



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
30.03.2005 Bulletin 2005/13

(51) Int Cl.7: **D06F 39/14**

(21) Application number: **03425621.4**

(22) Date of filing: **25.09.2003**

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

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(54) **Household electrical appliance provided with door for closing an internal chamber**

(57) An electric household appliance is described which comprises a frame (1) with a top panel (2) provided with an opening (3) for acceding into an internal chamber (9) of the electric household appliance and with a door (4) adapted to close said opening (3). The door (4) is coupled with the panel (2) by means of at least one hinge (20) that comprises first means (21) integral with the edge (10) of said opening (3) and second means (25) coupled with the door (4) at a first end (27) and with the first means (21) at a second end (26) so as

to rotate around a horizontal axis (P); said hinge (20) comprises elastic means (40) coupled with the first means (21) and with the second means (25) to urge the rotation of the second means (25) towards the opening direction of the door (4) to a position of total opening of the door (4). The door (4) is kept closed by means of a bolt (7) releasable by an unhooked button (8). The electric household appliance comprises third means (50) adapted to brake the rotation of said door (4) towards the closing direction of the same door (4) when the door is open.

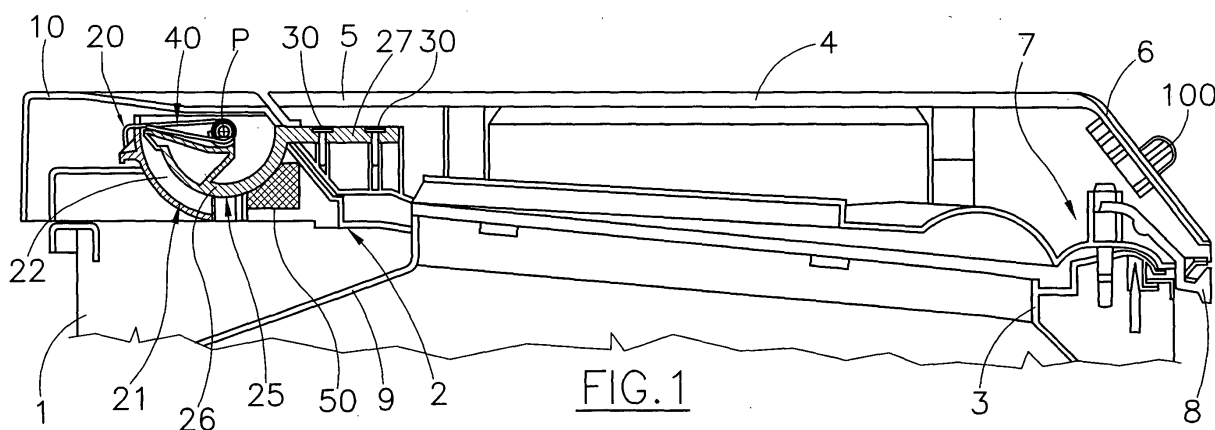


FIG. 1

Description

[0001] The present invention refers to an electric household appliance provided with a door for closing an internal chamber, particularly to a top loading washing and/or drying laundry machine.

[0002] The present top loading washing and/or drying laundry machines are provided with a drum adapted to store the laundry to wash and/or dry which is located at a central position of the laundry washing machine and it has an opening on the top part of the machine. This drum is arranged in revolving way inside a container, called washing tub, which is assigned to contain the washing liquid and which is equipped for fixing the suspension units allowing to be suspended inside a cabinet storing the laundry washing/drying machine.

[0003] The top opening of the drum is generally closed by a metal door provided generally with two wings, which are normally shut with each other by means of coupling means; in such way the door is kept closed during the meaning of the machine.

[0004] The opening of the drum is aligned with the opening of the cabinet on the top of the same for loading the laundry to wash or to dry. The opening of the cabinet is closed by means of a door hinged with the cabinet at one its end and at the opposite end it is provided with a closing device engaged with the cabinet.

[0005] In some present laundry washing machines the control instrumentation of the machine is arranged on the front of the door, preferably in a frontal sloped portion of the same at the end of the door where the closing device is provided. This makes heavy the structure of the door.

