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(54) **A laundry dryer machine having a filter for condensed water**

(57) The present invention concerns a laundry dryer machine comprising a rotary drum (13) with a cavity (41) for receiving the laundry to be dried, heating means (14) for heating a drying air, a condenser (15) for removing moisture from the drying air and conveying means (16), for successively circulating the drying air through the drum (13), the condenser (15) and the heating means (14), the machine further comprising a collection tank

(30) for collecting by gravity the water condensed in the condenser (15) and means (31) for drawing the water collected in said tank (30). The machine also comprises means for carrying the condensed water from the condenser (15) to a first area (40) of the collection tank (30), said drawing means (31) being adapted to draw water from a second area (41) of the tank (30), water filtering means (43, 44) being provided between the first (40) and the second (41) areas.

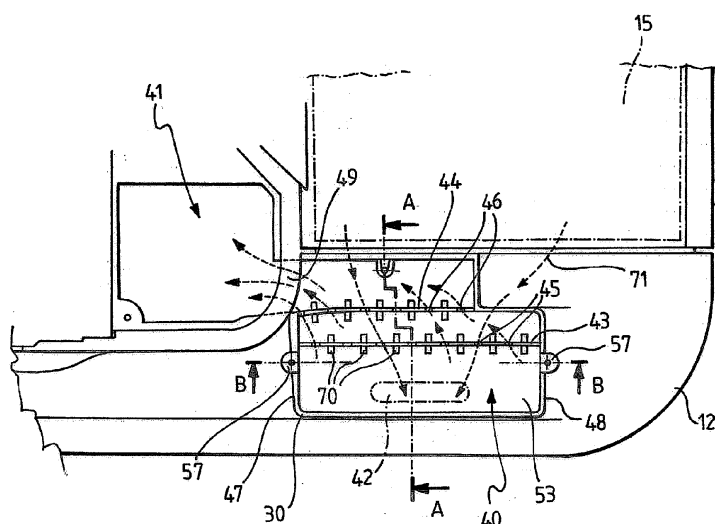


Fig. 2

Description

[0001] The present invention relates to a laundry dryer machine having filter means for filtering the condensed water in the condenser of the machine.

[0002] It is known in the art to provide laundry dryer machines comprising a rotary drum designed to receive the laundry to be dried, means for heating the drying air and a condenser for removing the moisture contained in the drying air at the exit of the rotary drum. These parts are arranged within an outer casing of the household appliance.

[0003] The machine also comprises a special fan which successively circulates the drying air through the drum, the condenser and the heating means (typically an electrical resistor) during operation of the apparatus.

[0004] The laundry dryer also comprises a collection tank for condensed water, which is placed at a lower level than the condenser for collecting the falling condensed water.

[0005] A pump is also provided, which draws the condensed water collected in the tank and conveys it to a container that can be removed from the household appliance to be emptied by the user at the end of a drying cycle. The removable container is at a higher level than the collection tank, to be easily reachable by the user.

[0006] The air exiting the drum typically contains impurities released from the laundry being dried, such as fluff, fibers, etc. While air filters are provided downstream from the drum, in operation some of these impurities may reach the condenser and be carried by the condensed water to the collection tank. Then, the impurities may be conveyed through the conduits, that carry water from the collection tank to the removable drain container of the household appliance.

[0007] In view of the above state of the art, the object of this invention is to provide a laundry dryer machine, that allows the hydraulic circuit of condensed water and the removable drain container of the machine to be kept in a satisfactorily clean state.

[0008] A further object of the invention is to provide a machine that has a simple and inexpensive structure and requires no laborious maintenance and/or cleaning procedure.

[0009] A further object of the invention is to provide a machine that can also maintain both the filter for the drying air at the outlet of the drum and the condenser in a satisfactorily clean state.

[0010] According to the present invention, this object is fulfilled by a laundry dryer machine that comprises a rotary drum with a cavity for receiving the laundry to be dried, means for heating a drying air, a condenser for removing moisture from the drying air and conveying means, for successively circulating the drying air through the drum, the condenser and the heating means, the machine also comprising a collection tank for collecting the water condensed in the condenser and means for drawing water from said tank, **characterized in that** the col-

lection tank has a first area into which water from the condenser is introduced, and a second area from which said drawing means draw water from the tank, water filtering means being provided between the first and the second tank areas.

