(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 957 196 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
17.11.1999 Bulletin 1999/46

(51) Int. Cl.[6]: **D06F 39/14**, D06F 37/28

(21) Application number: **99111796.1**

(22) Date of filing: **15.02.1996**

(84) Designated Contracting States:
DE ES FR GB IT

(30) Priority: **21.02.1995 IT TO950039 U**

(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC:
96102265.4 / 0 728 861

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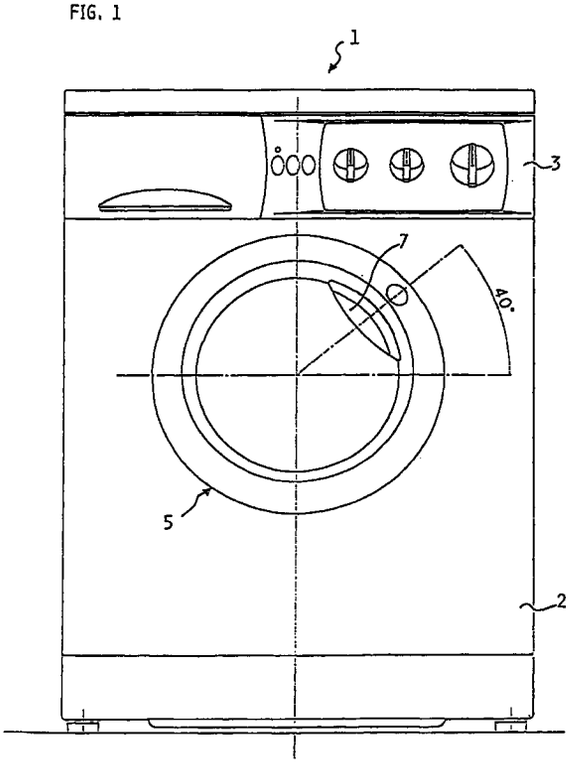
Remarks:
This application was filed on 18 - 06 - 1999 as a divisional application to the application mentioned under INID code 62.

(54) Front loading laundry washing and/or drying machine, with improved means for the door opening

(57) A laundry washing and/or drying machine is described, having a cabinet (1), in the front part of said cabinet (1) being present an opening (4) for the loading/unloading of the laundry, a door (5) for closing said opening, a hinge (9) to pivot said door (5) to said cabinet (1), a door lock/release system (6,7,8). According to the invention, said lock/release system comprises elements (6,7) located in the upper half of said door (5).

FIG. 1



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Description

[0001] The present invention refers to a laundry washing and/or drying machine having a cabinet, in the front part of said cabinet being present an opening for the loading/unloading of the laundy, a door for closing said opening, a hinge to pivot said door to said cabinet, a door lock/release system.

[0002] It is known that front loading laundry washing and/or drying machines are provided with a door, usually having a circular shape, through which the user can reach inside the machine drum to perform the usual loading and unloading operations of the laundry. Such a door or porthole is generally hinged to the cabinet by means of a hinge comprising a fixed part fastened to the machine body and a movable part integral with the porthole, the rotation axis of the hinge, and consequently of the door, being vertical.

[0003] It is also known that the machines of said type are further provided with a door lock/release system, to keep the door closed during the machine operation and allow its opening for the loading and unloading of the clothes.

[0004] In most cases, the door lock/release system is provided with a suitable actuation handle located on the door itself, on the opposite side with respect to the hinge; moreover, said handle with the relevant kinematic motion of the lock/release system and the hinge are always aligned, one on the door right-hand side and the other on the left hand-side, in line with the center-line of the door or of the loading aperture.

[0005] Said embodiment, which is typical according to the known state of the art, may at times cause some problems in the practical use.

[0006] As an example, the position of the door opening handle in line with its center-line may at times be difficult to reach, above all in such instances when the user is holding a container full of clothes to be washed.

[0007] Moreover, in the machine according to the known state of the art, the door rotary motion has to be performed by the user completely by hand due to the inherent hinge characteristics, unless some complex spring mechanisms are provided that allow a kind of automatic complete opening of the door after it was unlocked by the proper handle.

[0008] It is the object of the present invention to solve the above drawbacks and specifically provide a front loading laundry washing and/or drying machine, wherein the door opening handle can be reached in an easier way in respect to the ones foreseen by the machines of the known type; in this frame, it is a further object of the present invention to provide a machine wherein the opening motion of the door, after being released, is automatically and naturally obtained through simple and low-cost means.

