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(54) **A DISHWASHER COMPRISING A DEHUMIDIFYING UNIT**

GESCHIRRSPÜLMASCHINE MIT EINER ENTFEUCHTUNGSEINHEIT

LAVE-VAISSELLE ÉQUIPÉ D'UNE UNITÉ DE DÉSHUMIDIFICATION

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(72) Inventors:

- **KOC, Yusuf**
34950 Istanbul (TR)
- **KANTAS, Murat**
34950 Istanbul (TR)
- **AKDAG, Levent**
34950 Istanbul (TR)

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(56) References cited:

EP-B1- 0 358 279 EP-B1- 1 674 030
WO-A1-2006/061287 DE-A1-102007 052 083
JP-A- 2006 020 753

(73) Proprietor: **Arçelik Anonim Sirketi**
34950 Istanbul (TR)

EP 2 637 548 B1

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Description

[0001] The present invention relates to a dishwasher comprising a dehumidifying unit that provides the dehumidification process to be performed effectively.

[0002] In the drying step of dishwasher washing programs, it is aimed to remove the water remaining on the dishes and also to prevent the moisture in the tub from leaving stains on the dishes getting cold by condensing. The last rinsing step is performed with hot water in order to remove the water remaining on the dishes in an easier way in the drying step. And this means a greater amount of energy to be consumed during heating the water. In the drying step after the hot rinsing step, humid air in the tub is delivered to the exterior environment by means of a fan. In some dishwashers, an additional air channel that delivers the humid air received from the tub to tub again by condensing it thereon is disposed near this line. However, moisture in the tub cannot be completely discharged and causes stains on the dishes by condensing. Moreover, when the user opens the door of the dishwasher, air mass with high temperature remaining in the tub at once exits to the outer environment and may cause the user to be exposed to hot vapor.

[0003] In order to solve the said problem, dehumidifying units comprising reversible type moisture adsorbent materials are used. Adsorbent materials can adsorb moisture up to the saturation point and at that moment emits heat to its surroundings. In the state of the art, zeolite is used as moisture adsorbent in dishwashers. The humid air received from the tub by means of the fan is sent to the zeolite-comprising receptacle and after heating up and leaving its moisture, it is again directed into the tub. By means of this process, an effective drying process is realized by vaporizing the water on the dishes without requiring the hot rinsing step. Zeolite that fills its moisture adsorption capacity during that time is regenerated at the next washing step by being heated up to high temperatures by means of a heater placed therein or thereabout and can be used again.

[0004] Since regeneration of the zeolite is realized at very high temperatures, a heater outside the receptacle cannot provide an effective regeneration. In cases where the heater is disposed inside the receptacle, since zeolite particles directly contacting the heater are subject to high amount of heat, they burn and lose their desiccation characteristic after some time. As a result of this, the dishwasher cannot perform an efficient dehumidification in course of time.

[0005] In state of the art International Patent Application No. WO2006061287, positioning of the heater just before the inlet of the receptacle comprising reversible desiccant material in the flow direction of the air, is explained.

[0006] In the state of the art European Patent Document No EP358279, a dishwasher comprising a zeolite receptacle positioned around a pipe-type water heater, is described,. In this embodiment, latent heat occurring

around the heater is used during the water heating process for zeolite regeneration.

[0007] In the state of the art European Patent Document No. EP1674030, a dishwasher comprising a receptacle having desiccant material therein between the outer cabinet and the tub, is described,. In this embodiment, at least one heater is disposed between the desiccant materials arranged as plates so as to make thermal contact with the particles.

[0008] The aim of the present invention is the realization of a dishwasher comprising a dehumidifying unit having desiccant material that can be regenerated homogeneously and the particles of which are not damaged during its regeneration.

[0009] In the dishwasher realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof, an air channel located outside the tub, extending between the tub inlet and the tub outlet and a dehumidifying unit located on the air channel are provided.

