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(54) A DISHWASHER COMPRISING A DEHUMIDIFYING UNIT

GESCHIRRSPÜLMASCHINE MIT EINER TROCKNUNGSEINRICHTUNG

LAVE-VAISSELLE COMPRENANT UN DISPOSITIF DE SÉCHAGE

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Description

[0001] The present invention relates to a dishwasher comprising a dehumidifying unit that provides the drying 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 requires a great amount of energy to be consumed for 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 the tub 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 cover of the dishwasher, air mass with high temperature remaining in the tub at once exits to the outer environment and can cause the user to be exposed to hot vapor.

[0003] In order to eliminate the said problem, drying elements comprising reversible type moisture adsorbent materials are used. Adsorbent materials can adsorb moisture upto 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. Humid air received from the tub by means of the fan is sent to the zeolite-comprising chamber 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 realization of the hot rinsing step. At the same time, zeolite that fills its moisture adsorption capacity 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 zeolite regeneration is realized at very high temperatures, a heater outside the chamber cannot provide an effective regeneration. In cases where the heater is disposed inside the chamber, since zeolite particles directly contacting the heater are subject to high amount of heat, they burn and lose their desiccation feature after some time. In this case, the dishwasher cannot perform an effective drying in the course of time and the user thinks that the machine is broken down. And this causes customer dissatisfaction and increase in maintenance and repair rate.

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

[0006] In the state of the art European Patent Document No EP358279, a dishwasher is described, comprising a zeolite chamber positioned around a pipe-type water heater. In this embodiment, waste 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 is described, comprising a chamber having desiccant material therein between the outer cabinet and the tub. 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. In the state of art International Patent Application WO 2010/012713 A1, a dishwasher according to the preamble of claim 1 is disclosed.

[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] The dishwasher realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof, comprises an air channel that is disposed outside the tub and that provides the creation of a closed air cycle between the tub outlet and the tub inlet, a dehumidifying unit that is disposed on the air channel, having a chamber, more than one desiccant material placed into the chamber and a heater immersed into the desiccant material and at least partially extending into the chamber, and a vibration generator providing the desiccant material to be stirred by vibrating the heater.

[0010] During the regeneration process, desiccant material particles reaching the regeneration heat have the risk of losing their desiccation feature due to the heat that it will be subjected to thereafter. The vibration generator provides the heater to vibrate and thus the desiccant material particles to shift by being activated a little before the regeneration temperature. Thus, the desiccant material particles contacting the heater are prevented from losing their desiccation feature and almost all of the desiccant material particles are provided to be regenerated by providing a homogeneous heat distribution in the chamber.

[0011] In an embodiment of the present invention, at least one hole is present on the dehumidifying unit, disposed on the chamber and providing a portion of the heater to be taken out of the chamber by being passed therethrough. In this embodiment, the heater is preferably U-shaped, with resistance and have circular cross-section. The ends of the heater are taken out of the chamber through the holes. The area of the hole is larger than the cross sectional area of the heater. When the leg of the heater is passed through the hole, a gap remains between the heater and the hole. The vibration generator that is required to contact the heater interacts with the portion of the heater outside the chamber. Thus, a wider area is created for the placement of the vibration generator and also operating conditions are improved in terms of temperature.

[0012] In another embodiment of the present invention, at least one sealing element that prevents the desiccant

material from getting out of the chamber by covering the gap between the hole and the heater is placed in the dehumidifying unit. The sealing element allows the heater to make vibrational motion by means of its flexible structure.

[0013] In another embodiment of the present invention, the vibration generator comprises a piezoelectric actuator that provides the heater to vibrate by being mounted to the portion thereof remaining outside the chamber.

[0014] In another embodiment of the present invention, the vibration generator comprises a crankshaft-piston rod mechanism that provides the heater to vibrate by transferring its movement to the portion of the heater remaining outside the chamber.