[0009] Accordingly, for attaining said aims, it is the object of the present invention to provide a laundry washing and/or drying machine having the characterizing features of the enclosed claim 1; further advantageous embodiments of the invention are indicated in the dependent claims.

[0010] Further characteristics and advantages of the present invention will become apparent from the following description and annexed drawings, which are supplied by way of clarifying not limiting example, wherein:

- Fig. 1 shows a front view of a laundry washing and/or drying machine according to the present invention, with the loading door being closed;
- Fig. 2 shows a front view of the machine of Fig. 1, with the loading door being half-open;
- Fig. 3 shows a front view of the machine of fig. 1 or 2, where the front loading door is not illustrated for better description purposes.

[0011] In said figures, number 1 indicates as a whole the laundry washing and/or drying machine according to the present invention; said machine comprises a steel-sheet cabinet 2, whose upper section houses a control panel 3; the cabinet front side has an opening indicated by number 4 to reach inside the machine drum for the normal laundry loading/unloading operations.

[0012] Number 5 indicates as a whole the front loading door of the machine 1, which is provided for the closure of said aperture 4, specifically during the machine operation.

[0013] The machine 1 is provided with a manual lock/release actuation system which comprises a hook 6 on the door 5 and an actuation handle 7, which is suitable either to lock or release said hook; moreover, inside the door 5 some further mechanical means are provided, which are part of the lock/release system, such as for example a spring, not shown in the figures for simplicity's sake.

[0014] The door lock/release system also comprises a seat indicated by 8 on the machine cabinet 1 where, during the closure of the door the hook 6 can enter and engage through elastic means; the seat 8 is coupled inside the cabinet 1 with a suitable electric safety device, that locks the hook 6 mechanically during the whole machine operation cycle, so as to prevent an accidental opening of the door 5.

[0015] Finally, in figure 3, the fixed part of a hinge integral with the machine cabinet is indicated with 9, said hinge being the one usually provided to pivot the door 5 to the machine cabinet.

[0016] As it can be better seen from figures 2 and 3, the horizontal center-line of the hinge element 9 results in being inclined with respect to the center-line of the aperture 3 or of the door 4.

[0017] In other words, as it is apparent from figures 2 and 3, the hinge rotation axis on which the door 5 rotates, is inclined in respect to the machine vertical axis (M); just by way of example, in figure 2 the door rotation axis indicated by S has an inclination being delayed to the clockwise motion of 5 degrees with

respect to the machine vertical axis, indicated by M.

[0018] According to the present invention, said inclination of the hinge rotation axis S is selected so that, once the door 5 is released by the handle 7 and slightly open, it will then perform a complete opening motion on its own through the combined action of its weight and misalignment against the vertical axis.

[0019] This arrangement is also particularly advantageous due to the fact that, when the door has reached its opening position, it will tend to keep it or resume it on its own, should the user casually move the door; this is a different situation from the known machines, where often the door can only remain half-open, thus causing a hindrance for the user.

[0020] As it is further apparent from the above figures, contrary to the known machines, the machine 1 according to the present invention has a door opening handle and a related lock/release system whose elements are located in the upper half of the same door, in an ergonomically comfortable position. As it can be seen from the figures, the handle 7 may be located at about 40 degrees in respect to the door center-line, whereas the hook 6 and the seat 8 may be about 30 degrees from it; both the handle and the lock/release system may also be located with the same inclination or different inclinations against the ones indicated by way of example.

[0021] It is obvious that, in the practical use, the door opening motion can in fact be obtained completely on its own, without requiring any manual displacement of the door by the user; as a matter of fact, the lock/release systems of the kind already known are usually capable of producing only a certain initial opening thrust when the door is unlocked; this is typically due to the availability of some elastic means opposing the door locking and to the flexible reaction of the bellows-type seal, usually being present in correspondence of the door aperture, to seal the door.

[0022] As a result, according to the present invention it is possible to use such an initial opening thrust, which as said above is a so-called "inherent" feature of most lock/release systems, to obtain a fully automatic door opening motion.

