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(54) A washing machine detergent compartment

(57) The present invention relates to a washing machine (10), the machine (10) including a washing tub (13) and at least one control system with a user interface (12), a compartment (23) being fluidly connected to the tub via an outlet, and a detergent container (11) with at least one tray (14, 15, 16) being located in the compartment (23). The compartment comprises a main water duct system (17) being arranged to provide water to the tray/-s (14, 15,16) in order to mix the detergent in the tray/-s with water and at least one drainage passage (34) arranged to guide the water-mixed detergent via the compartment (23) to the outlet (32).

The compartment is particularly characterized in that it further comprises at least one additional water duct system (18,19) being arranged to provide water beside the container directly into to the compartment (23) in order to flush out residues in the compartment (23) to the outlet (32).

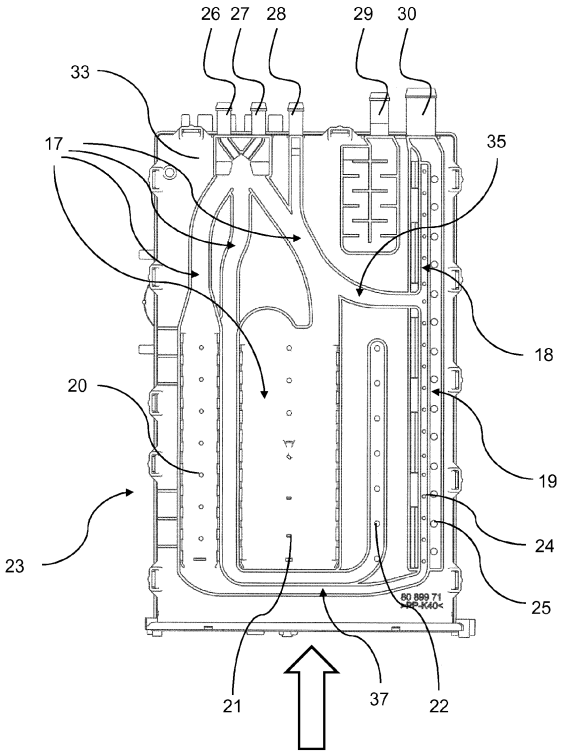

FIG 4

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Description

TECHNICAL FIELD

[0001] The present invention relates to a washing machine, the machine including a washing tub, at least one control system with a user interface and a compartment being fluidly connected to the tub via an outlet. A detergent container with at least one tray is located in the compartment. The compartment comprises a main water duct system is arranged to provide water to the tray/-s in order to mix the detergent in the tray/-s with water and guide it through at least one drainage passage in the container, via the compartment to the outlet.

BACKGROUND

[0002] Today's clothes washing machines comprise a compartment located in the upper part of the machine. The compartment is provided with a detergent container for loading detergent into the washing machine. In front loaded machines the detergent container is normally accessed via the front and in top loaded machines it is accessed via the top of the machine. In the following, front loaded machines will be discussed, but the characteristics of the compartment is similar in top loaded machines, which result in that the same problem may arise also for such machines.

[0003] The compartment of the front loaded machine has a detergent container with at least one tray. The compartment comprises a main water duct system arranged in a compartment wall to provide water to the tray/-s in order to mix the detergent in the tray/-s with water and guide it through at least one drainage passage in the container, via the compartment and an outlet to a tub.

[0004] This means that there is a drainage passage adjacent each tray which enables the detergent mixed with water to be collected in the bottom part of the compartment before it flows out via the outlet to a tub where the drum with the clothes is located.

[0005] A problem that arises is that detergent residues are collected in the trays, the bottom part of the compartment and in the tub. Old residues may then be released to the clothes during the washing cycle which reduces rinsing performance. Moreover, the old residues may result in bacteria growth in compartment.

[0006] In order to clean the tub from residues and bacteria, washing machines of today may comprise an extra drum cleaning program cycle. During this cycle it is intended that no clothes or detergent is present in the washing machine. In this program cycle, water is flushed through the empty trays, via the drainage passages into the compartment and then to the tub. The drum is further rotated in the tub to ensure that it is properly washed. No detergent is used during this program cycle. The water is heated in the tub drum and thereby ensures an efficient cleaning of the drum and the tub from bacteria and residues.

[0007] However, with this known cleaning program cycle, only the tub and drum is cleaned. The inlet water fed into the tub during said cycle is flushed through the trays into the tub without sufficient cleaning of the compartment.

SUMMARY

[0008] The object of the present invention is therefore to provide a washing machine with efficient cleaning of the detergent container and the complete compartment of the machine.

[0009] The object is obtained by means of a washing machine, the machine including a washing tub and at least one control system with a user interface and a compartment. The compartment is fluidly connected to the tub via an outlet and a detergent container with at least one tray is arranged to be provided in the compartment. The detergent container is adapted to receive detergent. The compartment comprises a main water duct system being arranged to provide water to the tray/-s in order to mix the detergent in the tray/-s with water. The compartment also comprise at least one drainage passage fluidly connected to the container, being arranged to guide the detergent and water mix via the compartment to the outlet.