[0011] The characteristics and advantages of the present invention will appear from the following detailed description of one practical embodiment, which is illustrated without limitation in the annexed drawings, in which:

- Figure 1 is an overall perspective view of a machine according to the invention, with some parts being omitted for a clearer vision of the internal components of the machine,
- Figure 2 is a plan view of the condensed water collection tank,
- Figure 3 is a cross sectional view of the collection tank as taken along the plane A-A of Figure 2,
- Figure 4 is a cross sectional view of the collection tank as taken along the plane B-B of Figure 2.

[0012] Figure 1 shows a laundry dryer machine 11 having an outer casing 12, with a rotary drum 13, a condenser 15 and heating means 14 arranged therein.

[0013] The rotary drum 13 has a cavity for receiving the laundry to be dried, and is rotated, during operation, by known motor means.

[0014] The drum 13 has a front opening, through which the laundry may be loaded into and unloaded out of the drying cavity. The drum 13 has a substantially horizontal axis of rotation.

[0015] An opening 25 is formed on the front of the casing 12, for the user to access the interior of the drum 13 therethrough. The opening 25 can be closed by a door, preferably formed as a transparent window hinged to the casing 12 of the household appliance.

[0016] In operation, the heating means 14 have the task of heating the drying air 24 circulating in the household appliance. Preferably, those means are made by as an electrical resistor 14 disposed on the back of the machine 12, i.e. on the side opposite to the opening 25.

[0017] In operation, the condenser 15 has the task of removing moisture from the drying air let out of the drum 13 and may, per se, be formed as known in the art. The condenser 15 is placed below the drum 13, close to the bottom of the enclosure.

[0018] The laundry dryer 11 also comprises conveying means 16 for successively circulating the drying air through the rotary drum 13, the condenser 15 and the heating means 14. These conveying means preferably include a fan 16 placed downstream from the condenser 15 and upstream from the heating means 14.

[0019] In one embodiment of the invention, a drying air filter 26 is placed downstream from the drum 13 and upstream from the condenser 15.

[0020] The laundry dryer machine 11 also comprises a fan 17 for causing cooling air 19 to pass through the

condenser 15, introducing it into the casing of the household appliance through the inlet 18. Preferably, the fan 17 is placed downstream from the condenser 15, with respect to the direction of the cooling air flow 19.

[0021] A collection tank 30 is placed downstream from the condenser 15, for collecting by gravity the water condensed in the condenser.

[0022] The machine also comprises means 31 for drawing water from the collection tank 30, which preferably are made by a pump. Particularly, the pump 31 pumps the condensed water through the conduit 33 to a nozzle 34 located above a top opening 35 for filling the condensate draining container 32.

[0023] The container 32 is placed at the front opening 25 of the machine, in a position in which it can be easily accessed by the user. The container 32 is advantageously mounted to the closing door of the machine, and is removable to be more easily emptied by the user.

[0024] The drying air filter 26 is placed below the container 32.

[0025] The collection tank 30 is clearly shown in Figures 2 to 4, in which the tank closing lid 56 (partially shown in Fig. 1) has been omitted.

[0026] The tank 30 comprises a first area 40, into which condensed water is introduced, and a second area 41, from which water is drawn from the tank.

[0027] Water flowing from the condenser 15 is introduced into the first area 40 of the tank 30 by suitable water conveying means. Preferably, the means for conveying water to the first area 40 include the lid 56, which forms a chute adapted to carrying water from the condenser 15 to the mouth 42, lying above the area 40 of the tank. Figure 2 shows the position of the mouth 42 by broken lines, with numeral 71 designating the path of condensed water from the condenser 15 to the first area 40 of the tank.

[0028] The pump 31 for drawing water from the tank 30 draws water from the area 41 of the tank 30.

[0029] Filtering means are provided between the first area 40 and the second area 41 of the tank, designed to retain the impurities (fluff, fibers, etc.) contained in the condensed water in the first area 40, and prevent them from reaching the second area 41.

[0030] Preferably, the filtering means include at least one wall extending from the bottom 53 of the tank 30. In a preferred embodiment of the invention, the filtering means include two walls 43, 44.

[0031] Each wall 43, 44 has slots 45 and 46 respectively. Advantageously, each wall has at least three slots 45, 46, preferably at least five slots. The slots are open at their top upper portions. The slots 45, 46 are spaced about 2 cm apart. The slots are preferably 1 to 2 mm wide.

