



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
19.03.2008 Bulletin 2008/12

(51) Int Cl.:
D06F 58/24 (2006.01)

(21) Application number: **06120815.3**

(22) Date of filing: **18.09.2006**

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

(71) Applicant: **Electrolux Home Products Corporation N.V.**
1930 Zaventem (BE)

(72) Inventor: **Casagrande, Stefano**
33091, Castelnovo del Friuli (Pordenone (IT))

(74) Representative: **Giugni, Valter**
PROPRIA S.r.l.
P.O. Box 365
Via della Colonna, 35
33170 Pordenone (IT)

(54) **Condenser laundry dryer with sensed drawer**

(57) A condenser laundry dryer according to the invention comprises a cabinet (1) having a chamber (9) that removably receives a drawer (8), said drawer (8) being provided with a tank (10) for collecting condensate liquor extracted from laundry to be dried. The condenser laundry dryer is characterised in that said drawer (8) comprises sensing means (12) adapted to provide a first signal having a first intensity when said drawer (8) is in a position at least partly extracted from said chamber (9), a second signal having a second intensity greater than said first intensity when said drawer (8) is completely received in said chamber (9) and said tank (10) is full of condensate and further adapted to provide a third signal having a third intensity comprised between said first and second intensity when said drawer (8) is completely received in said chamber (9).

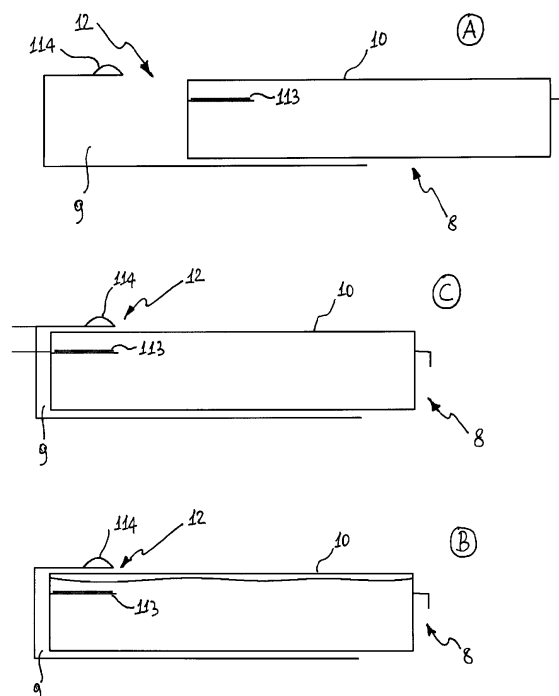


Fig. 2

Description

[0001] The present invention relates to a condenser laundry dryer having a sensed drawer.

[0002] Modern condenser laundry dryers and condenser washer-dryers are provided with a movable drawer having a tank for collecting condensate progressively formed during drying process.

[0003] When one of these known machines is turned on by a user and before starting a laundry drying cycle, an automatic check is performed in order to verify whether the drawer is absent from its receiving chamber and also whether such drawer is full of condensate liquor. The latter check is normally performed through a floating member that is pushed upwards by static hydraulic force. When such floating member reaches a preset level, an electric switch is activated giving the machine main control board a signal indicating that the drawer is full of condensate.

[0004] The check on whether the drawer has been removed from its receiving chamber is performed through the same floating member cited above by interpreting a signal corresponding to a constant condensate level in the tank sensed during laundry drying operations as an evidence of drawer absence or of a drawer not completely inserted in its receiving chamber. Since during machine operation, condensate level in the tank raises with a speed which is proportional to the condensation speed, it is required a relatively long time to definitely detect whether the drawer is effectively absent or not.

[0005] The aim of the present invention is therefore to solve the noted problems and thus providing a condenser laundry dryer in which the drawer tank presence and the condensate level in such tank are detected promptly after having turned on the machine.

[0006] Another object of the present invention is to provide a condenser laundry dryer in which a single sensing device performs both a condensate level measurement both a check whether the drawer is correctly inserted in its receiving chamber.

[0007] Still another object of the present invention is to provide a condenser laundry dryer which is simple to be produced and assembled.