[0010] The dehumidifying unit comprises an inner receptacle, at least one inlet port providing the air delivered from the tub by means of the fan to be received into the inner receptacle, a heater wrapped around the inner receptacle, an outer receptacle surrounding the inner receptacle such that a gap remains therebetween, an outlet port providing the air received into the inner receptacle through the inlet port to be transferred to the outer receptacle, at least one desiccant material placed between the outer receptacle and the inner receptacle and a connection pipe disposed on the outer receptacle, providing the air passing from the inner receptacle to the outer receptacle to be returned to the tub.

[0011] In an embodiment of the present invention, the inner receptacle starts from one end of the outer receptacle and extends almost up to the other end thereof.

[0012] In an embodiment of the present invention, the inner receptacle is in form of a pipe with two ends open. One end of the pipe is used as the inlet port, and the other end as outlet port. The air coming from the air channel enters into the inner receptacle from the inlet port at one end of the pipe and passes to the outer receptacle through the outlet port at the other end thereof. In this embodiment, the inner receptacle appears like the extension of the air channel, since the cross-sectional diameter of the air channel is equal to the cross-sectional diameter of the pipe-shaped inner receptacle.

[0013] In another embodiment of the present invention, the outer receptacle surface that the air leaving the inner receptacle hits is curved and concave so as to convert the flow direction of the air opposite to the incident flow direction. In this embodiment, the air entering into the inner receptacle through the inlet port passes to the outer receptacle through the outlet port and changes direction by hitting the outer receptacle wall.

[0014] In another embodiment of the present invention, the outer receptacle has an oval cross-section. The air entering into the inner receptacle through the inlet port

reverses its direction as opposite to its incident direction by hitting the curved wall after passing to the outer receptacle through the outlet port and passes to the air channel through the connection pipe.

[0015] In another embodiment of the present invention, the heater is in wire form, helically wrapped around the outer surface of the inner receptacle.

[0016] In another embodiment of the present invention, the inlet port and the connection pipe are disposed almost at the same side of the dehumidifying unit. Thus, after traversing the dehumidifying unit, the air entering through the inlet port returns to the tub by exiting from the connection pipe that is at the same side with the inlet port.

[0017] In an embodiment of the present invention, an air-permeable sieve that prevents the desiccant material from entering into the inner receptacle from the outer receptacle and that completely closes the outlet port is disposed in the dehumidifying unit. By means of this sieve, the outer receptacle and the inner receptacle are separated from each other and the desiccant materials are prevented from going into the inner receptacle or the air channel.

[0018] In another embodiment of the present invention, the dehumidifying unit comprises an additional heater disposed in the space between the outer receptacle and the inner receptacle. Preferably, all the surfaces of the additional heater contact the desiccant material. This heater is activated during the regeneration process and increases the temperature of the desiccant material.

[0019] By means of the present invention, since a homogeneous heat distribution is provided in the dehumidifying unit, almost all of the desiccant material particles are provided to be regenerated. Thus, total dehumidification capacity in the next drying step increases and hence a more efficient drying is provided. Moreover, the regeneration process time is reduced by means of the additional heater used. Furthermore, the desiccant material particles are prevented from burning and losing their desiccation feature during the regeneration of the desiccant material and in long term, the dehumidifying efficiency of the dishwasher is prevented from decreasing.

[0020] The dishwasher realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

Figure 1 - is the schematic view of the dishwasher of the present invention.

Figure 2 - is the schematic view of the dehumidifying unit.

Figure 3 - is the schematic view of the dehumidifying unit in an embodiment of the present invention.

[0021] The elements illustrated in the figures are numbered as follows:

1. Dishwasher
2. Outer cabinet

3. Tub
4. Tub inlet
5. Tub outlet
6. Air channel
7. Fan
8. Dehumidifying unit
9. Inner receptacle
10. Inlet port
11. Heater
12. Outer receptacle
13. Outlet port
14. Desiccant material
15. Connection pipe
16. Sieve
17. Additional heater

[0022] The dishwasher (1) comprises an outer cabinet (2), a tub (3) wherein the washing process is performed, disposed into the outer cabinet (2) such that a gap remains therebetween, a tub inlet (4) providing the air to enter into the tub (3), a tub outlet (5) providing the air in the tub (3) to be discharged, an air channel (6) extending outside the tub (3), between the tub inlet (4) and the tub outlet (5), a fan (7) disposed on the air channel (6) and providing the air in the tub (3) to be sucked and a dehumidifying unit (8) disposed on the air channel (6), desiccating the air passing therethrough (Figure 1).