[0010] The compartment is particularly characterized in that it further comprises a lower wall and at least one additional water duct system being arranged to provide water beside the container directly to the lower wall of the compartment in order to flush out residues in the compartment to the outlet. By introducing the additional water duct system, the compartment is cleaned from residuals and bacteria. The hot and/or cold water fed from the water inlet into the trays for flushing detergent via the main water duct system into the tub is at the same time used to provide water to the additional water duct system to rinse the compartment in order to remove residuals and bacteria.

[0011] The main and/or additional water duct system may further be arranged in an upper wall of the compartment positioned above the container. Thereby, the detergent container and the compartment are efficiently cleaned by the flushing water since the water pressure is also supported by gravity.

[0012] The additional water duct system may lead into one box-like channel on the bottom side of the upper wall. This ensures that water is directed efficiently in order to achieve a good cleaning effect.

[0013] The additional water duct system may comprise a first duct being connected to the main water duct system for provision of water via the main duct system to the first duct. At least one connecting duct preferably connects the main water duct system to the first duct. The main water duct system is preferably fed with inlet water from a water pipe connected to a water inlet of the washing machine. This first duct is provided to ensure efficient cleaning of the compartment when flushing out agent in

the trays. Via the connecting duct water is provided to the first duct when a tray is flushed of by the main duct system.

[0014] The additional water duct system comprises a second duct being provided with hot process water from the tub. Since process water during the washing cycle is re-circulated into the compartment it is ensured that all the detergent residuals in the compartment is provided to the washing cycle.

[0015] The additional water duct system may provide water to the highest part of the periphery of a lower wall of the compartment. The lower wall may be inclined such that the said provided water flows over the lower inclined wall in order to flush out said residues. The additional water duct system substantially extends along the whole length of the compartment. Thereby, a sufficient cleaning of the compartment inclining wall is achieved.

[0016] With the present invention, the self cleaning cycle can be improved with a sufficient cleaning of residuals and bacteria from the compartment.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The present invention will now be described more in detail with reference to the appended drawings, where:

Figure 1 schematically shows a washing machine according to the invention;

Figure 2 schematically shows a detergent container in the shape of a drawer where the detergent trays are shown;

Figure 3 schematically shows a perspective view of the compartment;

Figure 4 schematically shows a top view of the compartment;

Figure 5 schematically shows a perspective view of the compartment, with the upper wall separated from the rest of the compartment.

DETAILED DESCRIPTION

[0018] In the following, an example embodiment of a front loaded washing machine with a compartment accessed from the front will be illustrated. A person skilled in the art would realize that the system may be integrated into any washing machine comprising a compartment provided with a detergent container which may be refilled by a user.

[0019] The illustrative washing machine 10, see figure 1, includes a washing tub 13, where a washing drum is located. The drum is arranged to rotate around a horizontal axis. The drum is accessed through a door (not shown) at the front side of the machine. The machine further comprises a control system integrated into the machine, which is not shown in the figure. The control system as such controls the operation of the machine and will not be described further in the present patent application. However, a person skilled in the art would realize that the operation of the washing cycles of the machine is managed by this control system.

[0020] The machine further comprises a user interface 12 through which the user may control the operation of the machine. On the user interface, the user may for instance set the washing program and the temperature. Moreover, in relation to the present invention, the user may also determine if the detergent should perform cleaning of residues or not, either as part of a regular washing cycle or as a separate residues cleaning cycle. This information, together with information about for instance the washing program, the temperature and the amount of laundry, will be used by the control system when controlling the machine.

[0021] The washing machine further comprises a detergent container 11 comprising trays arranged to be provided with detergent, see figures 1 and 2. A person skilled in the art would realize that the machine may be provided with detergent and/or optionally also softener. In the following, detergent will be used as example of what can be used and provided into the machine. The detergent container is accessible from outside the machine by pulling it out from the machine in order to provide detergent into tray/-s 14, 15, 16.

[0022] In the illustrative embodiment, the container 11 consists in a drawer which can be pulled out horizontally in order to be accessed by the user. A person skilled in the art would realize that any type of container that can be pulled out from the machine is embraced within the scope of the invention. The present invention is, as will be described in the following, focused on containers which are able to be pulled or brought out of the machine body.

[0023] Trays 14 - 16 in the container, see figure 2, are intended for manual dosing of detergent. An automatic dosing system may be provided into the machine for automatic dosing of liquid or powder detergent into the trays. The container 11 is located in a detergent compartment 23, see figures 3 - 5. The compartment is fluidly connected to the tub 13 via an outlet 32.