[0008] Advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objects and advantages of the invention may be realised and attained as particularly pointed out in the appended claims.

[0009] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate a possible embodiment of the invention and together with the description serve to explain the principles of the invention.

[0010] In the drawings:

[0011] Figure 1 shows a condenser laundry dryer according to the invention;

[0012] Figure 2, shows schematically and in three different working situations a first embodiment of a drawer provided with sensing means according to the invention;

[0013] Figure 3 shows schematically and in three different working situations a second embodiment of a drawer provided with sensing means according to the invention;

[0014] Figure 4 shows schematically and in three different working situations a third embodiment of a drawer provided with sensing means according to the invention;

[0015] Figure 5 shows schematically and in three different working situations a fourth embodiment of a drawer provided with sensing means according to the invention;

[0016] With reference to figure 1, a condenser laundry dryer according to the invention comprises a cabinet 1 having a panel 2 carrying input and signalling means 3, 4 for allowing the user to choose drying programs and to be informed about the machine working conditions. A front door 5 closes an aperture 6 for introducing laundry to be dried into a inner region of a drum 7 which is rotatably mounted within a tub not shown in figure 1. A drawer 8 is arranged in a chamber 9 provided preferably in an upper portion of the machine cabinet 1. Drawer 8 has a tank 10 collecting condensate liquor extracted from laundry by a drying air flow passing through the drum 7.

[0017] An aperture 11 is provided in a tank wall for allowing the user to periodically empty the tank 10.

[0018] In order to check whether the drawer 8 is completely and correctly inserted in its receiving chamber 9 and to measure the condensate level in the tank 10, drawer 8 is provided with sensing means 12.

[0019] In figures 2 to 5 four embodiments of a drawer 8 with sensing means 12 are schematically shown. Each embodiment is shown in three different working situations. In particular, with letter A it is depicted a condition in which the drawer 8 is partly extracted from its receiving chamber 9; with letter B it is indicated a condition in which drawer 8 is completely received in said chamber 9 and tank 10 is full of condensate. Letter C indicates a condition in which drawer 8 is completely received inside chamber 9. In the latter condition the tank 10 can be completely empty or only partly full of condensate.

[0020] Sensing means 12 comprises an activating portion 113, 213, 313, 413 and a receiving portion 114, 214, 314, 414. In particular, embodiments shown in figures 2 to 4 have an activating portion 113, 213, 313 associated to the drawer 8 and a receiving portion 114, 214, 314 provided on a wall defining an upper portion of the chamber 9. The activating portion 113, 213, 313 and the receiving portion 114, 214, 314 are arranged such that, when the drawer 8 is completely inserted within its receiving chamber 9, they are facing each other.

[0021] The forth embodiment of the present invention which is shown in figure 5 has both the activating portion 413 both the receiving portion 414 fixed on a wall defining an upper portion of the chamber 9.

[0022] Sensing means 12 are adapted to provide a first signal having a first intensity when the drawer 8 is in a position at least partly extracted from chamber 9 (condition A in figures 2 to 5), a second signal having a second intensity greater than said first intensity when drawer 8 is completely received within chamber 9 and tank 10 is full of condensate (condition B in figures 2 to 5). Sensing means 12 are further adapted to provide a third signal having a third intensity comprised between said first and second intensity when the drawer 8 is completely received in chamber 9 (condition C in figures 2 to 5).

[0023] With reference to figure 2 the activating portion 113 is in the form of a metal sheet fixed on a drawer surface and the receiving portion 114 is formed by a capacitive sensor. When the drawer 8 is in condition A, sensor 114 emits a very low signal because it detects a dielectric constituted by air. In situation C, the drawer is completely inserted within chamber 9 and the metal sheet 113 faces the capacitive sensor 114. Because of the presence of metal the signal emitted by sensor 114 has an intensity which is greater than the intensity of the signal emitted in condition A. The greatest signal intensity is detected by sensor 114 when condensate covers the metal sheet 113. In this latter case the dielectric comprised between the receiving portion 114 and the activating portion 113 is predominantly determined by the presence of said condensate.