[0023] The dehumidifying unit (8) comprises an inner receptacle (9) connected to the air channel (6), at least one inlet port (10) providing the air delivered from the tub (3) by means of the fan (7) to be received into the inner receptacle (9), a heater (11) wrapped around the inner receptacle (9), an outer receptacle (12) surrounding the inner receptacle (9) such that a gap remains therebetween, an outlet port (13) providing the air received into the inner receptacle (9) through the inlet port (10) to pass to the outer receptacle (12) after traversing the inner receptacle (9), a desiccant material (14) disposed in the volume between the outer receptacle (12) and the inner receptacle (9) and a connection pipe (15) disposed on the outer receptacle (12), providing the air passing from the inner receptacle (9) to the outer receptacle (12) to be sent back to the tub (3) (Figure 2, Figure 3).

[0024] In the drying step, the humid air received from the inside of the tub (3) is directed to the dehumidifying unit (8) by means of the fan (7). After moving through the air channel (6) for a while, the humid air is received into the inner receptacle (9) by passing through the inlet port (10). After moving through the inner receptacle (9), the air propelled by the fan (7) reaches the outlet port (13). Just after passing to the outer receptacle (12) from the inner receptacle (9) by means of the outlet port (13), the air changes direction by hitting the outer receptacle (12) side wall and continues its movement in the outer receptacle (12) in the direction opposite to its incident direction. The air dehumidified and heated during its movement in the outer receptacle (12) containing the desiccant material (14) therein leaves the dehumidifying unit (8) by ex-

iting from the connection pipe (15) and returns to the tub (3) through the tub inlet (4) (Figure 2).

[0025] The desiccant material (14) retaining the moisture of the air passing thereover during the drying step and thus saturated with moisture is required to be regenerated by being heated in order to be used again. The regeneration process is realized between the cold washing and the hot washing steps of the next washing program. During the regeneration process, the heater (11) is activated. The heater (11) provides the desiccant material (14) located therearound to be regenerated by transferring heat to it by conduction. Moreover, air is received from the tub (3) by activating the fan (7) and directed to the outer receptacle (12) by being passed through the inner receptacle (9). The air, the temperature of which increases by passing through the inner receptacle (9) heated by the heater (11) is directed to the outer receptacle (12) by leaving the inner receptacle (9). The desiccant material (14) particles, that do not contact the heater (11), complete their regeneration by transferring heat from this air by means of convection. Thus, heat emitted from the heater (11) reaches almost all of the desiccant material (14) particles and hence regeneration is provided to be completed homogeneously. Consequently, the heater (11) is operated for a shorter period of time and energy saving is provided. On the other hand, since the desiccant material (14) particles contacting the heater (11) are subjected to heat for a shorter period of time, desiccant material (14) particles are prevented from structure degeneration by overheating and becoming non desiccant.

[0026] In an embodiment of the present invention, the inner receptacle (9), in the outer receptacle (12), starts from one end of the outer receptacle (12) and extends almost up to the other end thereof. In this embodiment almost the entire inner receptacle (9) is in the outer receptacle (12).

[0027] In another embodiment of the present invention, the inner receptacle (9) is in form of a pipe with two ends open. In this embodiment, one end of the pipe is used as the inlet port (10), and the other end as the outlet port (13). The air coming from the air channel (6) enters into the inner receptacle (9) through the inlet port (10) at one end of the pipe-shaped inner receptacle (9) and passes to the outer receptacle (12) through the outlet port (13) at the other end thereof.

[0028] In another embodiment of the present invention, the outer receptacle (12) surface that the air leaving the inner receptacle (9) hits is curved and concave so as to convert the flow direction of the air opposite to the incident flow direction. In this embodiment, the air entering into the inner receptacle (9) through the inlet port (10) passes to the outer receptacle (12) through the outlet port (13) and changes direction by hitting the outer receptacle (12) wall. By means of the curved wall of the outer receptacle (12), the hitting-and-returning movement of the air molecules is more easily realized. Thus, the process air is provided to be efficiently dehumidified.