[0024] A first valve (not shown) is provided to feed water from a water pipe (not shown), connected to the washing machine 10, to the compartment 23. The compartment comprises a main water duct system 17, see figures 3 - 4, which is arranged to provide water to the tray/-s 14,15,16 via holes 20, 21, 22. The detergent in the tray/-s is mixed with the water and guided from the detergent container through drainage passages 34 in the container 11 into the lower part of the compartment 23. The drainage passages are not shown in the drawings, but are preferably positioned in the rear end of each tray, i.e. at the back of the detergent container 11. The water-mixed detergent is hence flushed from the detergent container

11 via the compartment 23 to the outlet 32 and further to the tub 13 where the drum is located.

[0025] Inlet 26 is used to provide cold inlet water to flush the tray 15 with the detergent used for the main wash. The inlet water is provided from the cold water pipe connected to a water inlet of the washing machine. The water flows through the duct to the holes 21 into the tray 15. Inlet 27 is used to provide cold inlet water to flush the tray 14 with the detergent for the prewash. The water flows through the duct to the holes 20 into the tray 14. If water is fed through the both inlets 26, 27 at the same time, the mixed water beam will flow though a duct to the holes 22 into the tray 16 with softener used when rinsing the clothes.

[0026] Inlet 28 is used to provide hot inlet water to flush the tray 15 with the detergent used for the main wash. Inlet 29 is used for pressure equalization of the tub 13, where air flows via the trays out to the ambient air.

[0027] There is a need to clean the compartment 23 from residuals and bacteria. A known solution is to introduce a separate cleaning cycle. However, in this solution only the tub and drum is cleaned. The inlet water fed into the tub passes from the trays into the tub without sufficient cleaning of the compartment.

[0028] In order to solve this problem, the compartment further comprises at least one additional water duct system 18, 19 arranged to provide water beside the detergent container directly into to the compartment 23 in order to flush out any residues residing in the compartment 23 to the outlet 32. Water is consequently flushed directly into the lower part of the compartment 23 without passing through the trays 14, 15, 16.

[0029] Details of the present invention will now be described with reference to the figures 1 - 5. As shown in the figures, the main and/or additional water duct system 17, 18, 19 are arranged in an upper wall 33 of the compartment 23 partly positioned above the container 11. The water flowing via the main water duct system 17 and through the holes 20, 21, 22 flushes downwards into the trays 14, 15, 16. The holes 20, 21, 22 of the main duct system 17 are arranged above the trays 14, 15, 16. There are several holes exposed to each tray to ensure that each tray is sufficiently flushed.

[0030] As shown in figure 5, the additional water duct system 18, 19 leads into one box-like channel 36 at the bottom side of the upper wall 33. The box-like channel 36 ensures that water from ducts 18, 19 (will be described in the following) is directed beside the container 11. The detergent container 11 is designed to be narrower than the compartment 23. Thereby, the upper wall 33 of the compartment 23 comprising the duct systems is wider than the container 11. When the container 11 is positioned in the compartment 23, an open space will be formed in the rightmost part of the compartment, see figure 5, along the whole depth extent of the compartment. This space provides a passage for the water from additional duct system 18, 19 via the box-like channel 36 to the compartment lower wall 31. A person skilled in the art would realize that the passage may be arranged also at another position such as to the left of the container 11, depending on the design of the container 11 and the duct systems 17, 18, 19.

[0031] When water is provided via the box-like channel 36, it flows directly to the lower, inclined wall 31 of the compartment 23 and further to the outlet 32, see figure 5. Since the water is provided to the highest part of the periphery of the lower inclined wall 31, the provided water flows over the inclined wall in order to flush out said residues. Further, since the box-like channel 36 substantially extends along the whole length of the compartment, it is ensured that residuals on the whole lower, inclined wall compartment is flushed off.

[0032] The additional water duct system comprises a first duct 18, which is connected to the main water duct system 17 for provision of water to the first duct 18. The water is preferably provided to the first duct 18 during the main wash cycle of the washing program. A person skilled in the art realizes that water may also be provided to the first duct during the pre-wash or rinsing cycle. The first duct 18 extends essentially along the length of the upper wall 33 of the compartment 23.

[0033] As shown in figure 3 and 4, connecting ducts 35, 37 are provided which connects the main water duct system with the first duct 18. Through these connecting ducts 35, 37, water is provided to the first duct 18. Water provided to the first duct 18 flows through holes 24, via the box-like channel 36 to the lower, inclined wall 31. The holes 24 are arranged essentially along the entire length of the first duct 18. The washing machine may comprise one or a plurality of connecting ducts. A person skilled in the art realize that the arrangement of connecting duct/-s depend on the demands regarding in which program cycle water should be provided to the first duct. For instance, connecting duct 37 is arranged so that water is provided to the first duct during pre-wash.