[0015] In another embodiment of the present invention, the vibration generator comprises an unbalanced load mechanism that provides the heater to vibrate by being mounted to the portion thereof remaining outside the chamber.

[0016] In another embodiment of the present invention, the dishwasher comprises at least one temperature sensor disposed in the chamber and a control unit that actuates the vibration generator and/or changes the vibration frequency thereof according to the data received from the temperature sensor.

[0017] In another embodiment of the present invention, an empty space is left over the chamber. Thus, the desiccant material particles are provided to shift more easily while the heater vibrates. Thus, more particles shift in the chamber and a more homogeneous regeneration is realized.

[0018] In another embodiment of the present invention, the vibration generator is disposed in the chamber.

[0019] By means of the present invention, the desiccant material particles are prevented from burning and losing their desiccation feature during the regeneration of the desiccant material. Thus, drying efficiency of the dishwasher is prevented from decreasing in long term. Furthermore, since a homogeneous heat distribution is provided in the chamber, 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.

[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 front view of the chamber in an embodiment of the present invention.

Figure 4 - is the perspective view of the dehumidifying unit in another embodiment of the present invention.

Figure 5 - is the perspective view of the dehumidifying unit in another embodiment of the present invention.

Figure 6 - is the perspective view of the dehumidifying unit in another embodiment of the present invention.

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

1. Dishwasher
2. Tub
3. Tub inlet
4. Tub outlet
5. Air channel
6. Fan
7. Dehumidifying unit
8. Desiccant material
9. Heater
10. Chamber
11. Inlet port
12. Outlet port
13. Vibration generator
14. Hole
15. Sealing element
16. Temperature sensor
17. Control unit
18. Piezoelectric actuator
19. Crankshaft-piston rod mechanism
20. Unbalanced load mechanism

[0022] The dishwasher (1) comprises a tub (2) wherein the washing process is performed, a tub inlet (3) that provides air entrance into the tub (2), a tub outlet (4) providing the air in the tub (2) to be discharged, an air channel (5) located outside the tub (2), providing a closed air cycle between the tub outlet (4) and the tub inlet (3), a fan (6) disposed on the air channel (5) and providing the air in the tub (2) to be sucked and a dehumidifying unit (7) disposed on the air channel (5), providing the air passing therethrough to be dried (Figure 1).

[0023] The dehumidifying unit (7) comprises a desiccant material (8) desiccating the air passing therethrough, a chamber (10) wherein the desiccant material (8) is disposed, at least one heater (9) used during the regeneration of the desiccant material (8), at least partially extending into the chamber (10) and embedded into the desiccant material (8), an inlet port (11) providing the air coming from the air channel (5) to enter the chamber (10) and an outlet port (12) providing the air in the chamber (10) to pass into the air channel (5) again (Figure 2).,

[0024] In the drying step of the washing program, humid air in the tub (2) is sucked by means of the fan (6) to be received into the air channel (5). Air passing from the air channel (5) to the dehumidifying unit (7) by means of the inlet port (11) is dehumidified by the desiccant material (8) in the chamber (10) and heat is emanated. The air dehumidified and heated in the dehumidifying unit (7) leaves the dehumidifying unit (7) by passing through the outlet port (12) and returns to the tub (2) through the air

channel (5). Thus, the air leaving the tub (2) as humid completes its closed cycle by returning to the tub (2) in a dry and hotter state. Thus, water remaining on the dishes after the rinsing step is removed.

[0025] The desiccant material (8) saturated with moisture in the drying step is regenerated in the next washing step by being heated by means of the heater (9) and regains its desiccant feature.