[0006] Generally the door is provided with two hinges provided with springs or other elastic elements for making easy the opening thereof; the closing of the door occurs by means of a pushing downstream of the user. In the case of doors made heavy by means of the control instrumentation said elastic elements cannot any more support the weight of the door; this causes a spring lock of the door and such operation can result insecure for the user in the case of accidental crash with handles or arms.

[0007] In view of the art described, it is an object to the present invention to provide an electric household appliance provided with a door for closing an internal chamber which overcomes the aforementioned drawback.

[0008] According to the present invention, this object is obtained by means of an electric household appliance comprising a frame with a top panel provided with an opening for acceding into an internal chamber of the electric household appliance and with a door adapted to close said opening, said door being coupled with said panel by means of at least one hinge, said hinge comprising first means integral with the edge of said opening and second means coupled with said door at a first end and with said first means at a second end so as to rotate

around a horizontal axis, said hinge comprising elastic means coupled with said first means and with said second means to urge the rotation of said second means towards the opening direction of said door to a position of total opening of the door, said door being kept closed by means of a bolt releasable by an unhooked button, characterized in that said electric household appliance comprises third means adapted to brake the rotation of said door towards the closing direction of the same door when the door is open.

[0009] Preferably said third means determine a stopping position of the door which is intermediate between the closing position and the total opening position when the combination of the braking action thereof and the action of urging the rotation of said elastic means balances the weight force in the door.

[0010] Even more preferably said stopping position of the door is next the closing position of the same.

[0011] The features and the advantages of the present invention will be made evident by the following detailed description of an embodiment thereof, shown as not limiting example in the annexed drawings, wherein:

Figure 1 schematically shows in vertical section the top of a top loading laundry washing machine; Figure 2 is a top schematic view of a hinge of the laundry washing machine in Figure 1; Figure 3 is a magnified vertical schematic view of the hinge in Figure 2 with closed door; Figure 4 is a magnified vertical schematic view of the hinge in Figure 2 with open door; Figure 5 is a vertical schematic view analogous to Figure 4 but with door next the closed position and at the stopping position.

[0012] Referring to Figure 1 the top of a top loading laundry washing machine is shown; said machine comprises a frame 1 provided with a top panel 2 where an opening 3 is formed for entering into the washing tub 9. The opening 3 is closed by means of a door 4 hinged to the panel 2 so as to rotate around a horizontal axis P in order to allow the access inside of the washing tub 9. In more detail the door 4 is hinged to the panel 2 at a first end 5 while at a second end 6, opposite to the end 5, a bolt 7 is provided for closing the door 4; said bolt 7 is coupled with an unhooking button 8 to open the door 4. The door 4 comprises control instrumentation 100 of the laundry washing machine which make heavy the structure of the door. Said instrumentation 100 is preferably arranged next the end 6 and in a sloped part of the door 4. It is even possible that a display adapted to visualize the commands and/or the different operative steps of the laundry washing machine is arranged together with the control instrumentation.

[0013] At a portion 10 of the edge of the opening 3 of the top panel 2 a hinge 20 is located which comprises a flask 21 integral with the panel 2 and a cavity 22 having

a curvilinear vertical section and a rectangular transversal section; said cavity 22 comprises an top rectangular edge 23, more visible in Figure 2.

[0014] An arm 25 is hinged with the flask 21 that is constituted by a curved portion 26 and by a substantially rectilinear portion 27. The curved portion 26 is hinged with the edge 23 of the flask 21 by means of a horizontal pivot 28 extending along the axis P; the curved portion 26 can rotate around the P axis partially inside the cavity 22. The portion 27 of the arm 25 is connected by means of screws 30 with the door 4. Preferably the panel 2 comprises two hinges 20 for fastening the door 2 to the cabinet 1.

[0015] Elastic means 40 constituted by two helicoidal springs 41 are coupled with the flask 21 and with the arm 25. In more detail the central part 42 of a spring 41 is arranged around the pivot 28, an end 43 goes in abutment against the edge 23 of the flask 21 and the other end 44 goes in abutment against the curved part 26 of the arm 25. The springs 41 urge the arm 25 to rotate in anticlockwise way around the pivot 28 that is towards the opening direction of the door 4.