[0024] A second embodiment of the present invention is disclosed in figure 3 wherein the activating portion 213 of sensing means 12 is in the form of a floating member with a magnetic element fixed thereon and the receiving portion 214 is formed by a Hall sensor.

[0025] In condition A the Hall sensor detects no magnetic field, while in situation B sensor 214 emits a signal having a very high intensity because condensate within tank 10 lifts the floating member causing the magnetic element 213 to reach its closest position to the Hall sensor which is fixed to a wall defining the cavity 9. In condition C the tank is empty or only partly full of condensate and the magnetic member 213 faces the Hall sensor 214 but a wide gap exists therebetween. The signal emitted by sensor 214 has an intensity comprised between those of signals emitted in condition A and B.

[0026] Turning now to figure 4, the activating portion 313 of sensing means 12 is again in the form of a floating member, and the receiving portion 314 is formed by a displacement sensor. In condition A no displacement is detected by sensor 314. In situation B, the floating member 313 is lifted by the condensate which completely fills up the tank 10. The floating member 313 moves the displacement sensor 314 until it reaches its end of stroke position and the latter emits a signal of maximum intensity. In situation C, the floating member 313 slightly moves the displacement sensor in a position which is intermediate between those shown in situation A and B of figure 4. In this case the signal emitted by sensor 314 has an intensity comprised between those provided in situation A and B.

[0027] With reference to figure 5, the activating portion 413 of sensing means 12 is an optic emitter generating a light beam and the receiving portion 414 is an optical receiver. When the drawer 8 is at least partly extracted from chamber 9 (condition A) the light beam from emitter 413 is not received by the optical receiver 414 and therefore its output signal is quite low.

[0028] In situation C of figure 5, showing a working condition in which the drawer 8 is completely inserted within its receiving chamber 9, a light reflecting material 15 is opportunely associated to an upper portion of the drawer 8 such that a light beam generated by the optical emitter 413 is reflected towards the receiver 414 and meets the latter only partially. A portion of the light beam will pass the receiver 414 undisturbed. In such condition the emitter signal output will have a higher intensity than in working condition A.

[0029] The maximum intensity of the emitter signal is output in working condition B. In this case, condensate within the tank 10 covers the light reflecting material 15 and causes the light beam generated by the optical emitter 413 to be reflected towards the receiver 414 and to completely meet the latter.

[0030] Conclusively it can be stated that a condenser laundry dryer according to the present invention provides a prompt measure of the condensate level in the drawer tank and, at the same time, performs a quick check of the correct positioning of the drawer inside its receiving chamber formed in the drying machine.

Claims

1. A condenser laundry dryer comprising a cabinet (1) having a chamber (9) that removably receives a drawer (8), said drawer (8) being provided with a tank (10) for collecting condensate liquor extracted from laundry to be dried, **characterised in that** said drawer (8) comprises sensing means (12) adapted to provide a first signal having a first intensity when said drawer (8) is in a position at least partly extracted from said chamber (9), a second signal having a second intensity greater than said first intensity when said drawer (8) is completely received in said chamber (9) and said tank (10) is full of condensate and further adapted to provide a third signal having a third intensity comprised between said first and second intensity when said drawer (8) is completely received in said chamber (9).
2. A condenser laundry dryer according to claim 1 wherein sensing means (12) comprises an activating portion (113, 213, 313) associated to the drawer (8) and a receiving portion (114, 214, 314) provided on a wall defining an upper portion of said chamber (9).
3. A condenser laundry dryer according to claim 1 or 2 wherein said activating portion (113) is in the form

of a metal sheet and said receiving portion (114) is a capacitive sensor.