[0029] In another embodiment of the present invention, the cross-section of the outer receptacle (12) is in oval form. In this embodiment, after passing to the outer receptacle (12) through the outlet port (13), the air entering into the inner receptacle (9) through the inlet port (10) reverses its direction as opposite to its incident direction by hitting the curved wall and passes to the air channel (6) through the connection pipe (15).

[0030] In another embodiment of the present invention, the heater (11) is in wire form, helically wrapped around the outer surface of the inner receptacle (9). In this embodiment, since the heater (11) extends along the inner receptacle (9), it effectively heats the interior of the inner receptacle (9) and provides the temperature of the air passing therethrough to reach higher values.

[0031] In another embodiment of the present invention, the inlet port (10) and the connection pipe (15) are disposed almost at the same side of the dehumidifying unit (8). Thus, the air entering through the inlet port (10), after traversing the dehumidifying unit (8) twice in opposite directions through the interior and the exterior of the inner receptacle (9), exits from the connection pipe (15) that is at the same side as the inlet port (10) and enters into the tub (3).

[0032] In an embodiment of the present invention, the dehumidifying unit (8) comprises an air-permeable sieve (16) that prevents the desiccant material (14) from entering into the inner receptacle (9) from the outer receptacle (12) and that closes the outlet port (13). Thus, the desiccant materials (14) disposed in the outer receptacle (12) are prevented from going into the inner receptacle (9) or the air channel (6). Consequently, total dehumidification capacity is prevented from decreasing by maintaining the amount of desiccant material (14).

[0033] In another embodiment of the present invention, the dehumidifying unit (8) comprises an additional heater (17) disposed in the volume between the outer receptacle (12) and the inner receptacle (9). The additional heater (17) provides the regeneration process to be realized more quickly and homogeneously by being activated during regeneration (Figure 3).

[0034] The desiccant material (14) has reversible feature. Preferably zeolite is used as the desiccant material (14).

[0035] By means of the present invention, since a homogeneous heat distribution is provided in the dehumidifying unit (8), almost all of the desiccant material (14) particles are provided to be regenerated. Thus, total dehumidification capacity in the next drying step increases and hence a more efficient drying is provided. Furthermore, the desiccant material (14) particles are prevented from burning and losing their desiccation feature during the regeneration of the desiccant material (14) and thus, in long term, the dehumidifying efficiency of the dishwasher (1) is prevented from decreasing.

[0036] It is to be understood that the present invention is not limited to the embodiments disclosed above and a person skilled in the art can easily introduce different em-

bodiments. These should be considered within the scope of the protection postulated by the claims of the present invention.

Claims

1. A dishwasher (1) comprising an outer cabinet (2), a tub (3) wherein the washing process is performed, disposed into the outer cabinet (2) such that a gap remains therebetween, a tub inlet (4) providing the air to enter into the tub (3), a tub outlet (5) providing the air in the tub (3) to be discharged, an air channel (6) extending outside the tub (3), between the tub inlet (4) and the tub outlet (5), a fan (7) disposed on the air channel (6) and providing the air in the tub (3) to be sucked and a dehumidifying unit (8) disposed on the air channel (6), desiccating the air passing therethrough,
characterized by the dehumidifying unit (8) having

- an inner receptacle (9) connected to the air channel (6),
- at least one inlet port (10) providing the air delivered from the tub (3) by means of the fan (7) to be received into the inner receptacle (9),
- a heater (11) wrapped around the inner receptacle (9),
- an outer receptacle (12) surrounding the inner receptacle (9) such that a gap remains therebetween,
- an outlet port (13) providing the air received into the inner receptacle (9) through the inlet port (10) to pass to the outer receptacle (12),
- a desiccant material (14) disposed in the volume between the outer receptacle (12) and the inner receptacle (9) and
- a connection pipe (15) disposed on the outer receptacle (12), providing the air passing from the inner receptacle (9) to the outer receptacle (12) to be sent back to the tub (3).