[0016] Always inside the portion 10 a means 50 adapted to stop the rotation of the door 4 in the closing direction of the door 4 is arranged. Said means 50, generally constituted by a rubber plug or other material having similar elastic properties, is arranged in adjacent way with the curved portion 26 of the arm 25, preferably outside the cavity 22 of the flask 21. Since the action of the elastic means 40 is an action of urging to the anticlockwise rotation of the door 4 towards the opening direction, the combination of said action of the elastic means 40 and the action of the rubber plug 50 opposes the action of the weight force of the door 4 which tends to close the door 4 by means of a rotation around the axis P towards the closing direction.

[0017] Therefore the action of said plug 50 is to brake, for friction between the curved portion and the same rubber plug 50, the rotation of the door 4. Preferably a stop of the door 4 is obtained before the closing thereof when the combination of the aforementioned action of the elastic means 40 and of the stopping action of the plug 50 is equal to the action of the weight force in the door 4.

[0018] The curved portion 26 has a cam function so that the positive gradient puts a greater pressure on the plug 50 next the closing of the door 4, that is the combination of the higher or lower value of the profile of the curved portion 26 and the compression capacity (hardness) of the plug 50 allows a gradual and adsorbed braking of the door, which is calibrated on the same door with suitable values of pressure on the closing.

[0019] A detail of the laundry washing machine with closed door in Figure 1 is shown in magnified view; particularly the hinge 20 and the rubber plug 50 arranged in adjacent way to the curved portion 26 of the arm 25 are shown. The rubber plug 50 has a curved portion 51 that faces to the curved portion 26.

[0020] When the door 4 is open (Figure 4), the arm

25 is urged by the springs 41 to rotate around the pivot 28 towards the opening direction of the door 4, in this case the anticlockwise rotation direction, and the curved portion 26 of the arm 25 is braked in its anticlockwise rotation around the pivot 28 by the friction with the curved portion 51 of the rubber plug 50.

[0021] When the sum of the action due to the friction between the curved portion 26 and the rubber plug 50 and of the action of urging the anticlockwise rotation of the springs 41 balances the weight force of the door 4 it has a stop of the door 4 at the closing direction of the door 4, as shown in Figure 5; in such way the door 4 assumes a stopping position A comprises between the closing position and the position of total opening. The last is caused by the abutment of a transversal appendix 34 of the curved portion 26 against a vertical appendix 24 of the flask 21, the position that is shown in Figure 4.