[0032] The number and shape of the slots ensures a satisfactory water filtering action, without unduly slowing down or hindering the passage of water from the first to the second areas of the collection tank.

[0033] Furthermore, the slots 45, 46 of successive walls 43, 44 are offset in a direction transverse to the

walls. This arrangement allows a more reliable trapping of any kind of fiber present in the water.

[0034] Preferably, the slots are substantially vertical.

[0035] The walls 43, 44 are preferably parallel to each other. The walls 43, 44 are substantially parallel to lateral walls of the tank.

[0036] Preferably, the walls 43, 44 extend from one lateral wall 47 to the opposite lateral wall 48 of the tank 30.

[0037] Preferably, the walls 43, 44 have a continuous lower portion 51, 52, which extends between the lateral walls 47, 48 of the tank to form a barrier to water passage up to a certain level. The height of the continuous lower portion 51 is more than 5 mm, preferably about 1 cm. Impurities are trapped in the first area 40 of the tank at a level lower than the height of the wall portion 51, and remain there throughout the life of the household appliance, without requiring any maintenance.

[0038] Preferably, the tank area with the walls 43, 44 and the area 41 communicate with each other through an opening 50 (Fig. 3), whose top edge is about level with the bottom end of the slots 45, 46. The wall 49 of the machine structure forms the top edge of the opening 50.

[0039] Preferably, the walls 43, 44 have reinforcement members 70, which connect the wall sides with the bottom 53 of the tank 30.

[0040] Preferably, the machine also comprises means for rinsing (or washing) the filter 26, which feed water through the filter 26. After the filter 26, the rinsing water passes through the condenser 15 and reaches the tank 30.

[0041] The filter rinsing means advantageously comprise means for discharging the water contained in the container 32 towards the filter. The discharge of rinsing water may be controlled by a suitable valve, in a manual or automatic manner.

[0042] When rinsing of the filter 26 is actuated, a considerable amount of impurities is carried to the collection tank 30, where it is trapped by the filtering means 43, 44. The combination of the means for rinsing the filter 26 and the presence of the filtering means 43, 44 in the collection tank 30 allows maintaining in a satisfactory clean state any part of the laundry-dryer machine (air filter, condenser, hydraulic circuit for condensed water), without requiring the user to carry out burdensome maintenance or cleaning procedures.

[0043] Holes 57 are formed on the lateral edges of the tank 30, for receiving fastener means (such as screws) that fix the lid 56 to the tank.

[0044] Preferably, the tank 30 is formed on the bottom of the household appliance and may have a total height of about 5 cm.

[0045] The above clearly shows that the objects of the present invention have been fulfilled.

[0046] Particularly, a laundry dryer machine has been provided, which can maintain the hydraulic circuit for condensed water, the filter for the air that comes out of the drum and the condenser in a satisfactory clean state,

without requiring any burdensome maintenance or cleaning procedure.

[0047] The machine does not have a particularly complex structure and does not involve high manufacturing costs.

[0048] Those skilled in the art will obviously appreciate that a number of changes and variants may be made to the arrangements as described hereinbefore to meet incidental and specific needs, without departure from the scope of the invention, as defined in the following claims.

