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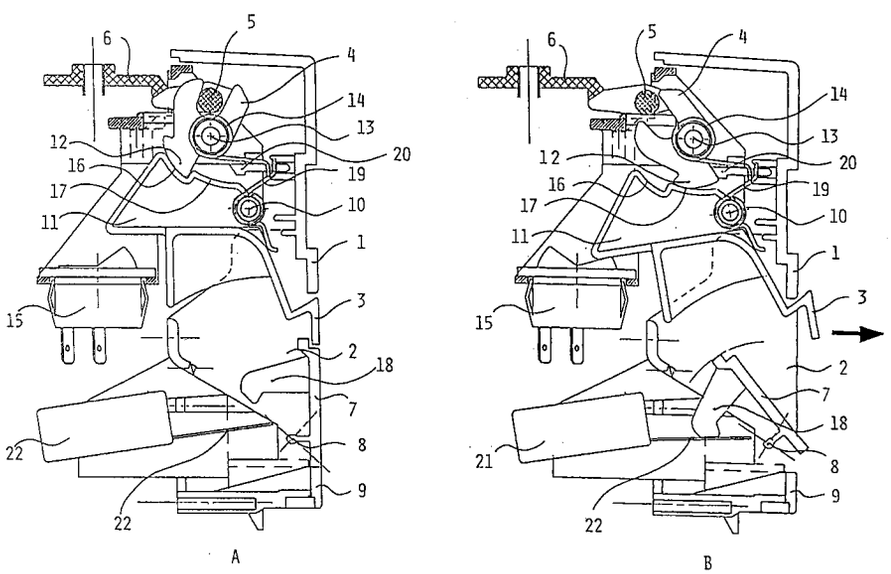
(71) Applicant: **MERLONI ELETTRODOMESTICI S.p.A.**
**Viale Aristide Merloni, 45**
**I-60044 Fabriano (AN)(IT)**

(72) Inventor: **Caforio, Luigi**
**Via Cristoforo Colombo 2/13**
**Piossasco (TO)(IT)**
Inventor: **Schena, Giuseppe**
**Via Martiri della Libertà 18**
**Bricherasio (TO)(IT)**
Inventor: **Premoli, Marcello**
**Corso Palestro 6**
**Torino(IT)**

## (54) Door for household appliance.

(57) The present invention relates to a door for a household appliance comprising a frontal wall (1,9), wherein an opening, covered by a movable opening flap (7) is provided, in which it is possible to introduce the fingers of a hand; the main characteristic of the door according to the invention consists in that a limb (3) of the opening is also movable, and that the pulling movement carried-out with the fingers on such limb (3), causes the unhooking of the closure latch of the door.

FIG. 1

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The present invention relates to a door for household appliance comprising a frontal wall, wherein an opening, covered by a movable opening flap is provided, in which it is possible to introduce the fingers of a hand.

As is known, household appliances are generally provided with doors, necessary for carrying out the normal loading operations; we think for example to washing machines, cooking ovens or refrigerators.

Such doors are provided with more or less complex closure systems, depending of the type of household appliance: for example refrigerators do not need particular devices, in as much they normally provide magnetic elements that maintain the door closed; in the same way, as with domestic ovens, the door is maintained in the closure position by means of springs.

For other kinds of household appliances, typically washing machines, it is however opportune to provide actual latches that, regards security systems provided by standard regulations, warrant the necessary security.

Thus the openings handles of doors of electric household appliances are of different kinds, depending on the necessity: in some cases it is sufficient to provide the user a simple handle to exercise a pulling motion (as in the case of refrigerators and ovens), while in other cases it is more convenient to provide a handle that commands a blockage latch of the door (washing machines and dish washers).

It is however clear that besides the above mentioned practical and security needs are also to be, within certain limits, considered the aesthetic needs and for this reason solutions that safeguard the stylistic line of the household appliance have been researched, so to make for example in such a way that the engaging element is not in view, or that the command system of the latch is hidden, etc.

A door of the indicated type is known for example by the French patent n. 2 409 458, which describes a handle for the door of a cooking oven, consisting in an opening in the upper wall of the door and closed by an opening flap.

Such door, as already mentioned previously with regards ovens, is not endowed with a closure latch, but only held in the closed position by a spring; such solution, as anticipated, can be sufficient for refrigerators or ovens, but is not always safe, particularly in the case of washing machines.