[0026] The dishwasher (1) of the present invention comprises a vibration generator (13) providing the desiccant material (8) wherein the heater (9) is embedded to be stirred by vibrating the heater (9). The vibration generator (13) is activated during the regeneration process. The heater (9) is vibrated by means of the vibration generator (13) and the desiccant material (8) particles in the chamber (10) shift by the effect of the vibrations. The desiccant material (8) particles far from the heater (9) come closer and those that are near move away. Consequently, the desiccant material (8) particles close to the heater (9) are prevented from losing their desiccation feature by being continuously subjected to high temperatures and almost all of the desiccant material (8) particles in the chamber (10) are provided to be regenerated by those that are far coming closer. Thus, total dehumidification capacity and hence drying performance are preserved.

[0027] In an embodiment of the present invention, the dehumidifying unit (7) comprises at least one hole (14) disposed on the chamber (10) and providing a portion of the heater (9) to be taken out of the chamber (10) by being passed therethrough. In this embodiment, the ends of the heater (9) in form of a curved pipe, containing resistance wire are taken out of the chamber (10) through the hole (14). Thus, electrical connection of the heater (9) is provided to be performed easily and this connection is provided to be protected from high temperatures and also a convenient space is provided for placing the vibration generator (13) (Figure 3).

[0028] The area of the hole (14) is larger than the cross sectional area of the heater (9). The heater (9) has preferably circular cross-section. Thus, the heater (9) that vibrates when the vibration generator (13) is activated is provided to more easily move inside the hole (14).

[0029] In another embodiment of the present invention, the dehumidifying unit (7) comprises at least one sealing element (15) that prevents the desiccant material (8) from getting out of the chamber (10) by covering the gap between the hole (14) and the heater (9). In this embodiment, the sealing element (15) is preferably in ring form. The sealing element (15) prevents the desiccant material (8) particles displacing inside the chamber (10) from leaving the chamber (10). Moreover, the sealing element (15), by means of its flexible structure, prevents the movement of the heater (9) from being limited during the vibrational motion (Figure 3).

[0030] In another embodiment of the present invention, the vibration generator (13) comprises a piezoelectric actuator (18) that provides the heater (9) to vibrate by being mounted to the portion thereof remaining outside the chamber (10). When fed with electricity, the piezoelectric actuator (18) provides the heater (9) whereon it is mounted to vibrate (Figure 4).

[0031] In another embodiment of the present invention, the vibration generator (13) comprises a crankshaft-piston rod mechanism (19) that provides the heater (9) to vibrate by transferring its movement to the portion of the heater (9) remaining outside the chamber (10). In this embodiment, a motor making circular motion transfers its motion to the disc located just thereabove by means of a shaft. By means of the piston rod, one end of which is connected to the disc and the other end to the heater (9), the circular motion of the motor is converted to planar motion and the heater (9) is provided to vibrate (Figure 5).

[0032] In another embodiment of the present invention, the vibration generator (13) comprises an unbalanced load mechanism (20) that provides the heater (9) to vibrate by being mounted to the portion thereof remaining outside the chamber (10) (Figure 6).

[0033] In another embodiment of the present invention, the dishwasher (1) comprises at least one temperature sensor (16) disposed in the chamber (10) and a control unit (17) that actuates the vibration generator (13) and/or changes the vibration frequency thereof according to the data received from the temperature sensor (16). In this embodiment, the temperature sensor (16) is preferably disposed in the vicinity of the heater (9). The control unit (17) provides the desiccant material (8) particles to shift by activating the vibration generator (13) when the desiccant material (8) particles near the heater (9) reach the regeneration temperature and prevents the desiccant material (8) contacting the heater (9) from burning. Thus, the vibration generator (13) is provided to operate only when needed instead of the whole regeneration process and energy consumption is reduced. The control unit (17), furthermore, regulates the vibration frequency by changing the power fed to the vibration generator (13) according to the temperature information received from the temperature sensor (16).

[0034] In another embodiment of the present invention, a portion of the chamber (10) is left empty in order to facilitate the movement of the desiccant material (8) particles. Thus, when the heater (9) starts vibrating, the desiccant material (8) particles can shift more easily and a more homogeneous regeneration process is realized.