Claims

1. A laundry dryer machine comprising a rotary drum (13) with a cavity (41) for receiving the laundry to be dried, heating means (14) for heating a drying air, a condenser (15) for removing moisture from the drying air and conveying means (16), for successively circulating the drying air through the drum (13), the condenser (15) and the heating means (14), the machine also comprising a collection tank (30) for collecting in the condenser (15) the condensed water and means (31) for drawing water from said tank (30), **characterized in that** the collection tank (30) has a first area (40) into which water from the condenser (15) is introduced, and a second area (41) from which said drawing means (31) draw water from the tank (30), water filtering means (43, 44) being provided between the first (40) and the second (41) tank areas.
2. A machine as claimed in claim 1, **characterized in that** said filtering means (43, 44) comprise at least one wall that extends upwards from a bottom (53) of the tank (30).
3. A machine as claimed in one or more of the preceding claims, **characterized in that** the at least one wall (43, 44) comprises a continuous lower portion (51) which extends from a lateral wall (47) of the tank to the lateral wall (48) opposite thereto.
4. A machine as claimed in one or more of the preceding claims, **characterized in that** said continuous lower portion (51) is more than 5 mm high.
5. A machine as claimed in one or more of the preceding claims, **characterized in that** the filtering means include two of said walls (43, 44).
6. A machine as claimed in one or more of the preceding claims, **characterized in that** the at least one wall (43, 44) has at least one or more slots (45, 46) for water passage.
7. A machine as claimed in one or more of the preceding claims, **characterized in that** the slots (45, 46) of successive walls are offset in a direction transverse to the walls.
8. A machine as claimed in one or more of the preceding claims, **characterized in that** the slots (45, 46) are substantially vertical.
9. A machine as claimed in one or more of the preceding claims, **characterized in that** the slots (45, 46) are from 1 to 2 mm wide.
10. A machine as claimed in one or more of the preceding claims, **characterized in that** it comprises a drying air filter (26) downstream from the drum (13) and upstream from the condenser (15), the machine comprising means for washing said filter (26) which are adapted to rinse the filter (26) with water, that after having passed through the filter (26) flows by gravity into the condenser (15) and then into said collection tank (30).
11. A machine as claimed in one or more of the preceding claims, **characterized in that** said water drawing means (31) comprise a pump connected to a conduit (33) for carrying the condensed water into a container (32) placed at a level higher than the collection tank (30).
12. A machine as claimed in one or more of the preceding claims, **characterized in that** said container (32) is placed at a machine door, that can be opened for access to the drum (13).
13. A machine as claimed in one or more of the preceding claims, **characterized in that** said collection tank (30) is placed at a level below the condenser (15) to collect condensed water by gravity.
14. A machine as claimed in one or more of the preceding claims, **characterized in that** it comprises means for carrying water from the condenser (15) to the first area (40) of the tank (30), said means comprising a top closing lid of the tank (30) having a chute (56) for carrying water to an opening (42) set above the first area (40) of the tank.
15. A machine as claimed in one or more of the preceding claims, **characterized in that** the area of the tank (30) with the filtering means (43, 44) and the second area (41) of the tank communicate with each other through an opening (50) whose top edge is substantially level with the bottom of the slots (45, 46) of the walls (43, 44) extending from the bottom (53) of the tank (30).