It is also known (see German Patent Application n. 33 14 681) a door for washing machines, in the frontal wall of which a hand opening is provided, having in its interior an upper gripping shell, secured to the opening lever of the latch; to operate the latch, it is necessary to grip with the tip of the fingers such shell and act on it.

Even such solution has several drawbacks: in the first place a complete introduction of the fingers is not always easy and in the second place the hand opening remains in view, and the vision of such "hole" in the door of the washing machine is not very aesthetic.

Another typical problem of the known washing machines is that of preventing that jets of hot water, coming from rotary collectors, can strike the user. This can happen in the case of sudden openings of the door during the washing cycle, mainly when the machine is utilizing hot water, because the stopping of the rotary collectors that spray the dishes is not immediate, even if the electric supply circuit of the pump has been interrupted.

For this purpose precautions are generally taken consisting in directing the outgoing jets of the rotary collectors in a perpendicular way to their rotation plane: in this way it is very difficult that, even with the door being completely open, hot water jets can exit the cabinet of the washing machine. This precaution has however the disadvantage that the jets of the rotary collectors are to be directed towards the interior of the machine, with the consequent poor quality of the washing results.

The aim of the present invention is thus that of indicating a door for household appliances that overcomes the drawbacks presented from the known doors, and more precisely that it is furnished with a closing latch, the opening of which does not present difficulties, having a high level of security for the user and the aesthetic appearance is safeguarded.

To achieve such aims the present invention has as its object a door for household appliances comprising a frontal wall, in which an opening, closed with a movable opening flap is provided, in which it is to possible introduce the fingers of a hand, characterised in that a limb of the opening is also movable, and that the pulling movement carried-out with the fingers on such limb, causes the unhooking of the closure latch of the door.

Further aims and advantages of the present invention will result in being clear from the specified description that follows and from the annexed drawings supplied purely as an explanatory and non-limiting example, in which:

- Figure 1 represents schematically in a sectioned view the upper zone of a door for household appliances according to the invention, in two functioning conditions;
- Figure 2 represents the frontal schematic view of the upper portion of a door according to the invention, in which the command panel of the household appliance is placed;
- Figure 3 represents an enlarged detail of

Figure 2.

In Figure 1, that represents schematically the upper zone of a door for a washing machine according to the present invention in the closed position, the reference number 1 indicates the frontal wall of the door, which is vertical and is hinged downwardly to the cabinet of the machine; the reference number 2 indicates an opening (visible more clearly in part B of the Figure) made in said frontal wall; the reference number 3 indicates the upper limb of said opening, that is movable, as will be mentioned in detail later, and that, in the closed door position, is aligned with the frontal wall 1, to form a single vertical surface; the reference number 4 indicates a lever that makes up part of the mechanism of the closing latch of the door; the reference number 5 indicates a pivot that is engaged in a fork obtained in the lever 4; the pivot 5 is connected, through a bar indicated with the reference number 6, to the cabinet of the household appliance (lever 4, bar 6 and pivot 5 therefore constitute the actual latch).

The reference number 7 indicates a movable opening flap, hinged in its lower point 8, that, under the action of a spring, not represented, normally closes the opening 2, aligning itself with the frontal wall 1 of the door and with the movable limb 3, so forming a single vertical surface; said opening flap has, towards the interior of the door, a protruding element 18, the function of which will be explained below.

The reference number 9 indicates the secured lower limb of the opening 2; also such lower flap 9 is aligned with the other described elements 1, 3 and 7; the reference number 10 indicates the hinging point of a lever, indicated with the reference number 11, that is as one with the movable upper limb 3 of the opening 2; the lever 11 has a first superior recess 16 of an approximately triangular form, in which, with the door closed, engages a protrusion, indicated with the reference number 12, having the form of a tooth, and being as one with the lever 4 already described. The same lever 11 then has a second superior recess 17, to the right of the previous, that, as illustrated herein below, is engaged by the protrusion 12 in the door open condition.

In its hinging point, the lever 11 is furthermore furnished with a spiral spring 19, that tends to rotate the same lever in a clockwise sense.

The reference number 13 indicates the pivot of said lever 4; the reference number 14 indicates a spiral spring that tends to rotate the lever 4 in counter clockwise sense, i.e. in the opening position of the latch; the reference number 20 indicates a secured element, that has the aim of limiting the movement of the lever 4. Finally, the reference numbers 15 and 21 indicate respectively a button security breaker and a micro switch, of a substantially known type, placed in series within the electric circuit supply, that provides in interrupting the power supply of the machine any time that the door is or is about to be opened.