[0035] In another embodiment of the present invention, the vibration generator (13) is disposed in the chamber (10).

[0036] The desiccant material (8) has reversible feature. Preferably zeolite is used as the desiccant material (8).

[0037] By means of the present invention, the desiccant material (8) particles are prevented from burning and losing their desiccation feature during the regeneration of the desiccant material (8). Thus, drying efficiency of the dishwasher (1) is prevented from decreasing in long term. Furthermore, since a homogeneous heat dis-

tribution is provided in the chamber (10), almost all of the desiccant material (8) particles are provided to be regenerated. Thus, total dehumidification capacity in the next drying step increases and hence a more efficient drying is provided.

[0038] 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 embodiments. These should be considered within the scope of the protection postulated by the claims of the present invention.

Claims

1. A dishwasher (1) **comprising** a tub (2) wherein the washing process is performed, a tub inlet (3) that provides air entrance into the tub (2), a tub outlet (4) providing the air in the tub (2) to be discharged, an air channel (5) located outside the tub (2), providing a closed air cycle between the tub outlet (4) and the tub inlet (3), a fan (6) disposed on the air channel (5) and providing the air in the tub (2) to be sucked and a dehumidifying unit (7) disposed on the air channel (5), having a desiccant material (8) desiccating the air passing therethrough, a chamber (10) wherein the desiccant material (8) is disposed, at least one heater (9) used during the regeneration of the desiccant material (8), at least partially extending into the chamber (10) and embedded into the desiccant material (8), an inlet port (11) providing the air coming from the air channel (5) to enter the chamber (10) and an outlet port (12) providing the air in the chamber (10) to pass into the air channel (5) again, **characterized by** a vibration generator (13) providing the desiccant material (8) to be stirred by vibrating the heater (9).

2. A dishwasher (1) as in Claim 1, **characterized by** the dehumidifying unit (7) comprising at least one hole (14) disposed on the chamber (10) and providing a portion of the heater (9) to be taken out of the chamber (10) by being passed therethrough.

3. A dishwasher (1) as in Claim 2, **characterized by** the hole (14), the area of which is larger than the cross-sectional area of the heater (9).

4. A dishwasher (1) as in any one of the above claims, **characterized by** the dehumidifying unit (7) comprising at least one sealing element (15) that prevents the desiccant material (8) from getting out of the chamber (10) by covering the gap between the hole (14) and the heater (9).

5. A dishwasher (1) as in any one of the above claims, **characterized by** the vibration generator (13) comprising a piezoelectric actuator (18) that provides the heater (9) to vibrate by being mounted to the portion thereof remaining outside the chamber (10).

6. A dishwasher (1) as in any one of the claims 1 to 4, **characterized by** the vibration generator (13) comprising a crankshaft-piston rod mechanism (19) that provides the heater (9) to vibrate by transferring its movement to the portion of the heater (9) remaining outside the chamber (10).

7. A dishwasher (1) as in any one of the claims 1 to 4, **characterized by** the vibration generator (13) comprising an unbalanced load mechanism (20) that provides the heater (9) to vibrate by being mounted to the portion thereof remaining outside the chamber (10).

8. A dishwasher (1) as in any one of the above claims, **characterized by** at least one temperature sensor (16) disposed in the chamber (10) and a control unit (17) that actuates the vibration generator (13) and/or changes the vibration frequency thereof according to the data received from the temperature sensor (16).

9. A dishwasher (1) as in any one of the above claims, **characterized by** the chamber (10), a portion of which is left empty in order to facilitate the movement of the desiccant material (8) particles.