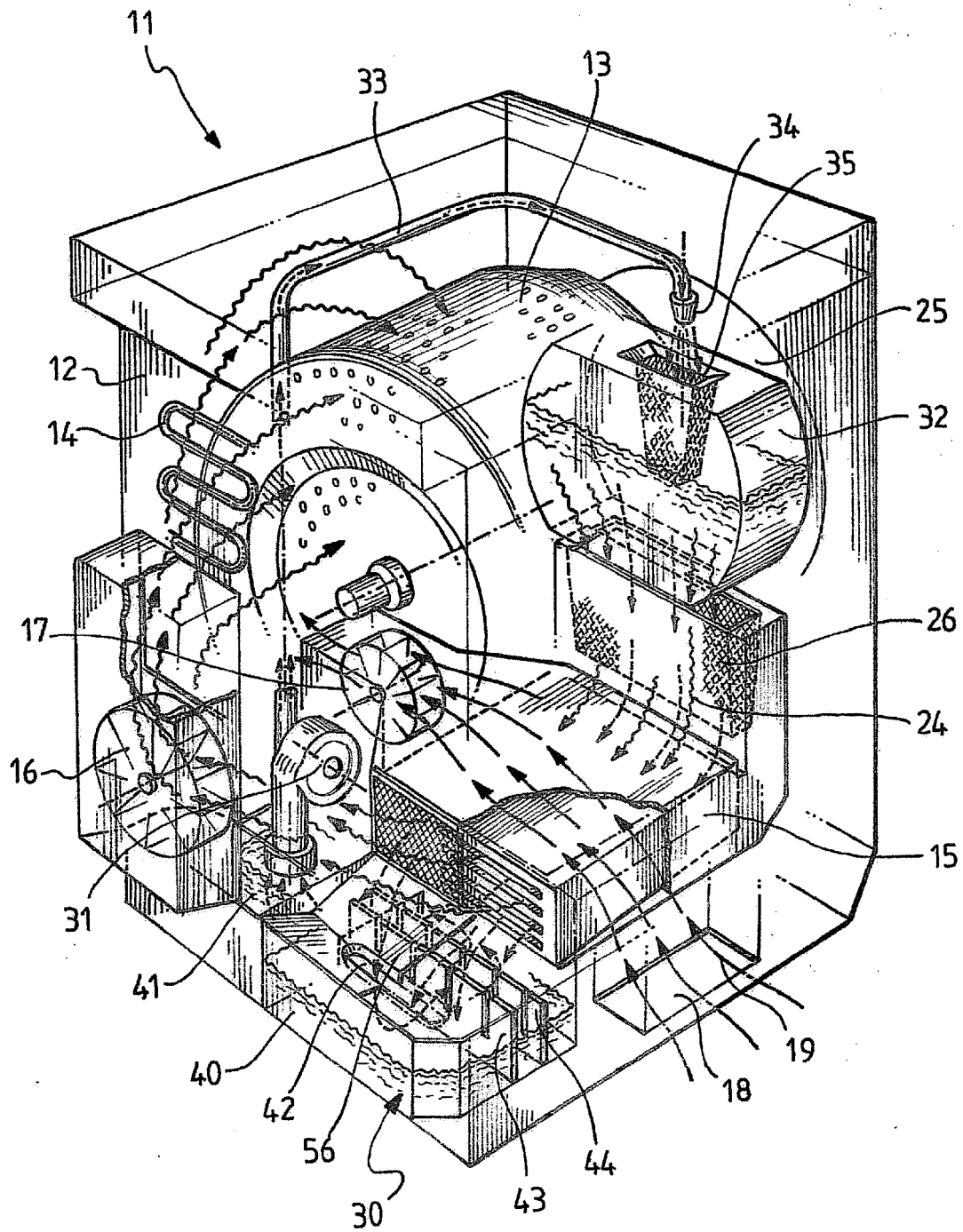


Fig. 1

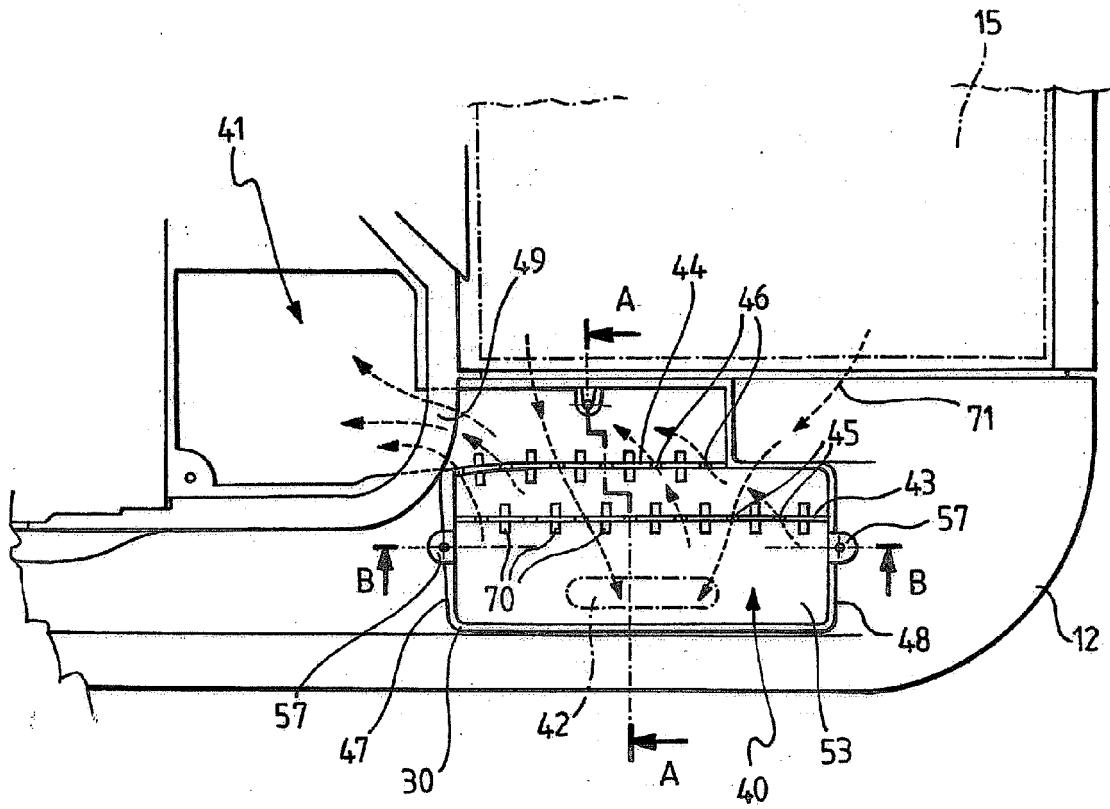


Fig.2

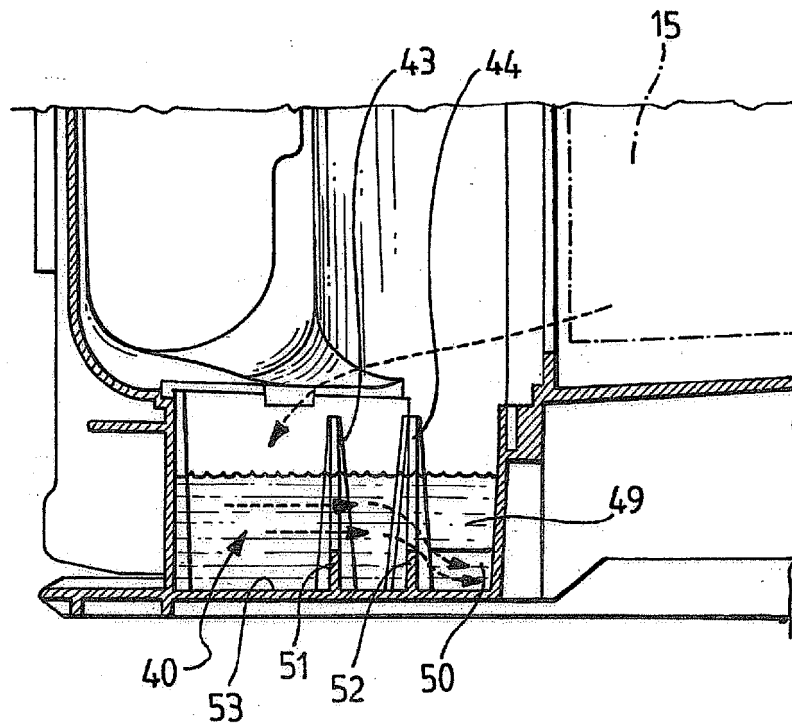


Fig. 3

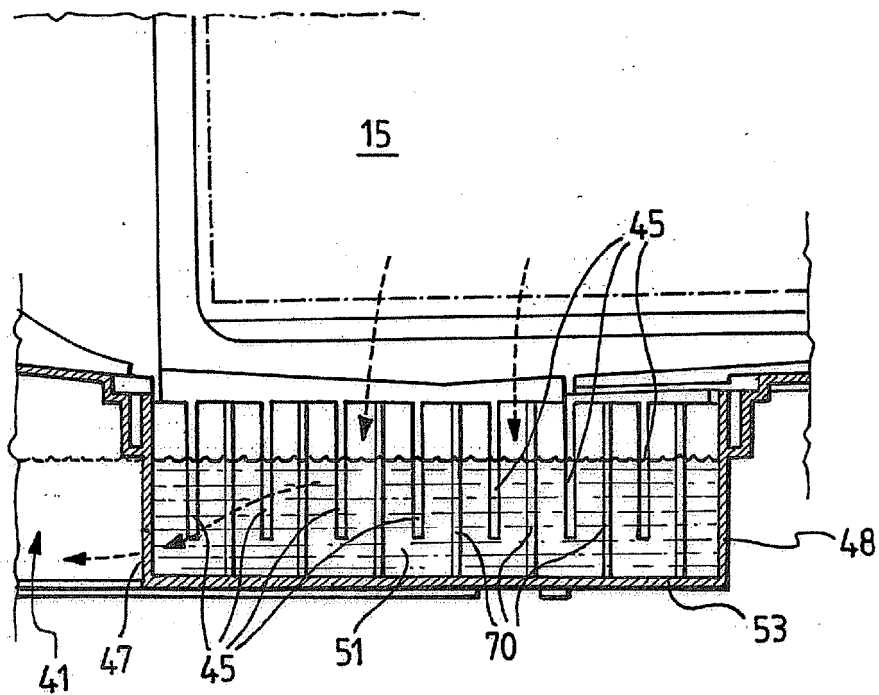


Fig. 4



EUROPEAN SEARCH REPORT

Application Number
EP 09 42 5410

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 9 April 2010	Examiner Westermayer, Wilhelm
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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EPO FORM 1503 03.82 (P04C01)

**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.
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