The functioning of the door for household appliances will now be described with reference to part B of Figure 1, that utilises the same reference numbers previously cited.

The user introduces his fingers in the opening 2, pushing the opening flap 7 against the action of its spring.

The slight push exercised with the fingers on the opening flap 7 makes sure that the protruding element 18 causes the opening of the micro switch 21, acting on a small bar 22. In this way, before the latch is unlocked (as will be explained below) and the door opened, the electric supply of the household appliance is interrupted; as previously mentioned, in the washing machine in which the supply is removed simultaneously with the opening of the door, it can occur that a sprinkler continue to rotate due to inertia, with the risk that a hot water jet exit and strike the user. In the case of the present invention, however, in the amount of time that elapses from the lowering of the opening flap 7 and the actual opening of the door, the micro switch 21 intervenes practically in an instantaneous manner, also due to the fact that it is more ready to intervene respects the security breaker 15 (this is possible also as consequence of the fact that the small bar 22 also feels slight movements). In such a way a time margin is obtained, sufficient in eliminating the cited risks. Once the opening flap 7 has been lowered, the user grips the upper rear limb 3 of the opening, exercising, with an action being more than natural, an opportune drawing, in the sense indicated with the arrow.

Such drawing causes the lower rotation of the lever 11, thus moving the first recess 16 out of the reach of the tooth 12; in this way the lever 4 is freed, that rotates in a counter clockwise sense under the action of the spring 14, liberating itself from the pivot 5.

In its downward movement, the lever 11 determines the pressure of the button breaker 15, that causes a further interruption in the electric supply circuit, and warrants the necessary security (breakers 15 and 21 are in fact connected in series between them: in this way the electric open circuit condition is maintained constant by the breaker 15 for all the time that the door (or, if we prefer, the latch) remains open; the user, even upon removing his fingers, thus releasing the opening flap 7 and causing the closure of the micro switch 21, does not run any risk of the machine being re-activated).

The tooth 12 at this point is engaged in the second recess 17, maintaining the fork of the lever

4 directed towards the pivot 5 and, as mentioned, maintaining the switch 15 open; the maintenance of the position of the tooth 12 in the recess 17 is favoured by the action of the spring 19.

At a certain point of the successive closure phase of the door, analogous to that represented in part B of Figure 1, pivot 5 and lever 4 enter in contact; more in detail the pivot 5 enters the fork obtained in the lever 4, that is forced to rotate clockwise until having reached the initial position; therefore, the tooth 12 is moved from the second recess 17 to the first recess 16 and the lever 11, under the action of the spring 19, upwardly rotates, releasing the breaker 15: thus returning to the initial condition, as illustrated in part A of Figure 1. Finally it is to be mentioned that if the door, and therefore the latch, is not perfectly closed, the limb 3 is not aligned with the frontal wall 1-9 of the door, as can be seen in the part B of Figure 1.

In this way, after the closure movement, the eventual external protrusion of the limb 3 informs the user in a visual, clear and unequivocal manner, that the door of the machine has not been closed perfectly.

By the successive Figures 2 and 3, that represent respectively the frontal view of the upper portion of a door according to invention, in which there is placed the command panel of the household appliance (in particular a dishwasher) and an enlarged particular thereof, it is clearly understood the way in which the aesthetic effect of the door is safeguarded, inasmuch the opening for the introduction of the fingers is completely closed by the opening flap 7, that co-operates to such end with the limb 3.

The characteristics of the described door are clear by the supplied description and by the annexed drawings, as are also clear the advantages.

In particular they are represented by the combination of:

- security, due to the presence of a latched closure device, along with two security switches, one of which, being of the type capable to detect small movements, provides to interrupt the supply of the household appliance as soon as the user inserts his hand in the recess that allows for the opening manoeuvre actually before the door is materially opened;
- facilitates opening, inasmuch as it is no longer necessary to completely introduce the fingers in the opening and exercise an upward pressure; according to present invention the unlocking of the door is obtained through an easy and natural grip of the upper limb 3 of the opening and an equally natural forward pull, i.e. in the same opening sense of the door; furthermore it is not necessary to force as is the case of doors with jerk openings;
- an easthetical clean appearance, inasmuch limb 3 and opening flap 7 are perfectly aligned with the wall 1-9 of the door and cover the opening provided for the insertion of fingers.