2. A dishwasher (1) as in Claim 1, **characterized by** the inner receptacle (9) extending in the outer receptacle (12) from one end of the outer receptacle (12) almost to the other end thereof.
3. A dishwasher (1) as in Claim 1 or 2, **characterized by** the inner receptacle (9) in form of a pipe with two ends open.
4. A dishwasher (1) as in any one of the above claims, **characterized in that** the surface of the outer receptacle (12) on which the air leaving the inner receptacle (9) hits is curved and concave so as to convert the flow direction of the air as opposite to the incident flow direction.

5. A dishwasher (1) as in Claim 4, **characterized in that** the cross-section of the outer receptacle (12) is in oval form.

6. A dishwasher (1) as in any one of the above claims, **characterized by** the heater (11) in form of wire helically wrapped around the outer surface of the inner receptacle (9).
7. A dishwasher (1) as in any one of the above claims, **characterized in that** the inlet port (10) and the connection pipe (15) are disposed at the same side of the dehumidifying unit (8) so as to provide the air to traverse the dehumidifying unit (8) twice in opposite directions through the interior and the exterior of the inner receptacle (9).
8. A dishwasher (1) as in any one of the above claims, **characterized by** the dehumidifying unit (8) comprising an air-permeable sieve (16) that prevents the desiccant material (14) from entering into the inner receptacle (9) from the outer receptacle (12) and that closes the outlet port (13).
9. A dishwasher (1) as in any one of the above claims, **characterized by** the dehumidifying unit (8) comprising an additional heater (17) disposed in the volume between the outer receptacle (12) and the inner receptacle (9).

Patentansprüche

1. Geschirrspüler (1), umfassend einen Außenschrank (2), einen Spülbehälter (3), in dem der Spülvorgang durchgeführt wird und der im Außenschrank (2) angeordnet ist, derart, dass ein Abstand dazwischen verbleibt, einen Spülbehältereinlass (4), der Luft in den Spülbehälter (3) einlässt, einen Spülbehälterauslass (5), der Luft aus dem Spülbehälter (3) ablässt, und einen Luftkanal (6), der sich aus dem Spülbehälter (3) heraus zwischen dem Spülbehältereinlass (4) und dem Spülbehälterauslass (5) erstreckt, ein Gebläse (7), das an dem Luftkanal (6) angeordnet ist und die Luft im Spülbehälter (3) ansaugt, und eine Entfeuchtungseinheit (8), die an dem Luftkanal (6) angeordnet ist und die dadurch geleitete Luft entfeuchtet,
dadurch gekennzeichnet, dass die Entfeuchtungseinheit (8) Folgendes aufweist:

- eine innere Aufnahme (9), die mit dem Luftkanal (6) verbunden ist,
- wenigstens einen Einlassanschluss (10), der dafür sorgt, dass Luft, die mithilfe des Gebläses (7) vom Spülbehälter (3) aufgenommen wird, in der inneren Aufnahme (9) aufgenommen wird,
- eine Heizeinrichtung (11), die um die innere