Patentansprüche

1. Geschirrspülmaschine (1) umfassend eine Spülkammer (2), in welcher der Spülvorgang durchgeführt wird, einen Spülkammereingang (3) der die Zufuhr der Luft in die Spülkammer (2) sicherstellt, einen Spülkammerausgang (4) der das Entleeren der Luft in der Spülkammer (2) sicherstellt, einen Luftkanal (5), der außerhalb der Spülkammer (2) angeordnet ist und einen Innenluftkreislauf zwischen dem Spülkammerausgang (4) und Spülkammereingang (3) gewährleistet, ein Gebläse (6), das auf den Luftkanal (5) eingesetzt wird und das Ansaugen der Luft in der Spülkammer (2) sicherstellt, und eine Entfeuchtungseinheit (7), die auf den Luftkanal (5) eingesetzt wird und die ein Trockenmittel (8), das die hier durchgehende Luft trocknen läßt, aufweist, einen Raum (10), in welchem man das Trockenmittel (8) lagert, mindestens ein Heizgerät (9), das während der Erneuerung des Trockenmittels (8) verwendet wird, mindestens teilweise in den Raum (10) erstreckt und in das Trockenmittel (8) eingebettet ist, einen Eingangsanschluss (11), der das Einleiten der Luft aus dem Luftkanal (5) in den Raum (10) gewährleistet und einen Ausgangsanschluss (12), der das Zurückleiten der Luft in dem Raum (10) wieder in den Luftkanal (5) gewährleistet, **dadurch gekennzeichnet,**

dass ein Schwingungserzeuger (13), das Rühren des Trockenmittels (8) durch das Schwingen des Heizgeräts (9) gewährleistet.

2. Geschirrspülmaschine (1) nach Anspruch 1 **gekennzeichnet durch** eine Entfeuchtungseinheit (7), die mindestens ein Bohrloch (14) auf dem Raum (10) umfasst und das Aufnehmen eines Teils des Heizgeräts (9) aus dem Raum (10) durch Passieren hindurch gewährleistet.

3. Geschirrspülmaschine (1) nach Anspruch 2 **gekennzeichnet durch** ein Bohrloch (14), dessen Querschnittsfläche größer als die Querschnittsfläche des Heizgeräts (9) ist.

4. Geschirrspülmaschine (1) nach einem der vorgehenden Ansprüche **gekennzeichnet durch** eine Entfeuchtungseinheit (7), die mindestens ein Dichtungselement (15) umfasst, das das Rauskommen des Trockenmittels (8) aus dem Raum (10) durch Schließen des Spalts zwischen dem Bohrloch (14) und Heizgeräts (9) verhindert,

5. Geschirrspülmaschine (1) nach einem der vorgehenden Ansprüche **gekennzeichnet durch** einen Schwingungserzeuger (13), der eine piezoelektrische Betätigungsvorrichtung (18) umfasst, die auf dem Teil des Heizgeräts außer dem Raum (10) montiert ist und das Schwingen des Heizgeräts (9) sicherstellt.

6. Geschirrspülmaschine (1) nach einem der vorgehenden Ansprüche 1 bis 4 **gekennzeichnet durch** einen Schwingungserzeuger (13), der ein Kurbelwelle - Kolbenstange Mechanismus (19) umfasst, das das Schwingen des Heizgeräts (9) sicherstellt, in dem dessen Bewegung auf den Teil des Heizgeräts (9) außer dem Raum (10) übergeleitet wird.

7. Geschirrspülmaschine (1) nach einem der vorgehenden Ansprüche 1 bis 7 **gekennzeichnet durch** einen Schwingungserzeuger (13), der eine unausgeglichene Lasteinrichtung (20) umfasst, die auf dem Teil des Heizgeräts außer dem Raum (10) montiert ist und dadurch das Schwingen des Heizgeräts (9) sicherstellt.

8. Geschirrspülmaschine (1) nach einem der vorgehenden Ansprüche **gekennzeichnet durch** einen Temperatursensor (16) angeordnet im Raum (10) und eine Steuereinheit (17), die den Schwingungserzeuger (13) bewegen läßt und /oder dessen Frequenz gemäß den Daten aus dem Temperatursensor (16) verändert.