It is clear that numerous variants can be supplied by the skilled-man, to the described door as example, without however departing from the novelty principles inherent to the inventive idea.

For example the opening flap 7 can provide a type of groove on its upper edge, of the type indicated in Figure 3 with the reference number 23, to enable an easier introduction of the fingers. In the same way, to favour the grip of the upper limb 3, the same could provide as to the interior of the door a suitable shaping, for example being of a concave form.

Furthermore the position or the length of the small bar 22 can be different if compared to that illustrated in the figure; for example it could be nearer to the protruding element 18, when the opening flap 7 is closed, in such a way that also the minimum displacement of the mentioned opening flap 7 causes the interruption of the electric supply of the household appliance.

## Claims

1. Door for household appliance comprising a frontal wall (1), in which an opening (2) is provided, closed by a movable opening flap (7), in which it is possible introduce the fingers of a hand, characterised in that a limb (3) of the opening is also movable, and that the pulling carried-out with the fingers on such limb (3), causes the unhooking of the closure latch (4, 5, 6) of the door.

2. Door for household appliance, according to claim 1, characterised in that said movable limb (3) is hinged at a point (10) situated internally respects said frontal wall (1), said movable limb (3) being in particular the upper limb of said opening (2).

3. Door for household appliance, according to claims 2, characterised in that said movable upper limb (3) is hinged at a point (10) being superior and is connected with a first element (11) that has at least one recess (16, 17) and that said first element (11) co-operates with a second element (4), that has a protrusion (12) forming a tooth, which is a part of the unhooking mechanism of said latch (4, 5, 6).

4. Door for household appliance, according to claim 3, characterised in that said second ele-

ment (4) is also hinged in a superior point (13) and, in particular, is made to rotate in the opening sense of the latch by the action of a spring (14).

**5.** Door for household appliance, according to at least one of the previous claims, characterised in that said movable limb (3) and said movable opening flap (7), in a door closed position, are to be found on the same plane of said frontal wall (1), with which a surface without recesses or protrusions is formed.

**6.** Door for household appliance, according to one or more of the previous claims, characterised in that said movable opening flap is hinged at a point (8) and is maintained in a closed position by the action of a spring, said movable opening flap (7) having in particular an internal protruding element (18).

**7.** Door for household appliance, according to claims 3 or 4, characterised in that the pulling carried-out with the fingers on said movable limb (3) causes the disengagement of said protrusion (12) from said recess (16) of said first element (11), thus allowing the rotation of said second element (4), under the action of said spring (14), and as a result, unhooking the latch.

**8.** Door for household appliance, according to claim 3, characterised in that said first element (11) is made to rotate due to the action of a spring (19) and has a first recess (12) being approximately of a triangular form, and a second recess (17), in particular in the door closed condition said protrusion (12) engages said first triangular recess (16) and in a door open condition, said protrusion (12) engages said second recess (17).

**9.** Door for household appliance, according to at least one of the previous claims, characterised in that during the closure of the door, the said second element (4) enters in contact with a fixed part (5) of the closure mechanism of the latch (4, 5, 6) and is made to rotate in the closing sense of the latch, causing the disengagement of said protrusion (12) by the said second recess (17) and the successive engagement of said protrusion (12) in the said first triangular recess (16).

**10.** Door for household appliance, according to at least one of the previous claims, characterised in that the introduction of the fingers in the opening (2), determines a movement of the said movable opening flap (7) that causes the activation of first switch means (21) that removes the electric supply of the household appliance.

**11.** Door for household appliance, according to at least one of previous claims, characterised in that, when said protrusion (12) engages the said second recess (17), the said first element (11) provides for activating second switch means (15) that removes the electric supply of the household appliance, and that, when said protrusion (12) engages the said first triangular recess (16), said second switch means (15) that interrupts the electric supply of the household appliance are not activated.

**12.** Door for household appliance, according to claims 10 and 11, characterised in that said first (21) and second (15) means that interrupt the electric supply of the household appliance are represented by two switches connected in series between themselves, one of said switches being in particular of a type that intervenes more rapidly compared to the other.

**13.** Door for household appliance, according to claim 12, characterised in that the said switch of the rapid intervention type is a micro switch, comprising an actuation organ (22) that is activated by the said protruding element (18) of the said movable opening flap (7), when it is moved.