[0023] From this viewpoint, the present invention has a specific advantageous application in the case of machines where the door lock/release system is controlled by a push-button on the control board; in this case, in fact, said initial thrust on the door and the inclination of the door rotation axis according to the present invention allow to perform a complete and practically automatic door opening motion.

[0024] Finally, it should be pointed out that the above elements can all of them be of the type in itself known, both for the realization of the door hinge and its lock/release system.

[0025] What changes substantially in respect to the known state of the art is the geometric arrangement of said elements, which according to the present invention allows a higher functionality and a more comfortable use of the machine; specifically, in the machine described above the door rotation axis is not perpendicular to the machine laying plane, which allows to obtain a substantially autonomous motion of the door opening after that the latter has been released by the related lock/release system; moreover, the machine has a mutually non aligned hinge and a lock/release system; in the case of machines with the door opening actuated by a handle, the latter can be advantageously located in the upper half of the door, for an easier actuation by the user.

[0026] The characteristics and the advantages of the laundry washing and/or drying machine subject of the present invention are clear from the above description.

[0027] Obviously, many changes can be made to the laundry washing and/or drying machine subject of the present invention without departing from the novelty principles of the innovative spirit, and it is also clear that in the practical use of the invention both the materials and forms of the details above illustrated may be changed and replaced by other technically equivalent elements.

[0028] The possibility of using a rotary-translation hinge or an articulated quadrilateral hinge for implementing the present invention is pointed out as an example.

Claims

1. Laundry washing and/or drying machine having a cabinet (1), in the front part of said cabinet being present an opening (4) for the loading/unloading of the laundry, a door (5) for closing said opening, a hinge (9) to pivot said door (5) to said cabinet (1), a door lock/release system (6,7,8), characterized in that said lock/release system comprises elements (6,7) located in the upper half of said door (5).

2. Machine, according to claim 1, characterized in that said elements (6,7) comprise a manual actuation device (7), which is located the upper half of said door (5), in a position being ergonomically comfortable for its actuation.

3. Machine, according to claim 1 or 2, characterized in that said hinge (9) has at least a point being positioned on a centre-line of the door (5), while none of said elements (6,7) has a point being positioned on said centre-line of the door (5).

4. Machine, according to claim 1, characterized in that said door lock/release system comprises at least a first component (6,7) located on said door (5) and at least a second component (8) located on said cabinet (1).

5. Machine, according to claim 1, characterized in that said elements (6,7) are inclined by at least 30

degrees in respect to a center-line of the door (5).

6. Machine, according to at least one of the previous claims, characterized in that said manual actuation device comprises a handle (7).

7. Machine, according to at least one of the previous claims, characterized in that

- said manual actuation device or handle (7),
- said first and/or second components (6,8)

are in different angular positions with respect to a same centre-line of the door (5).

8. Machine, according to the previous claim, characterized in that said manual actuation device or handle (7) is at about 40 degrees in respect to said center-line, whereas said first and/or second components (6,8) is at about 30 degrees with respect to said centre-line.

9. Machine, according to claim 1, characterized in that said hinge (9) is fastened to the cabinet (1) so that the rotation axis (S) of said door (5) is inclined in respect to the vertical axis (M) of the machine, whereby said inclination of the rotation axis (S) of said door (5) is suitable to allow an opening motion of the door being at least partially autonomous, after that the latter has been released through said lock/release system (6,7,8).

10. Machine, according to the previous claim, characterized in that said inclination (S) of the rotation axis of said door (5) in respect to the vertical axis (M) of the machine is delayed against the clockwise motion.

11. Machine, according to the previous claim, characterized in that the rotation axis (S) of said door is inclined by at least 5 degrees in respect to the vertical axis (M) of the machine.

12. Machine, according to claim 9, characterized in that the inclination of the rotation axis (S) of said door (5) is suitable to let the door (5) maintain its opening position.

13. Machine, according to at least one of the previous claims, characterized in that means are provided apt at causing an initial opening thrust of said door (5) when the latter is unlocked by means of said lock/release system (6,7,8).

14. Machine, according to at least one of the previous claims, characterized in that said hinge is of the rotary-translation type or of the articulated quadrilateral type.