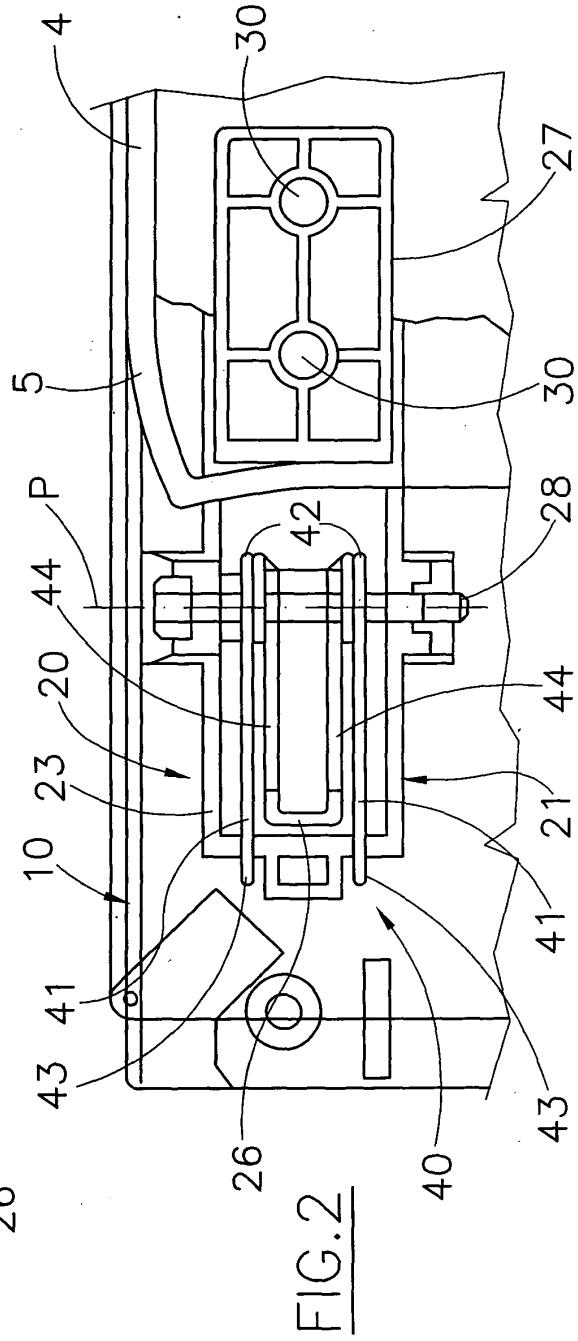
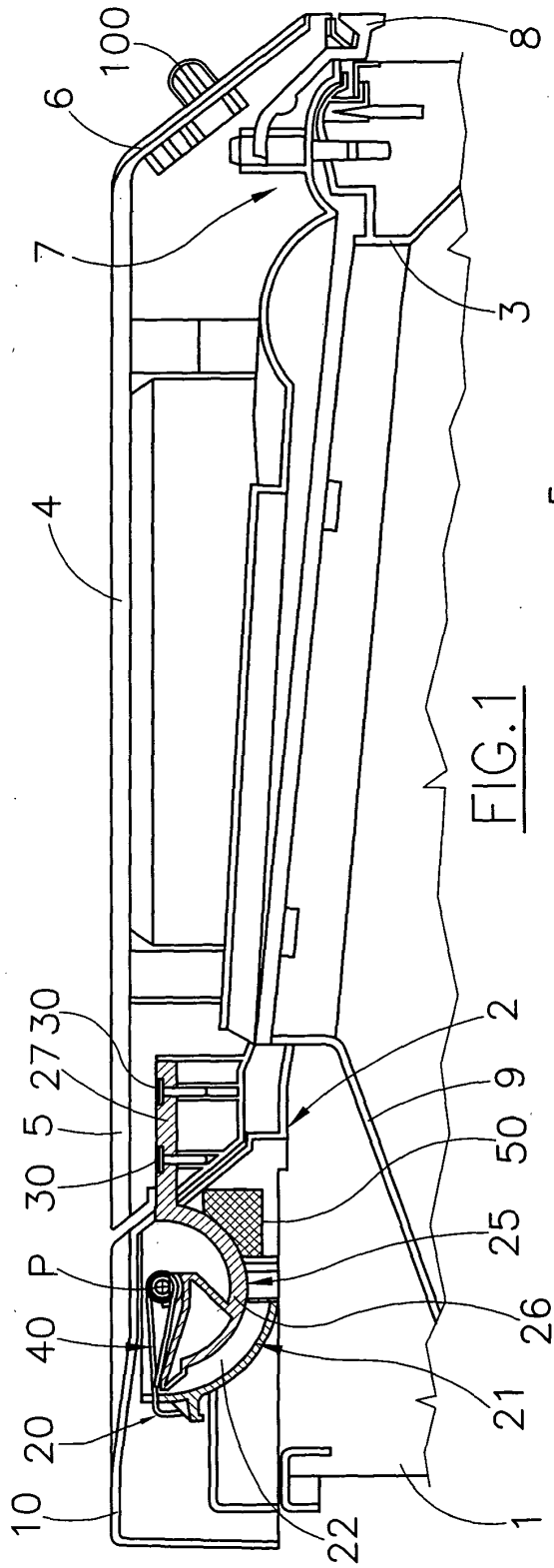
[0022] The stopping position A of the door is more specifically next the closing position of the same. It is possible to have a stop or a greater braking of the door 4 in more positions wherein the same door 4 has a slope of a variable angle D with respect to the closing position of the door 4. This is caused by the gradual and adsorbed braking due to the friction of the curved part 26 having a cam function with the rubber plug 50; in fact the profile of said curved portion 26 has such a shape so that the combination of it and the rubber plug provides a gradual and adsorbed braking of said door 4 towards the closing direction of the same.

