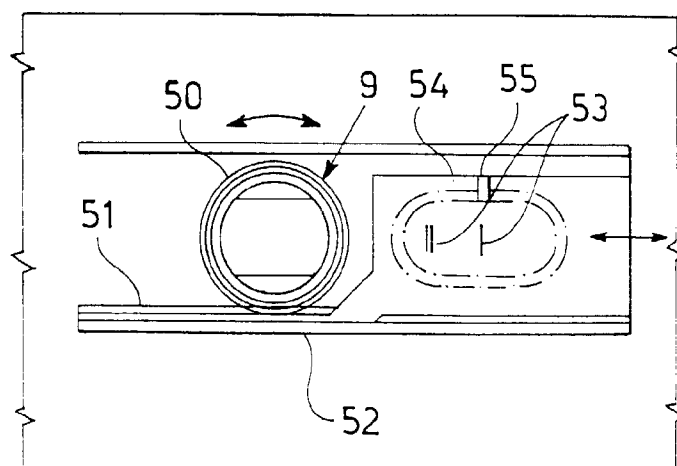


Fig. 7

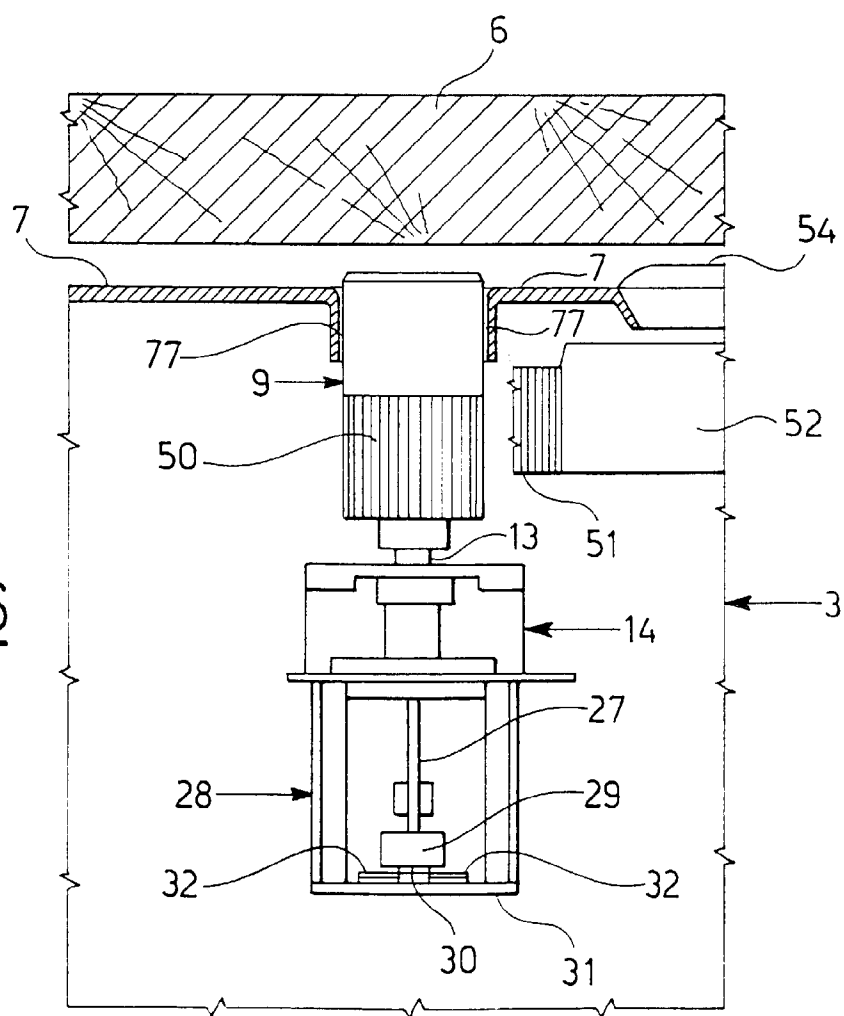


Fig. 6



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# EUROPEAN SEARCH REPORT

Application Number  
EP 98 20 0001

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IntCl.8)
X	US 3 064 662 A (B. GIVEN AND AL) * column 1, line 64 - column 2, line 14 * * column 5, line 25-35 * * column 7, line 20 - column 8, line 37; figures 2,3 *	1,2	A47L15/46
A	--- EP 0 728 437 A (CANDY SPA) * column 3, line 1-52; figures 1-5 *	1	
A	--- EP 0 727 181 A (CANDY SPA) * the whole document * -----	1	
			TECHNICAL FIELDS SEARCHED (IntCl.8)
			A47L
The present search report has been drawn up for all claims			
Place of search <b>MUNICH</b>		Date of completion of the search <b>20 February 1998</b>	Examiner <b>Laue, F</b>
<p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>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</p> <p>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 &amp; : member of the same patent family, corresponding document</p>			

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