[0034] As described earlier, the inlets 26 and 28 provides cold and hot water respectively, from the water inlets to the holes 21 used to flush the tray 15 with the detergent used in the main wash. Due to the connecting duct 35, water is at the same time also provided to the first duct 18. This means that the lower wall 31 of the compartment 23 is flushed off by clean water at the same time as the water-mixed detergent for the main wash flows from the tray 15 through the drainage passage 34 to the compartment 23. This results in an improved cleaning of the lower wall of the compartment 23 from residuals.

[0035] As also described earlier, the inlet 27 is used to provide cold inlet water to flush the tray 14 with the detergent for the prewash. Due to the connecting duct 37, water is at the same time also provided to the first duct 18 of the additional duct system. This means that the lower wall 31 of the compartment 23 is flushed off at the same time as the water-mixed detergent for the pre-wash flows through the drainage passage 34 to the compartment 23. This also results in an improved cleaning of the

lower wall 31 from residuals.

[0036] The additional water duct system also comprises a second duct 19 being provided with hot process water from the tub 13 via inlet 30. The second duct 19 of the additional water duct system extends essentially along the entire length of the upper wall 33 of the compartment 23. The second duct 19 is provided with holes 25. Water provided to the second duct 19 flows through holes 25, via the box-like channel 36 to the lower, inclined wall 31. This means that the lower wall 31 of the compartment 23 is flushed off with hot, re-circulated water from the tub 13. This also results in that an improved cleaning of the bottom part of the compartment 23 from residuals and bacteria.

[0037] The first and second ducts 18, 19 can consequently be used to clean off residuals residing in the compartment 23, e.g. water-mixed detergent that has gotten stuck to the lower wall 31 of the compartment 23 during flushing from the container 11 via the compartment to the tub 13. The cleaning process can, due to the fact the water is provided beside the trays, be used in a regular washing cycle.

[0038] The present invention is not limited to the examples above, but may vary freely within the scope of the claims. Furthermore, some components may be omitted and some, thus not shown components, may be added. The ducts 18, 19 can for instance be used in the known tub cleaning program to improve cleaning of the compartment, either during initial provision of water into the tub or by re-circulating the water. The holes 20, 21, 22 provided to the ducts may be at least one longitudinal slot or of other shapes suitable for providing water into the container 11 and compartment 23 for flushing.

[0039] In the examples, it is illustrated that the connecting ducts 35, 37 can provide water to the first duct 18 both during the flushing of the tray 15 for the main wash and the flushing of the tray 14 for the prewash. A person skilled in the art would realize that a connecting duct which is only fed with water during the flushing of one of the trays is embraced within the scope of the invention. The same person would consequently realize a variety of connecting ducts for the purpose of providing water to the first duct is embraced within the scope of the present invention.

[0040] The compartment may also be called a detergent compartment and is adapted to receive at least one container suitable for carrying detergent and/or softener. The compartment is not intended for being provided directly with detergent and/of softener.

Claims

1. A washing machine (10), the machine (10) including a washing tub (13), at least one control system with a user interface (12), a compartment (23) being fluidly connected to the tub (13) via an outlet (32), and a detergent container (11) with at least one tray (14, 15, 16) arranged to be provided with detergent and being located in the compartment (23),
the compartment (23) comprising a main water duct system (17) being arranged to provide water to the tray/- s (14, 15, 16) in order to mix the detergent in the tray/- s (14, 15, 16) with water and at least one drainage passage (34) fluidly connected to the container (11), being arranged to guide the detergent and water mix via the compartment (23) to the outlet (32),
characterized in that
the compartment (23) further comprises a lower wall (31) and at least one additional water duct system (18, 19) being arranged to provide water beside the container (11) directly to the lower wall (31) of the compartment (23) in order to flush out residues in the compartment (23) to the outlet (32) .

2. A washing machine (10) according to any of the preceding claims wherein the main and/or additional water duct system (17, 18, 19) are arranged in an upper wall (33) of the compartment (23) positioned above the container (11).

3. A washing machine (10) according to any of the preceding claims wherein the additional water duct system (18, 19) leads into one box-like channel (36) on the bottom side of the upper wall (33).

4. A washing machine (10) according to any of the preceding claims wherein the additional water duct system comprises a first duct (18) being connected to the main water duct system (17) for provision of water via the main duct system (17) to the first duct (18).

5. A washing machine (10) according to claim 4 wherein at least one connecting duct (35, 37) connects the main water duct system (17) to the first duct (18).

6. A washing machine (10) according to any of the preceding claims wherein the main water duct system (17) is fed with inlet water from a water pipe connected to a water inlet of the washing machine.

7. A washing machine (10) according to any of the preceding claims wherein the additional water duct system (18, 19) comprises a second duct (19) being provided with hot process water from the tub (13).

8. A washing machine (10) according to any of the preceding claims wherein the additional water duct system provides water to the highest part of the periphery of a lower inclined wall of the compartment (23) such that the said provided water flows over the lower inclined wall in order to flush out said residues.

9. A washing machine (10) according to any of the preceding claims wherein the additional water duct sys-

tem (18, 19) substantially extends along the whole length of the compartment (23).