9. Geschirrspülmaschine (1) nach einem der vorgehenden Ansprüche **gekennzeichnet durch** einen Raum (10), dessen ein Teil freigelassenen ist, um die Partikeln des Trockenmittels (8) bewegen zu lassen.

Revendications

1. Un lave-vaisselle (1) **comprenant** une cuve (2) dans laquelle le processus de lavage est effectué, une entrée de cuve (3) qui fournit une entrée d'air dans la cuve (2), une sortie de la cuve (4) permettant à l'air dans la cuve (2) de décharger (2), un canal d'air situé à l'extérieur de la cuve (2), permettant un cycle d'air fermé entre la sortie de la cuve (4) et l'entrée de la cuve (3), un ventilateur (6)disposé sur le canal d'air (5) et permettant à l'air dans la cuve d'être aspire et une unité de déshumidification (7) disposée sur le canal d'air (5), ayant un matériau dessicant (8) desséchant l'air traversant, une chambre (10) dans laquelle le matériau dessicant (8) est disposé, au moins un dispositif de chauffage (9) utilisé pendant la régénération du matériau dessicant (8), s'étendant au moins partiellement dans la chambre (10) et incorporé dans le matériau dessicant (8), un port d'entrée (11) fournissant l'air provenant du canal d'air (5) pour pénétrer dans la chambre (10) et un port de sortie (12) fournissant l'air dans la chambre (10) pour passer dans le canal d'air (5) encore, **caractérisé par** un générateur de vibration (13) fournissant le matériau dessicant (8) à agiter en faisant vibrer le réchauffeur (9).

2. Un lave-vaisselle (1) selon la revendication 1, **caractérisé en ce que** l'unité de déshumidification (7) comprend au moins un trou (14) disposé sur la chambre (10) et permettant à une partie du dispositif de chauffage (9) de sortir de la chambre (10) en étant passé à travers celui-ci.

3. Un lave-vaisselle (1) selon la revendication 2, **caractérisé par** le trou (14), dont la surface est supérieure à la surface en coupe transversale du dispositif de chauffage (9).

4. Un lave-vaisselle (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'unité de déshumidification (7) comprend au moins un élément d'étanchéité (15) qui empêche le matériau dessicant (8) de sortir de la chambre (10) en recouvrant l'espace entre le trou (14) et le dispositif de chauffage(9).

5. Un lave-vaisselle (1) selon l'une quelconque des revendications précédentes, **caractérisé par** le générateur de vibration (13) comprenant un actionneur piézo électrique (18) qui permet au dispositive de chauffage (9) de vibrer en étant monté sur sa partie restant à l'extérieur de la chambre (10).

6. Un lave-vaisselle (1) selon l'une quelconque des revendications 1 à 4, **caractérisé par** le générateur de vibration (13) comprenant un mécanisme de vilebrequin-piston (19) qui permet au dispositif de chauffage (9) de faire vibrer en transférant son mouvement vers la partie du dispositif de chauffage (9) restant à l'extérieur de la chambre (10).

7. Un lave-vaisselle (1) selon l'une quelconque des revendications 1 à 4, **caractérisé par** le générateur de vibration (13) comprenant un mécanisme de charge déséquilibré (20) qui permet au dispositif de chauffage (9) de vibrer en étant monté sur sa partie restant à l'extérieur de la chambre (10).

8. Un lave-vaisselle (1) selon l'une quelconque des revendications précédentes, **caractérisé par** au moins un capteur de température (16) disposé dans la chambre (10) et une unité de commande (17) qui actionne le générateur de vibration (13) et/ou change la fréquence de vibration selon les données reçues du capteur de température (16).

9. Un lave-vaisselle (1) selon l'une quelconque des revendications précédentes, **caractérisé par** la chambre (10), don tune partie est laissée vide afin de faciliter le déplacement des particules de matériau dessicant (8).