**14.** Door for household appliance, according to at least one of the previous claims, characterised in that, in the door open position or not closed correctly, the said movable limb (3) is arranged in order to protrude from the plane of said frontal wall (1), so as that its external protrusion informs the user that said door is open or not closed correctly.

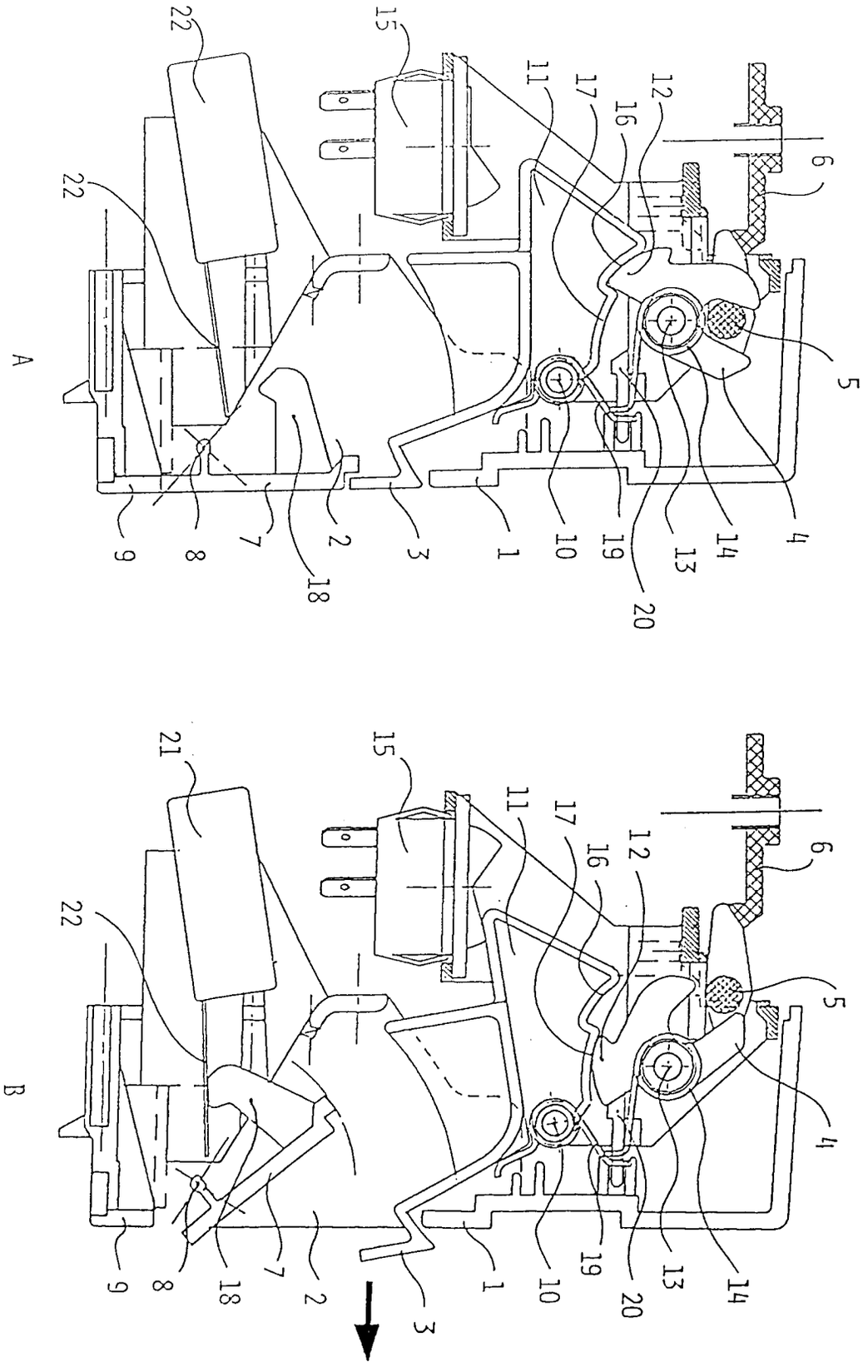
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FIG. 1