Claims

1. Electric household appliance comprising a frame (1) with a top panel (2) provided with an opening (3) for acceding into an internal chamber (9) of the electric household appliance and with a door (4) adapted to close said opening (3), said door (4) being coupled with said panel (2) by means of at least one hinge (20), said hinge (20) comprising first means (21) integral with the edge (10) of said opening (3) and second means (25) coupled with said door (4) at a first end (27) and with said first means (21) at a second end (26) so as to rotate around a horizontal axis (P), said hinge (20) comprising elastic means (40) coupled with said first means (21) and with said second means (25) to urge the rotation of said second means (25) towards the opening direction of said door (4) to a position of total opening of the door (4), said door (4) being kept closed by means of a bolt (7) releasable by an unhooked button (8), **characterized in that** said electric household appliance comprises third means (50) adapted to brake the rotation of said door (4) towards the closing direction of the same door (4) when the door is open.

2. Electric household appliance according to claim 1,

- characterized in that** said third means (50) determine a stopping position (A) of the door (4) which is intermediate between the closing position and the total opening position when the combination of the braking action thereof and the action of urging the rotation of said elastic means (40) balances the weight force in the door (4).
3. Electric household appliance according to claim 2, **characterized in that** said stopping position (A) is next the closing position of the door (4).
 4. Electric household appliance according to claim 3, **characterized in that** said third means (50) are adapted to brake the rotation of said door (4) by means of a friction between said second means (25) and said third means (50).
 5. Electric household appliance according to claim 4, **characterized in that** said third means (50) are constituted by at least one rubber plug.
 6. Electric household appliance according to anyone of the preceding claims, **characterized in that** said first means (21) comprise a cavity (22) having a curvilinear vertical section and said second means (25) comprise a curved portion (2) which is partially rotatable inside said cavity (22).
 7. Electric household appliance according to claim 6, **characterized in that** said first means (21) comprise a vertical appendix (24) of said cavity (22) and said second means (25) comprise a transversal appendix (34) of said curved portion (26), said position of total opening of the door (4) being determined by the abutment of said vertical appendix (24) against said transversal appendix (34).
 8. Electric household appliance according to claim 6, **characterized in that** said elastic means (40) comprise two helicoidal springs (41) each one of which has a first end (43) in abutment against the edge of said cavity (22) of the first means (21) and a second end (44) in abutment against said curved portion (26) of the second means (25).
 9. Electric household appliance according to claim 6, **characterized in that** said third means (50) are adjacent to the curved portion (26) of said second means (25).
 10. Electric household appliance according to claim 9, **characterized in that** the profile of said curved portion (26) has such a shape so that the combination of it and of said third means (50) generates a gradual and adsorbed braking of said door (4) towards the closing direction of the same.
 11. Electric household appliance according to claim 1, **characterized by** comprising two hinges (20) to couple said door (4) with the top panel (2) of the frame (1).
 12. Electric household appliance according to claim 1, **characterized in that** it is constituted by a top loading laundry washing machine.
 13. Electric household appliance according to claim 1, **characterized in that** it is constituted by a top loading laundry drying machine.
 14. Electric household appliance according to claim 1, **characterized in that** said door (4) comprises an instrumentation (100) for controlling the electric household appliance.