4. A condenser laundry dryer according to claim 1 or 2 wherein said activating portion (213, 313) is in the form of a floating member. 5
5. A condenser laundry dryer according to claim 4 wherein said activating portion (213) comprises a magnetic element and said receiving portion (214) is a Hall sensor. 10
6. A condenser laundry dryer according to claim 4 wherein said receiving portion (314) is a displacement sensor. 15
7. A condenser laundry dryer according to claim 1 wherein sensing means (12) comprises an activating portion (413) and a receiving portion (414) both provided on a wall defining an upper portion of said chamber (9). 20
8. A condenser laundry dryer according to claim 7 wherein said activating portion (413) is an optical emitter and the receiving portion (414) is an optical receiver. 25
9. A condenser laundry dryer according to claim 7 or 8 further comprising a light reflecting material (15) arranged on an upper portion of the drawer 8. 30

35

40

45

50

55

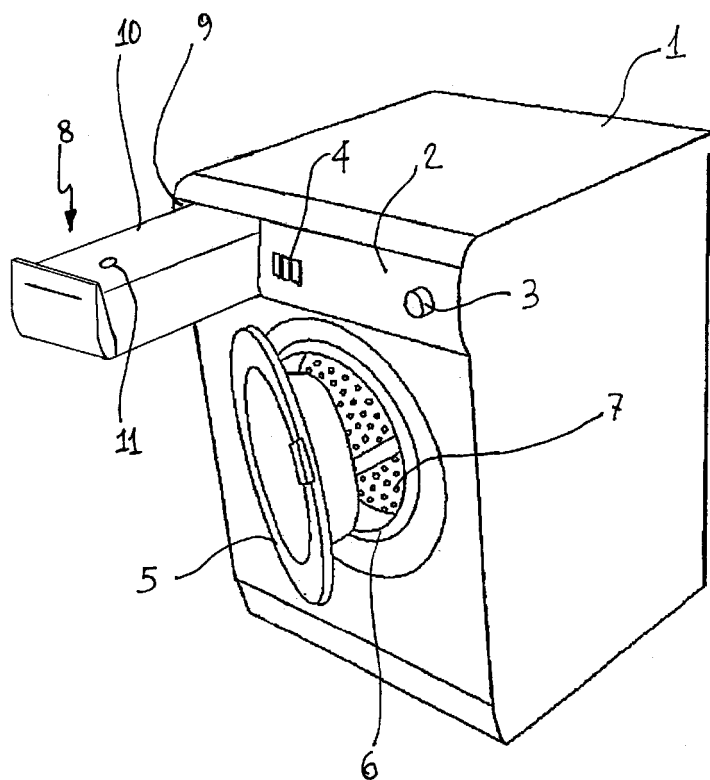


Fig. 1

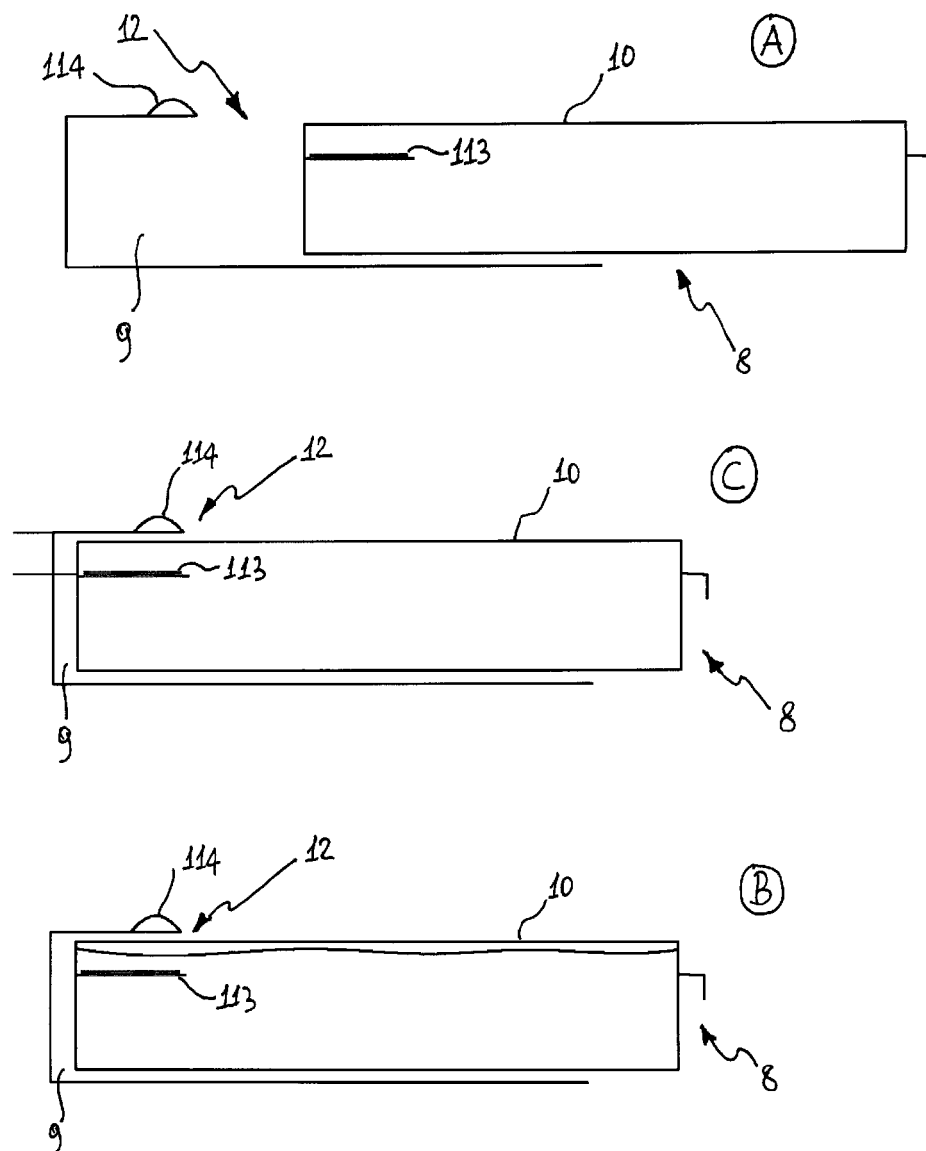


Fig. 2

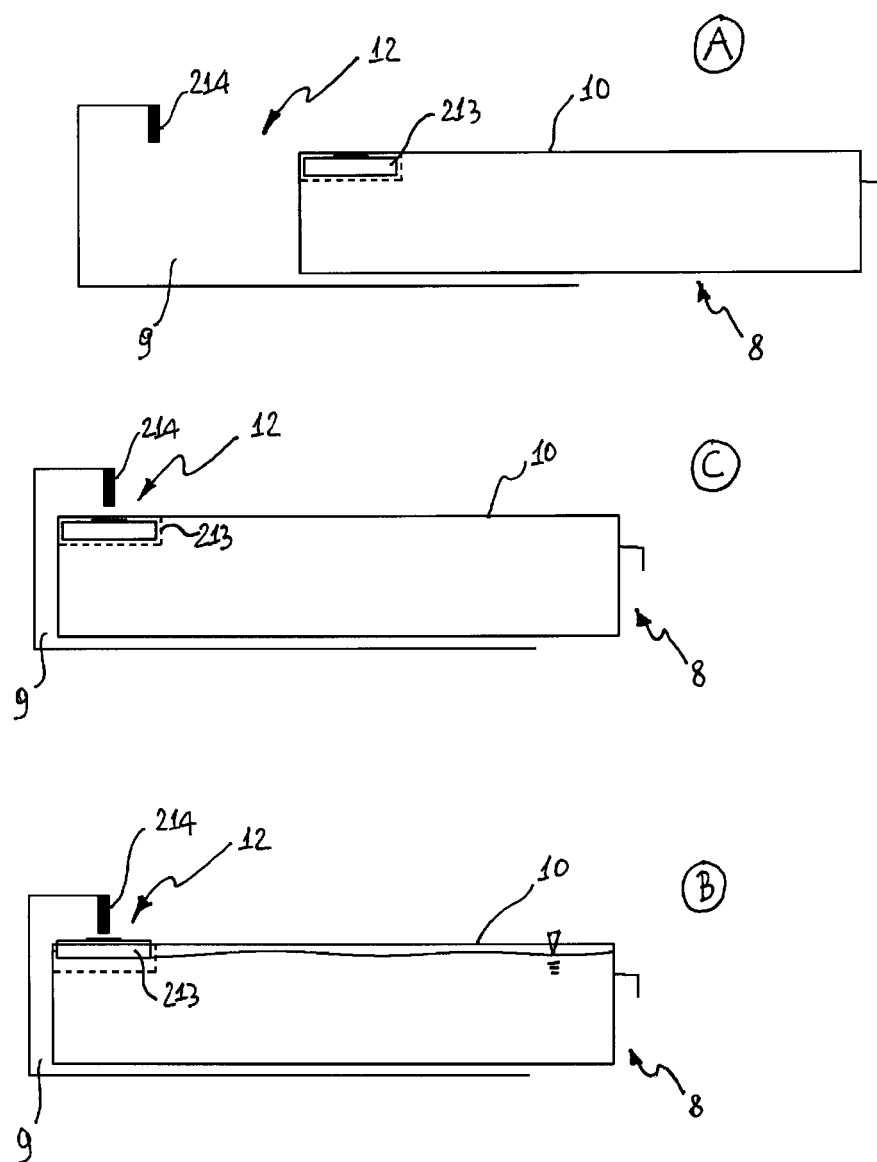


Fig. 3

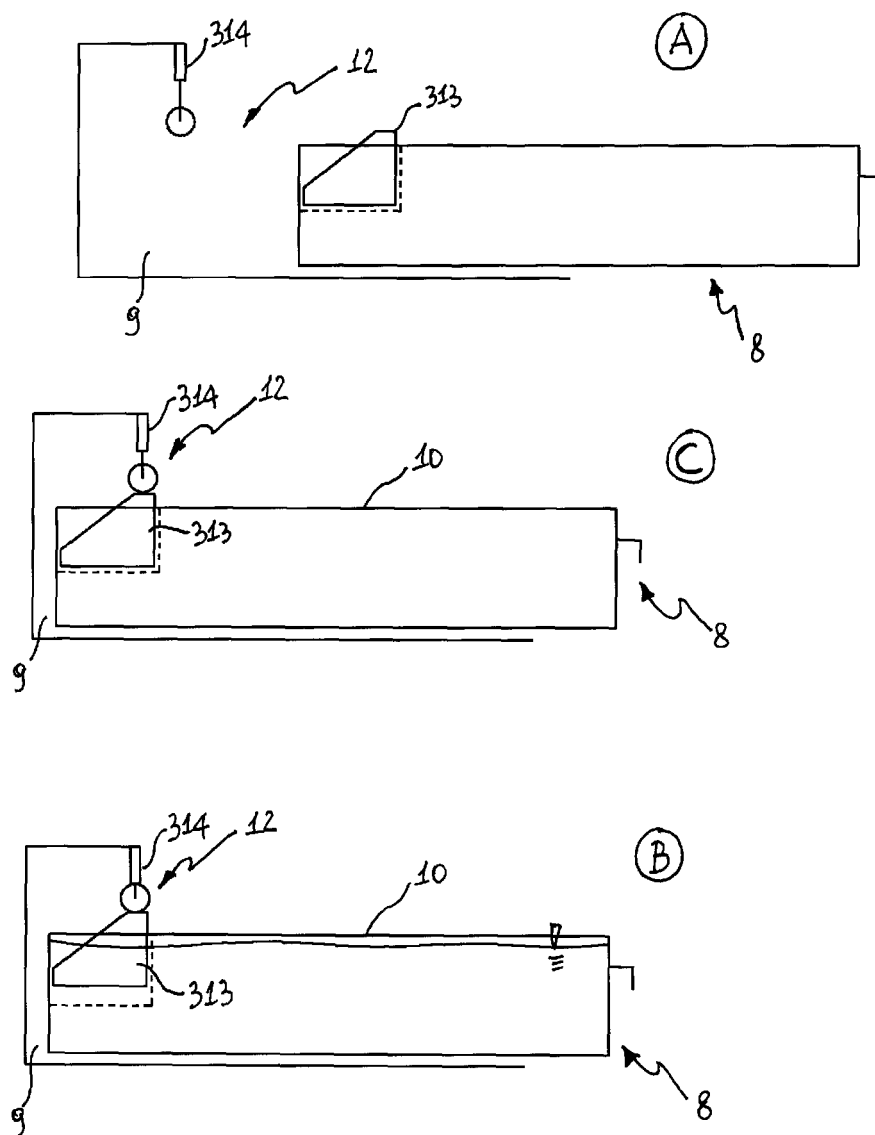


Fig. 4