- Aufnahme (9) gewickelt ist,
- eine äußere Aufnahme (12), die die innere Aufnahme (9) umgibt, derart, dass ein Abstand dazwischen verbleibt,
 - einen Auslassanschluss (13), der dafür sorgt, dass die Luft, die durch den Einlassanschluss (10) in der inneren Aufnahme (9) aufgenommen wird, zur äußeren Aufnahme (12) gelangt,
 - ein Entfeuchtungsmaterial (14), das in dem Raum zwischen der äußeren Aufnahme (12) und der inneren Aufnahme (9) angeordnet ist, und
 - ein Verbindungsrohr (15), das an der äußeren Aufnahme (12) angeordnet ist und dafür sorgt, dass die Luft, die von der inneren Aufnahme (9) zur äußeren Aufnahme (12) gelangt, zurück an den Spülbehälter (3) geleitet wird.
2. Geschirrspüler (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** sich die innere Aufnahme (9) von einem Ende der äußeren Aufnahme (12) fast bis zu deren Ende in die äußere Aufnahme (12) hinein erstreckt.
 3. Geschirrspüler (1) nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die innere Aufnahme (9) die Form eines Rohrs mit zwei offenen Enden aufweist.
 4. Geschirrspüler (1) nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Oberfläche der äußeren Aufnahme (12), auf die die Luft trifft, die die innere Aufnahme (9) verlässt, gekrümmt und konkav ist, derart, dass die Strömungsrichtung der Luft gegenüber der eintreffenden Strömungsrichtung umgekehrt wird.
 5. Geschirrspüler (1) nach Anspruch 4, **dadurch gekennzeichnet, dass** der Querschnitt der äußeren Aufnahme (12) von ovaler Form ist.
 6. Geschirrspüler (1) nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Heizeinrichtung (11) in Form eines spiralförmigen Drahts um die Außenfläche der inneren Aufnahme (9) gewickelt ist.
 7. Geschirrspüler (1) nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** der Einlassanschluss (10) und das Verbindungsrohr (15) auf derselben Seite der Entfeuchtungseinheit (8) angeordnet sind, damit die Luft zweimal in entgegengesetzten Richtungen durch das Innere und das Äußere der inneren Aufnahme (9) durch die Entfeuchtungseinheit (8) strömt.
 8. Geschirrspüler (1) nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Entfeuchtungseinheit (8) ein luftdurchlässiges Sieb

(16) umfasst, das verhindert, dass Entfeuchtungsmaterial (14) von der äußeren Aufnahme (12) in die innere Aufnahme (9) gelangt, und das den Auslassanschluss (13) verschließt.

9. Geschirrspüler (1) nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Entfeuchtungseinheit (8) eine zusätzliche Heizeinrichtung (17) umfasst, die zwischen der äußeren Aufnahme (12) und der inneren Aufnahme (9) angeordnet ist.

Revendications

1. Un lave-vaisselle (1) comprenant une enveloppe externe (2), une cuve (3) où le processus de lavage est effectué et qui est disposée dans l'enveloppe externe (2) de telle sorte qu'un espace reste entre celles-ci, une entrée de la cuve (4) qui permet l'entrée de l'air dans la cuve (3), une sortie de la cuve (5) qui permet l'évacuation de l'air dans la cuve (3), un canal d'air (6) s'étendant à l'extérieur de la cuve (3) et entre l'entrée de la cuve (4) et la sortie de la cuve (5), un ventilateur (7) disposé sur le canal d'air (6) et permettant la succion de l'air dans la cuve (3), et une unité de déshumidification (8) qui est disposée sur le canal d'air (6) et dessécher l'air passant à travers celle-ci, **caractérisé par** l'unité de déshumidification (8) présentant
 - un récipient interne (9) relié au canal d'air (6),
 - au moins un orifice d'entrée (10) qui assure que l'air délivré à partir de la cuve (3) au moyen du ventilateur (7) est reçu dans le récipient interne (9),
 - un dispositif de chauffage (11) enroulé autour du récipient interne (9),
 - un récipient externe (12) entourant le récipient interne (9) de telle sorte qu'un espace reste entre ceux-ci,
 - un orifice de sortie (13) qui assure que l'air reçu dans le récipient interne (9) à travers l'orifice d'entrée (10) passe au récipient externe (12),
 - un matériau desséchant (14) disposé dans le volume entre le récipient externe (12) et le récipient interne (9) et
 - un tuyau de raccordement (15) qui est disposé sur le récipient externe (12) et qui assure que l'air passant à partir du récipient interne (9) au récipient externe (12) est renvoyé à la cuve (3).
2. Un lave-vaisselle (1) selon la Revendication 1, **caractérisé par** le récipient interne (9) qui s'étend dans le récipient externe (12) à partir de l'une extrémité du récipient externe (12) presque à son autre extrémité.