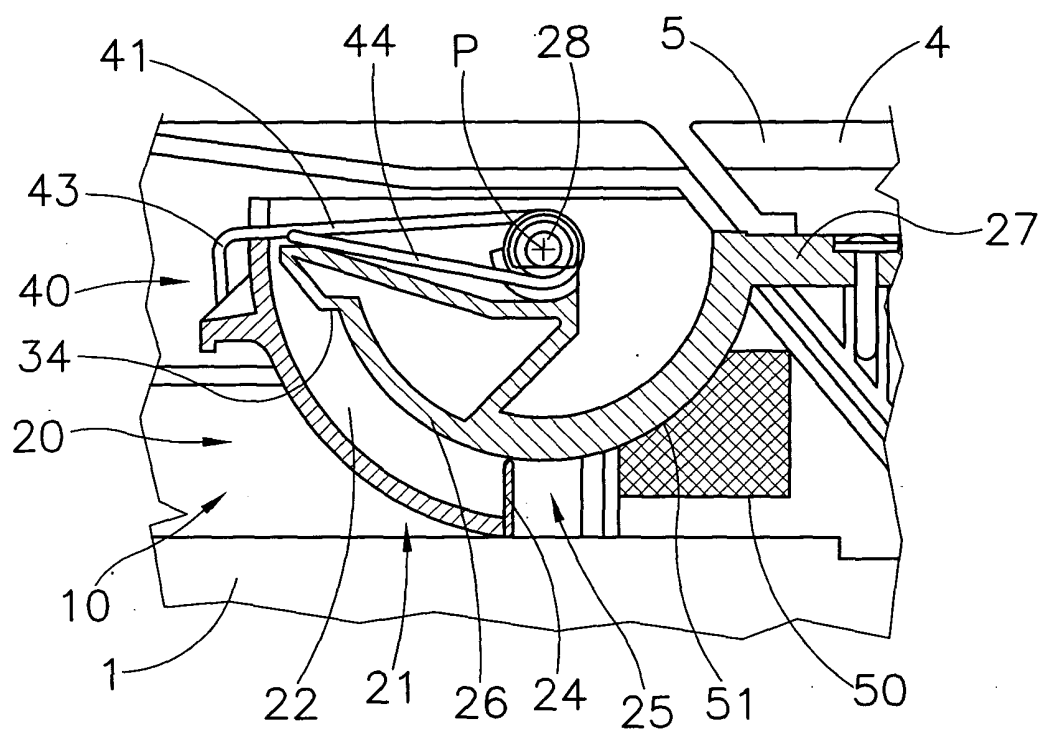


FIG. 3

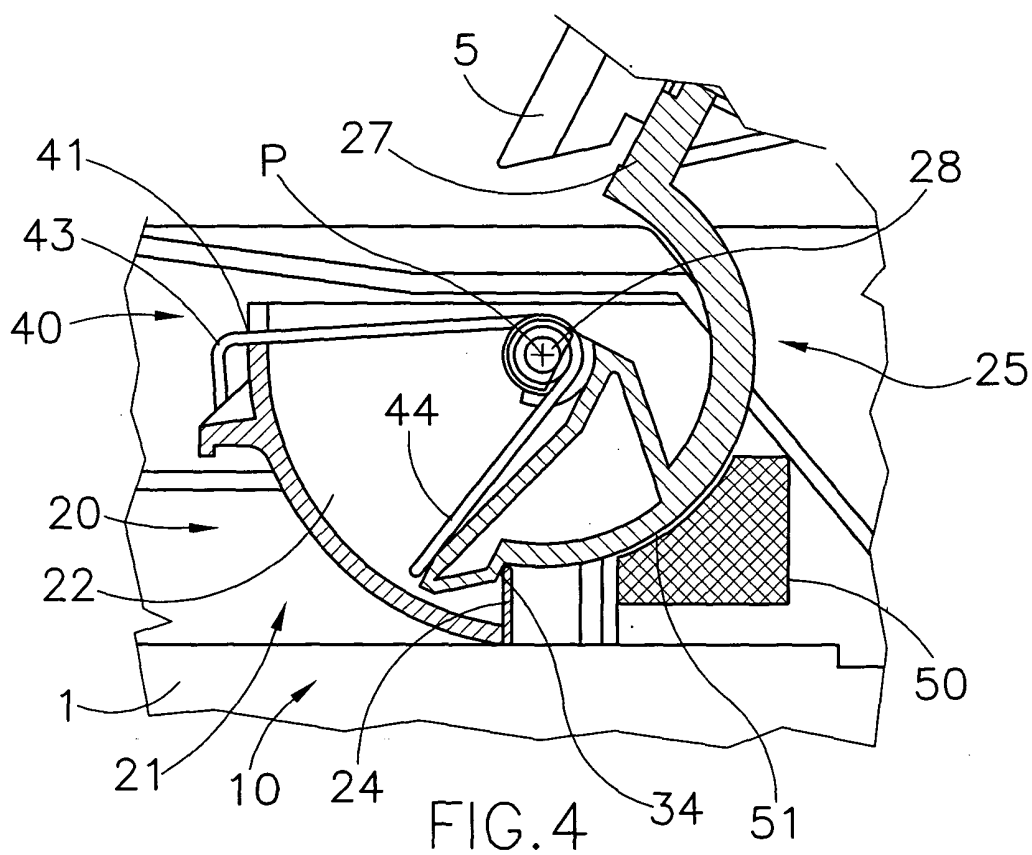


FIG. 4

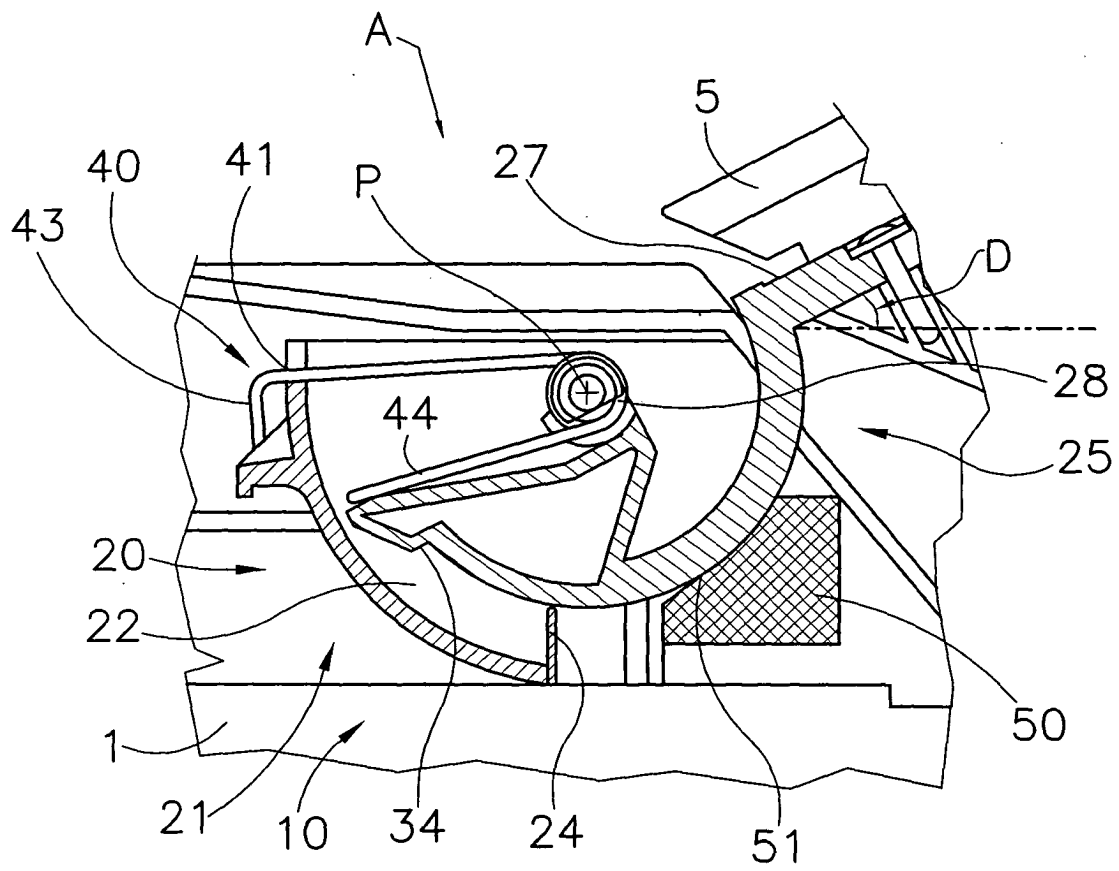


FIG.5



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EUROPEAN SEARCH REPORT

Application Number
EP 03 42 5621

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Place of search THE HAGUE		Date of completion of the search 3 March 2004	Examiner Norman, P
CATEGORY OF CITED DOCUMENTS 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 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 & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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