Figure 1

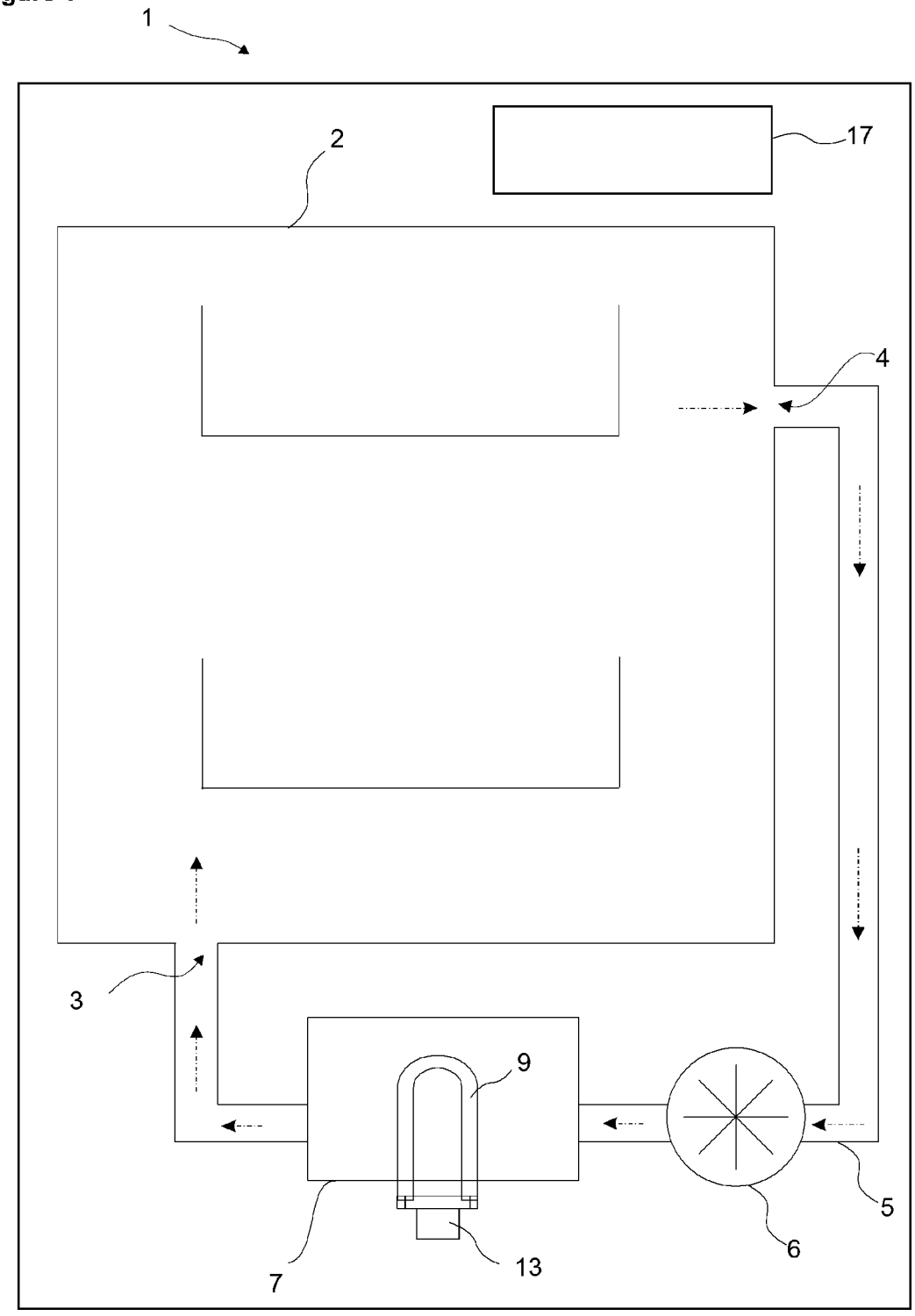


Figure 2

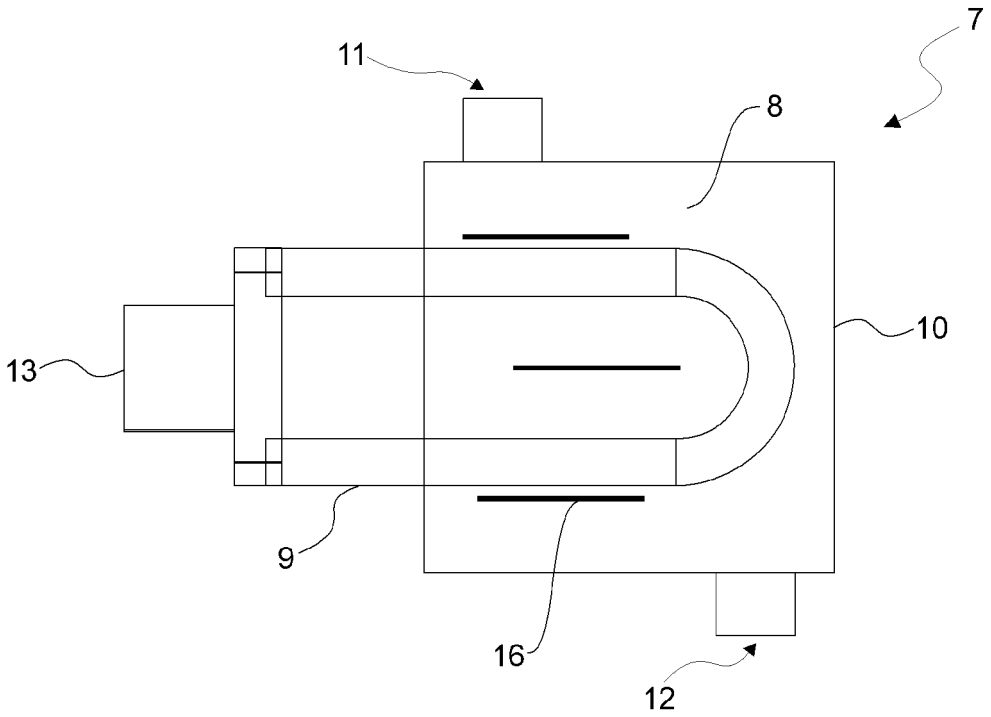