3. Un lave-vaisselle (1) selon la Revendication 1 ou 2, **caractérisé par** le récipient interne (9) en forme d'un tuyau dont les deux extrémités sont ouvertes.
4. Un lave-vaisselle (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la surface du récipient externe (12) sur laquelle l'air sortant du récipient interne (9) atteint est courbe et concave de manière à convertir la direction d'écoulement de l'air comme opposée à la direction d'écoulement d'impact. 5
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5. Un lave-vaisselle (1) selon la Revendication 4, **caractérisé en ce que** la section transversale du récipient externe (12) est ovale. 15
6. Un lave-vaisselle (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le dispositif de chauffage (11) en forme de fil enroulé en hélice autour de la surface extérieure du récipient interne (9). 20
7. Un lave-vaisselle (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'orifice d'entrée (10) et le tuyau de raccordement (15) sont disposés au même côté de l'unité de déshumidification (8) de manière à assurer que l'air traverse l'unité de déshumidification (8) deux fois dans des directions opposées à travers l'intérieur et l'extérieur du récipient interne (9). 25
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8. Un lave-vaisselle (1) selon l'une quelconque des revendications précédentes, **caractérisé par** l'unité de déshumidification (8) comprenant un tamis perméable à l'air (16) qui empêche le matériau desséchant (14) d'entrer dans le récipient interne (9) à partir du récipient externe (12) et qui ferme l'orifice de sortie (13). 35
9. Un lave-vaisselle (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'unité de déshumidification (8) comprenant un dispositif de chauffage supplémentaire (17) disposé dans le volume entre le récipient externe (12) et le récipient interne (9). 40
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Figure 1