15. Laundry washing and/or drying machine having a cabinet (1), in the front part of said cabinet being present an opening (4) for the loading/unloading of the laundry, a door (5) for closing said opening, a hinge (9) to pivot said door (5) to said cabinet (1), a door lock/release system (6,7,8), said lock/release system comprising at least one element (6,7) located on said door (5), characterized in that said element (6,7) is non aligned with respect to said hinge (9).

FIG. 1

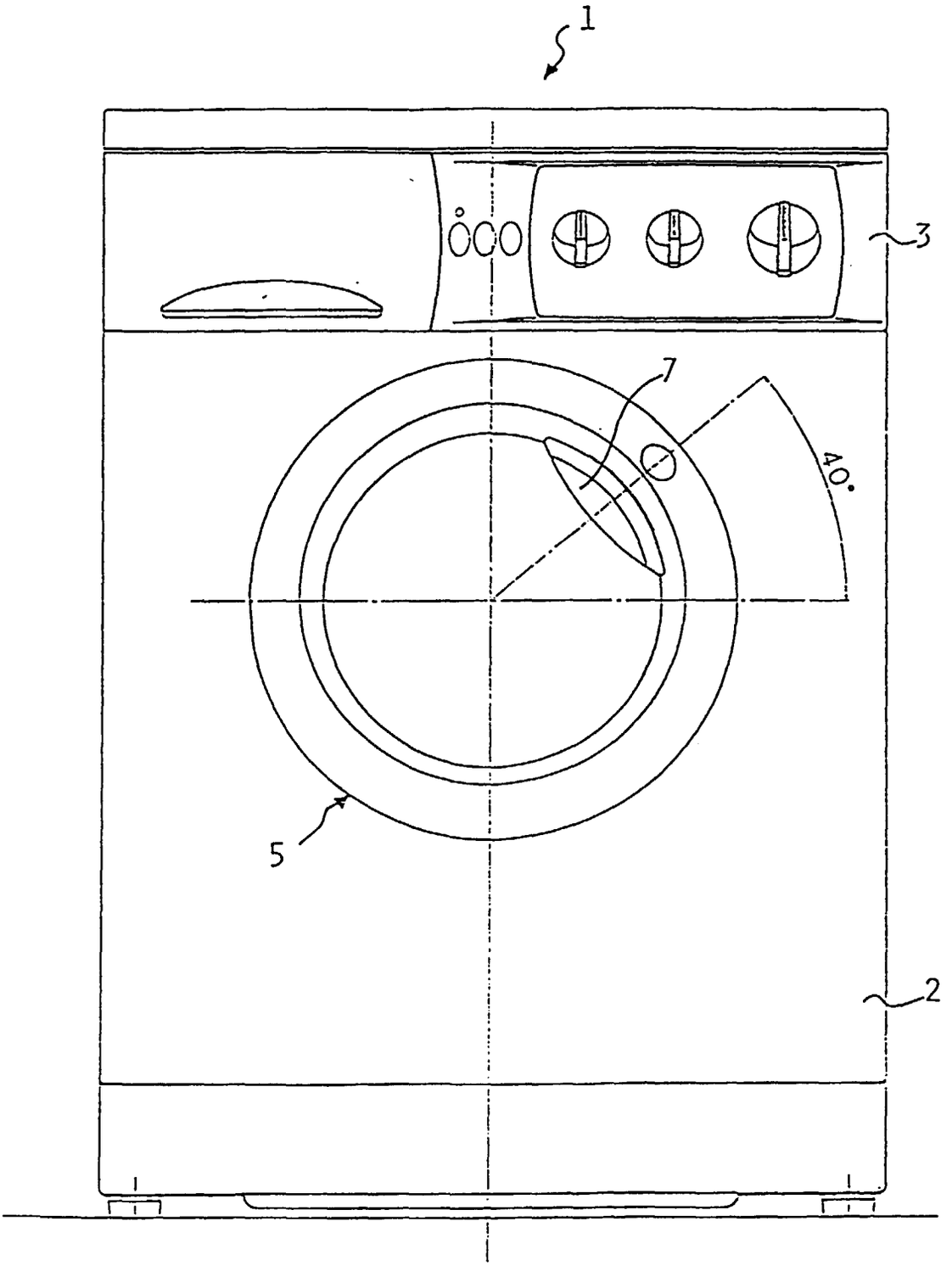


FIG. 2

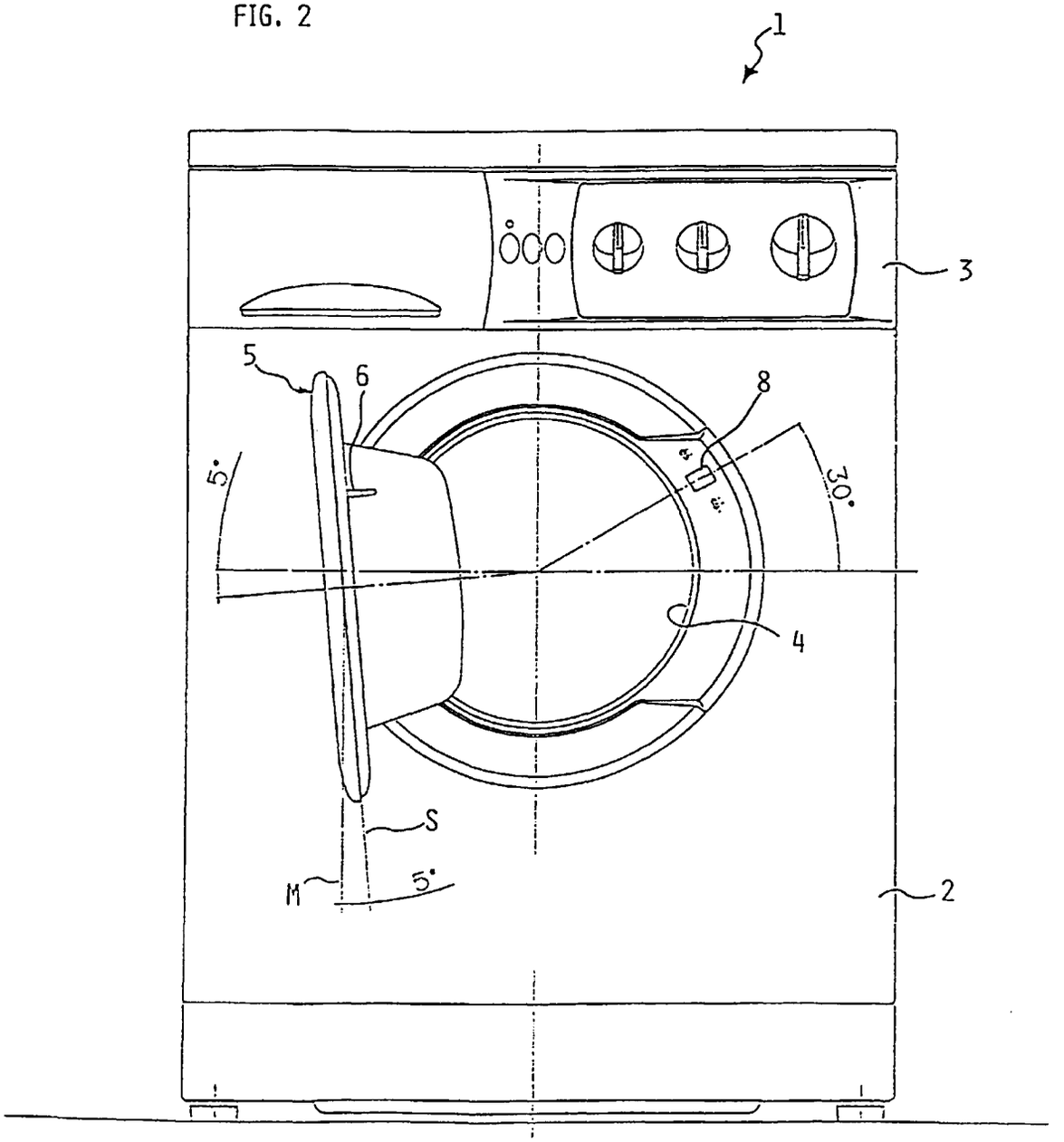
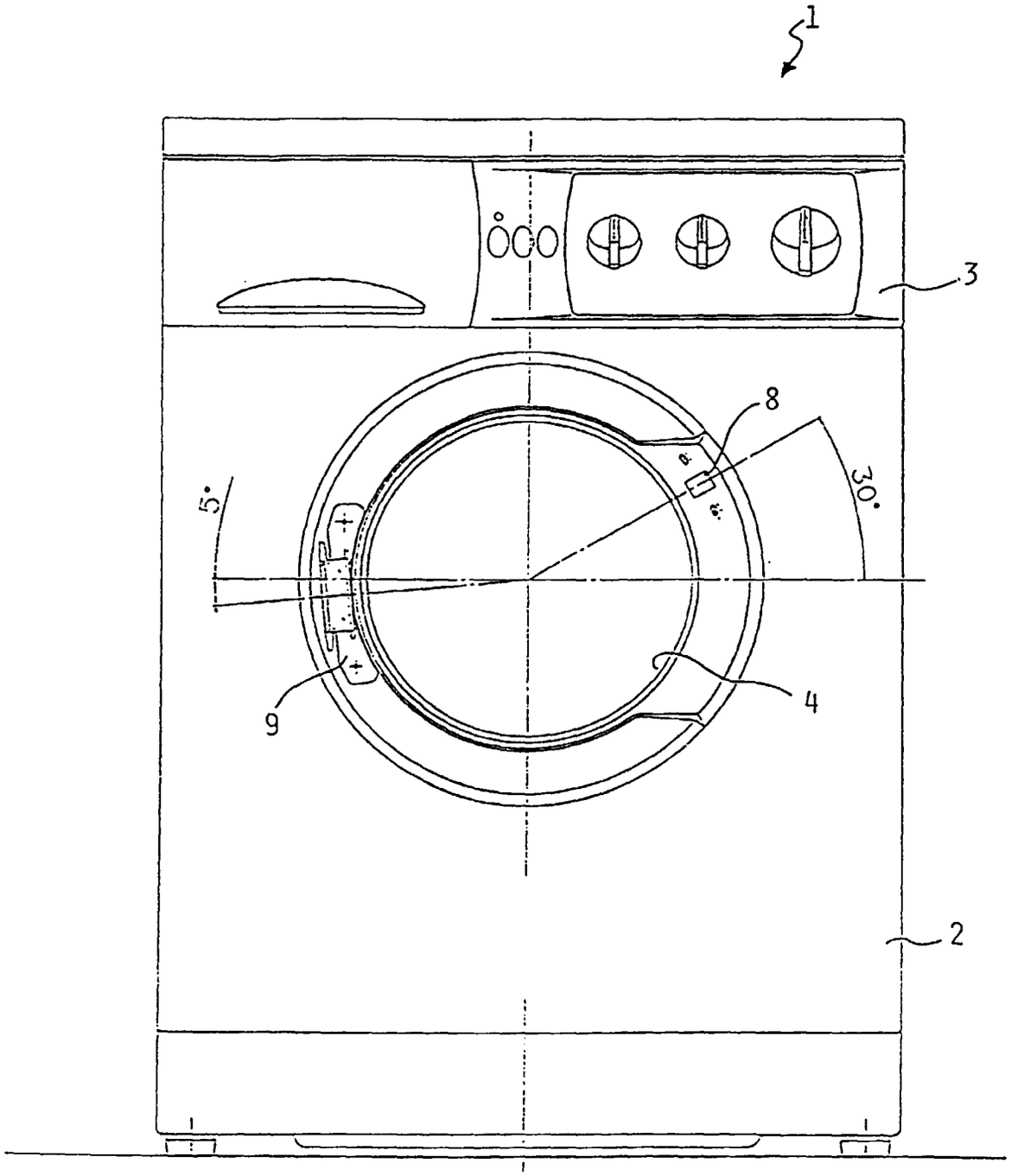


FIG. 3



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EUROPEAN SEARCH REPORT

Application Number
EP 99 11 1796

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.6)
X	US 2 264 307 A (BENDIX HOME APPLIANCES INC.) 2 December 1941 (1941-12-02)	1,2,4,6	D06F39/14 D06F37/28
A	* column 3, line 59 - line 75; figures *	3,9,10, 12,14,15	
X	US 3 520 568 A (GENERAL ELECTRIC COMPANY) 14 July 1970 (1970-07-14)	1,3,15	
A	* the whole document *	4,5,7,14	
A	GB 2 081 858 A (PHILIPS ELECTRONIC AND ASSOCIATED INDUSTRIES LIMITED) 24 February 1982 (1982-02-24) * figures *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	9 September 1999	Courrier, G

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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09-09-1999

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