FIG. 2

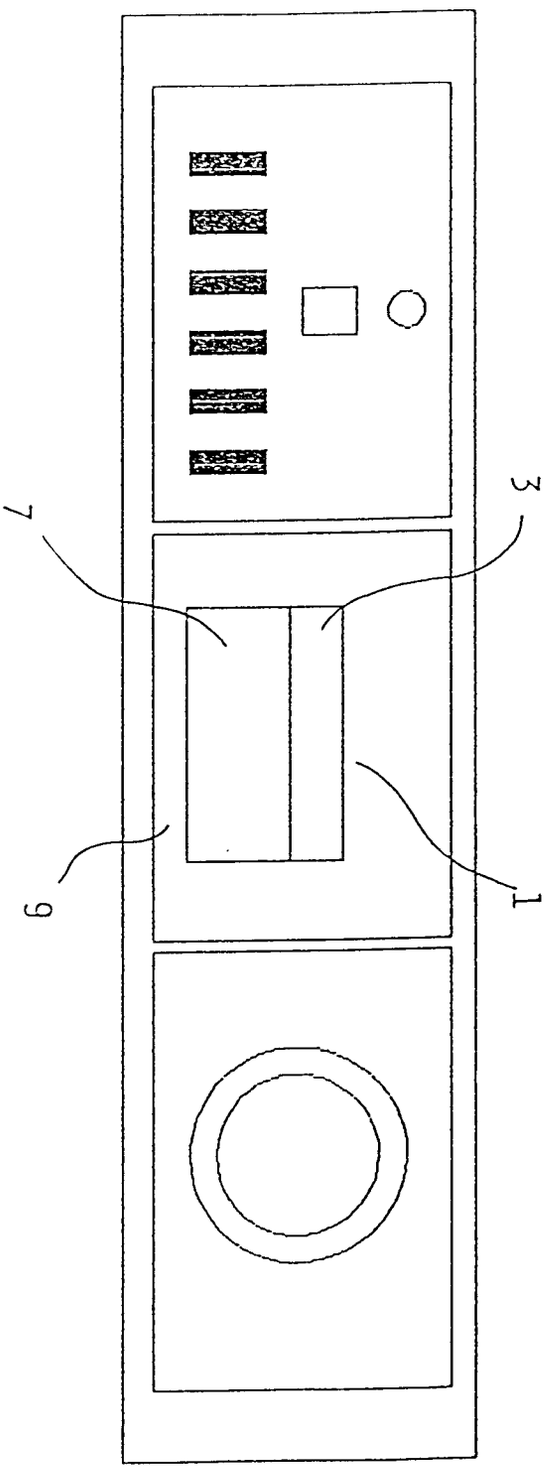
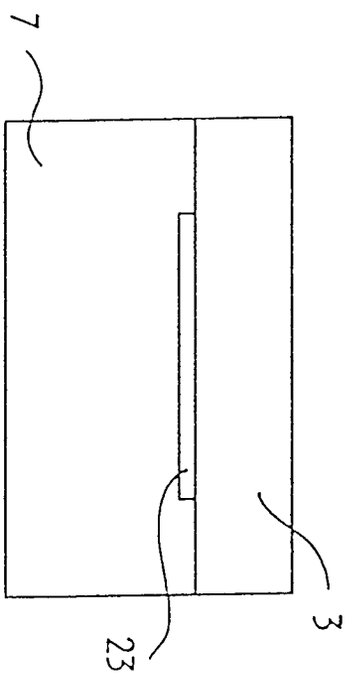



FIG. 3



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# EUROPEAN SEARCH REPORT

Application Number

EP 92 20 1409

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int. Cl.5 ) |
|---|---|---|---|
| X | DE-A-2 243 538 (FA. CARL SIEVERS)<br>* page 7, line 11 - page 10, line 1 *<br>* figures 1-5 * | 1,2,5,6 | D06F39/14<br>D06F37/42<br>A47L15/42 |
| A | --- | 3 | E05B5/00<br>E05C3/24 |
| A | FR-A-2 294 675 (AKTIEBOLAGET ELECTROLUX)<br>* page 2, line 14 - page 4, line 9 *<br>* figures 1-3 * | 1,6,10 | |
| D,A | DE-A-3 314 681 (LICENTIA PATENT-VERWALTUNGS-GMBH)<br>* page 6, line 11 - page 7, line 17 * | 1-4,7-9 | |
| | --- | | |

| TECHNICAL FIELDS SEARCHED (Int. Cl.5 ) |
|---|
| D06F |
| A47L |
| E05B |
| E05C |

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| THE HAGUE | 20 AUGUST 1992 | GOODALL C.J. |

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
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