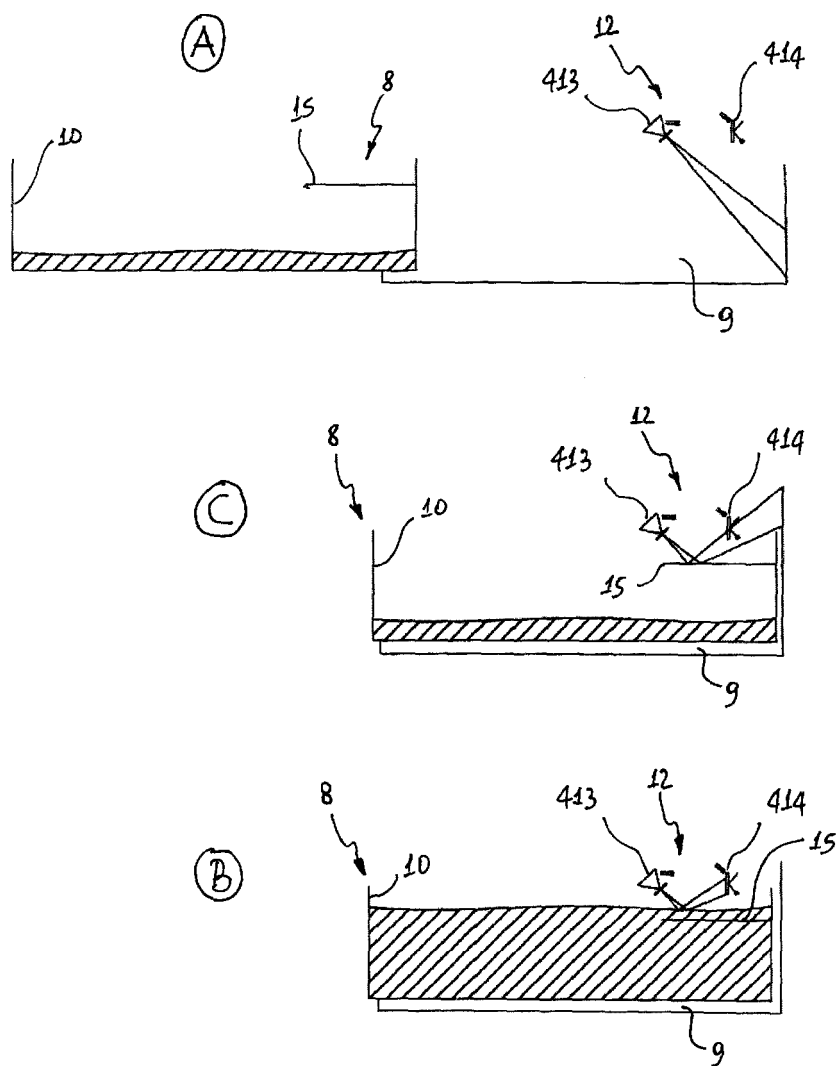


Fig. 5



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 12 0815

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 1 659 207 A (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 24 May 2006 (2006-05-24) * paragraphs [0023] - [0030]; figures *	1,2,7	INV. D06F58/24
A	DE 88 05 385 U1 (LICENTIA PATENT-VERWALTUNGS-GMBH, 6000 FRANKFURT, DE) 22 June 1989 (1989-06-22) * page 6, line 6 - line 14; claims 1,3; figures *	1,2,4,6-8	
A	DE 88 11 974 U1 (LICENTIA PATENT-VERWALTUNGS-GMBH, 6000 FRANKFURT, DE) 11 May 1989 (1989-05-11) * page 6, line 5 - line 8; claims; figures *	1,2,4,5,7	
			TECHNICAL FIELDS SEARCHED (IPC)
			D06F
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		7 February 2007	Courrier, Gilles
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			

2

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 06 12 0815

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

07-02-2007

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 1659207	A	24-05-2006	DE 102004055941 A1	24-05-2006
DE 8805385	U1	22-06-1989	IT 216514 Z2	16-09-1991
DE 8811974	U1	11-05-1989	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82