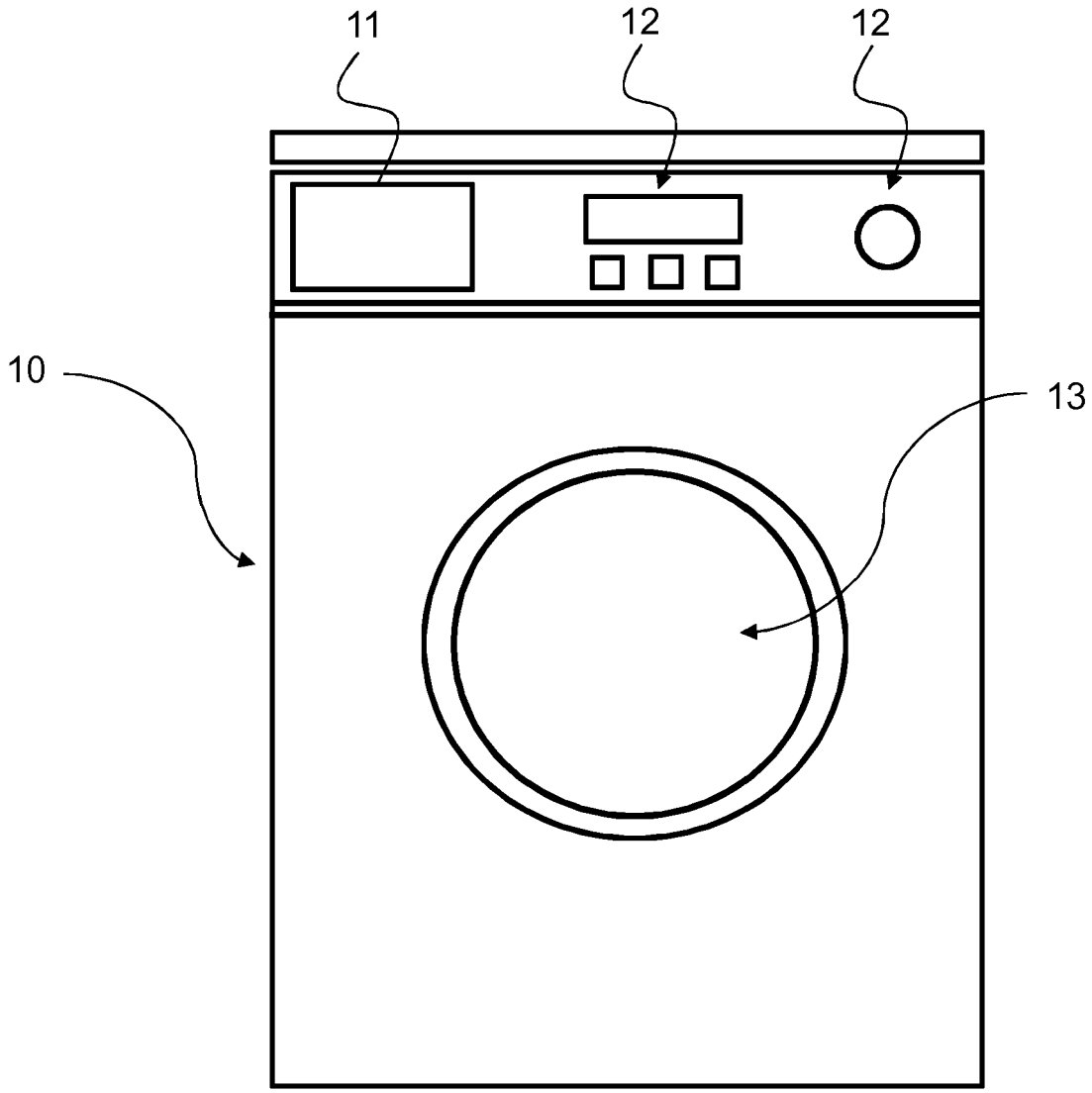

FIG 1

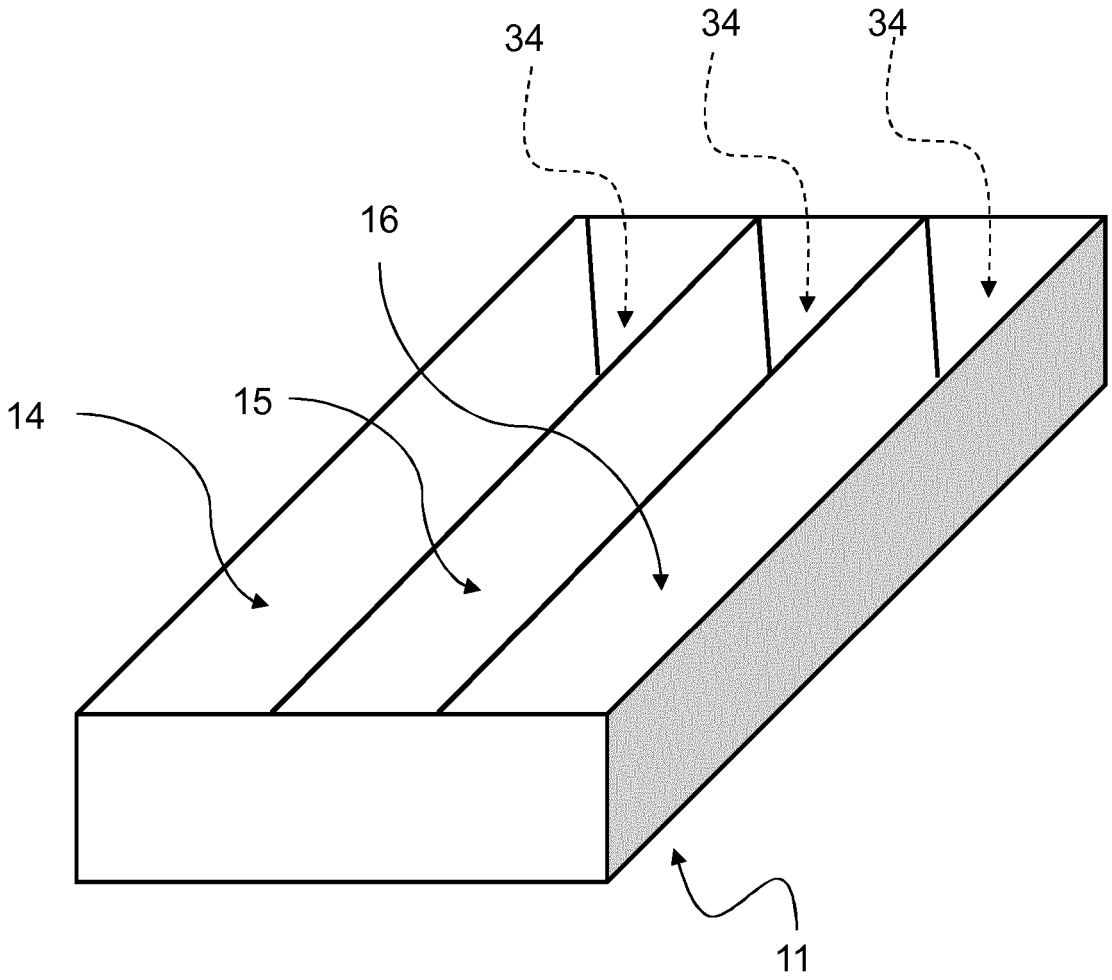

FIG 2

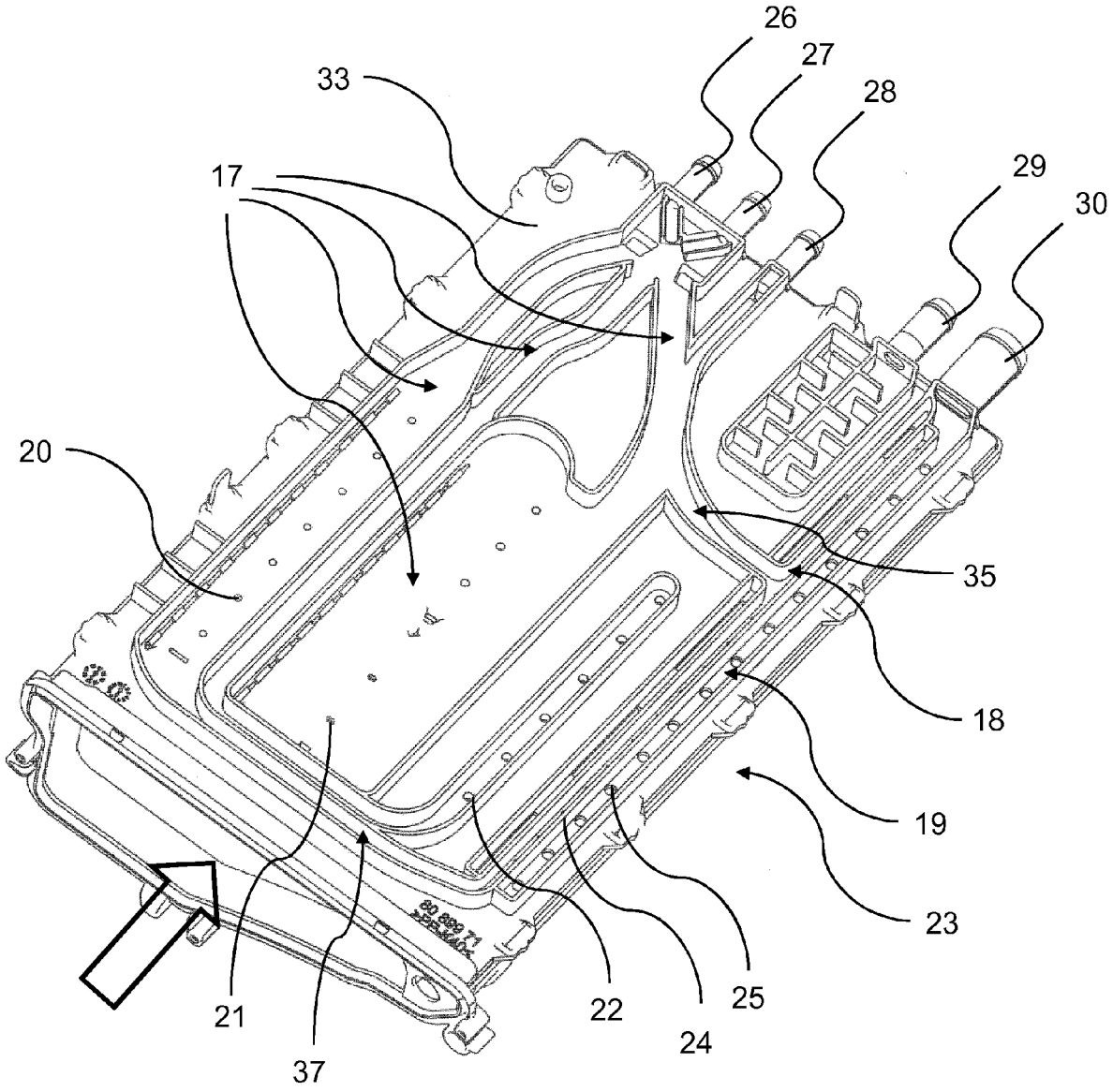

FIG 3