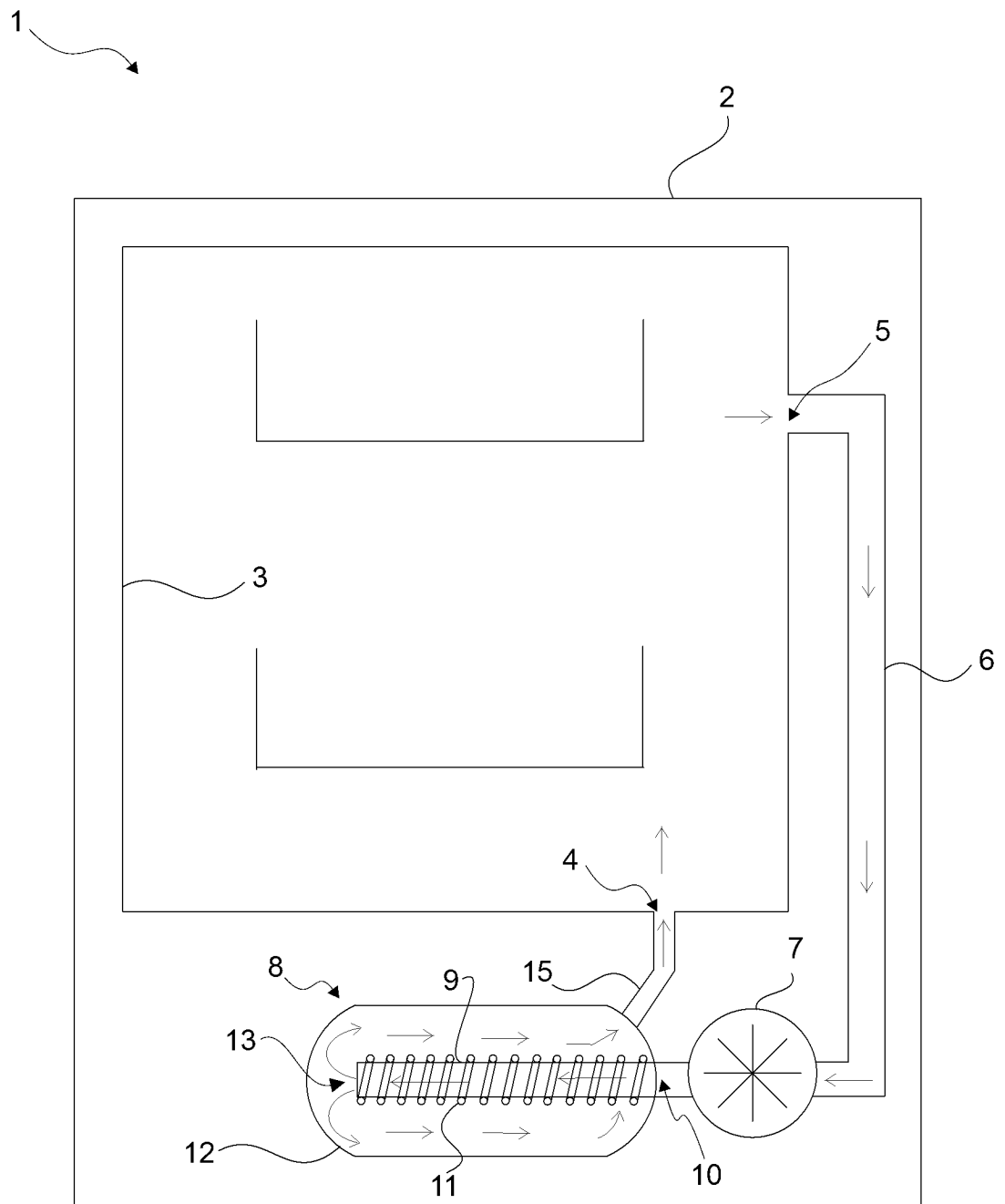


Figure 2

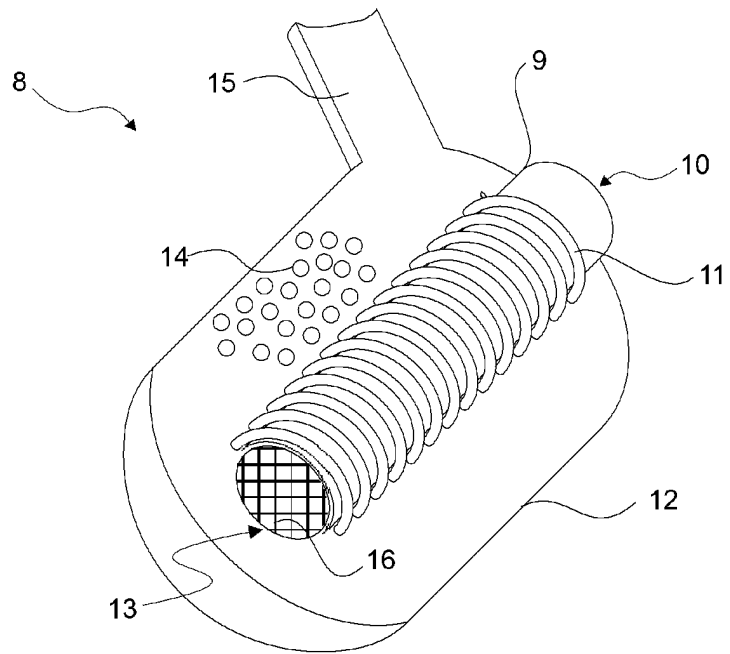
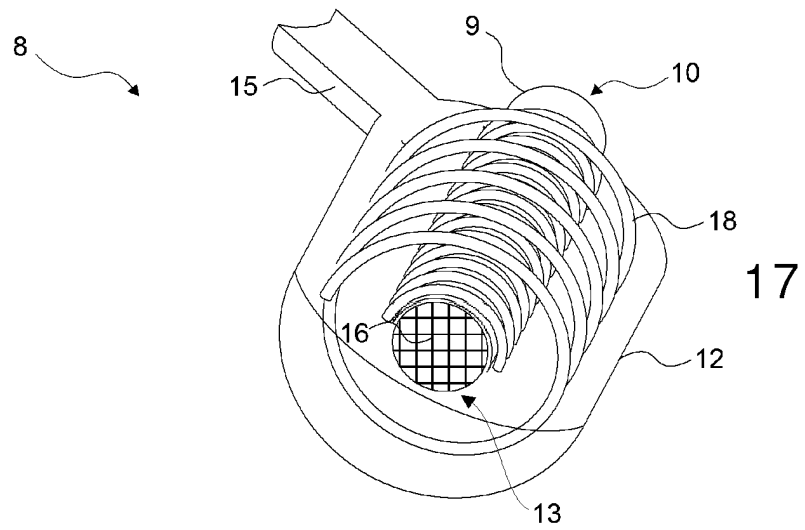


Figure 3



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2006061287 A [0005]
- EP 358279 A [0006]
- EP 1674030 A [0007]