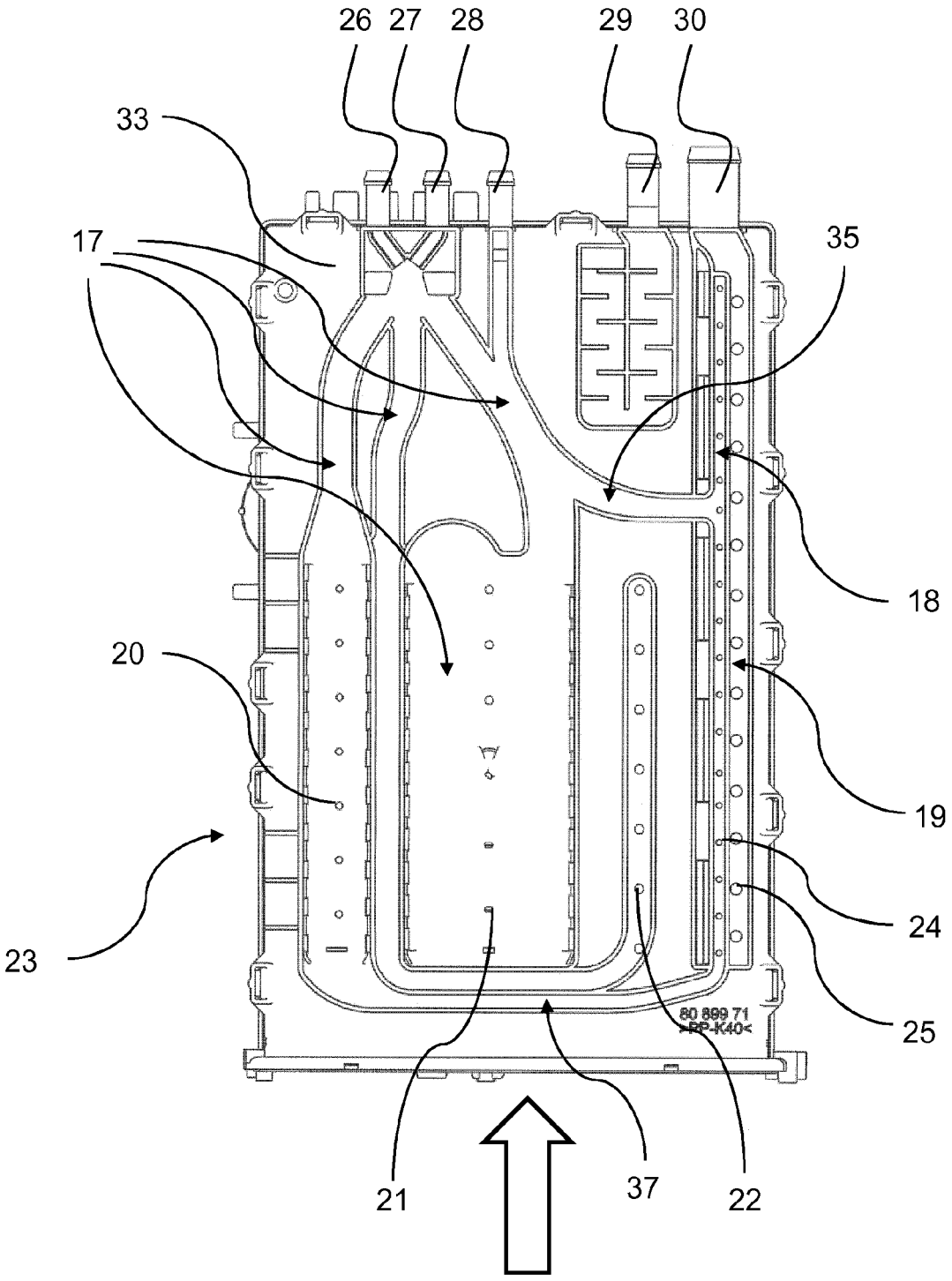

FIG 4

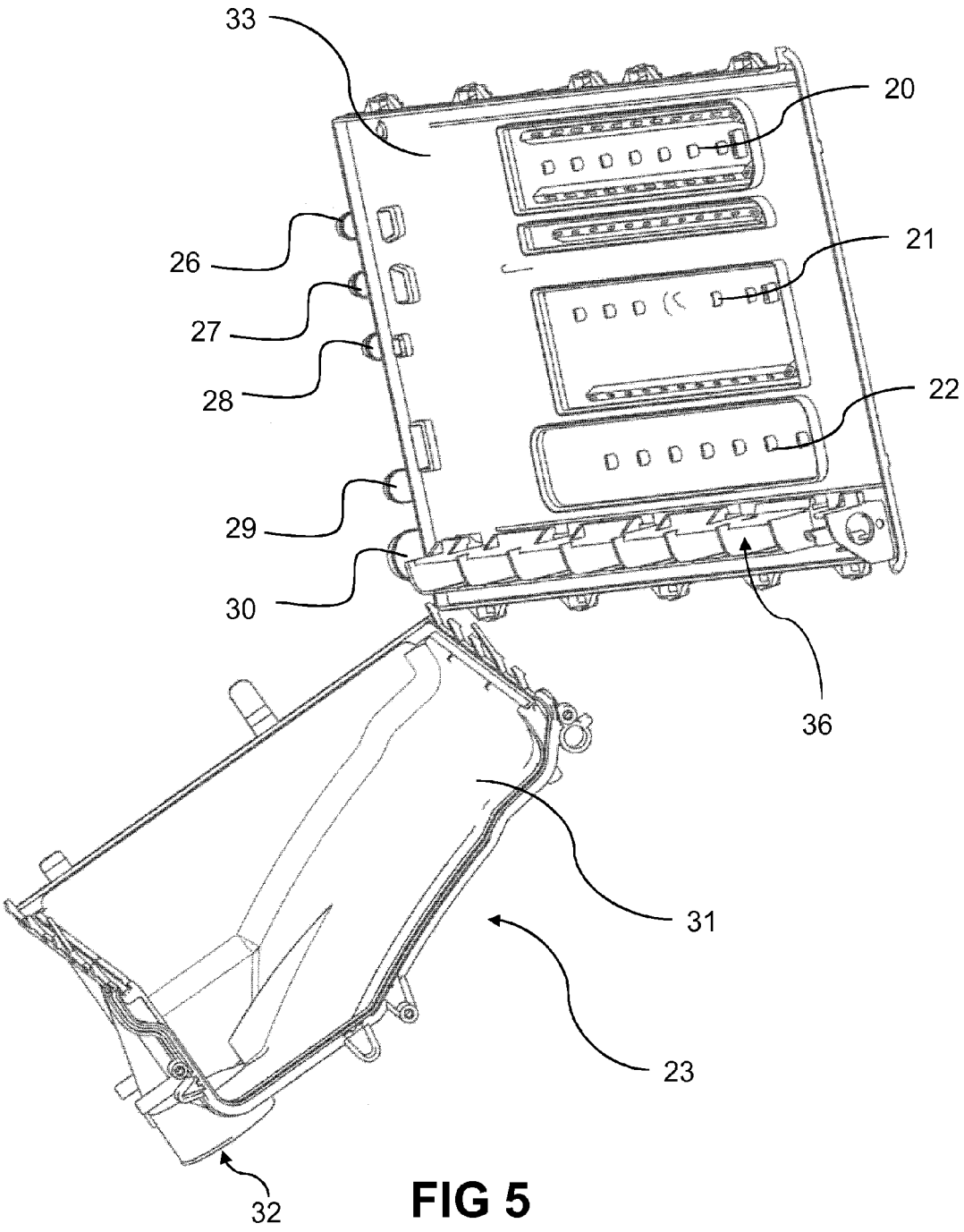

FIG 5

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EUROPEAN SEARCH REPORT

Application Number
EP 13 16 0090

DOCUMENTS CONSIDERED TO BE RELEVANT

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1 The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	19 June 2013	Westermayer, Wilhelm

CATEGORY OF CITED DOCUMENTS

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