Figure 3

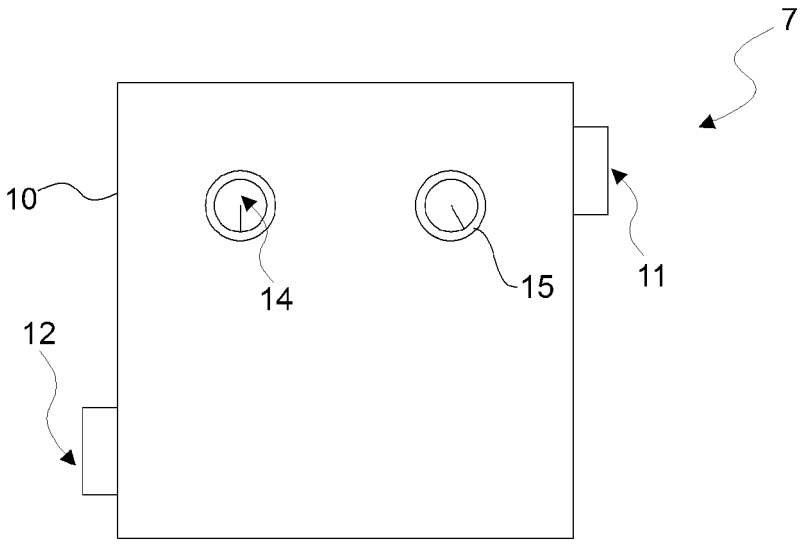


Figure 4

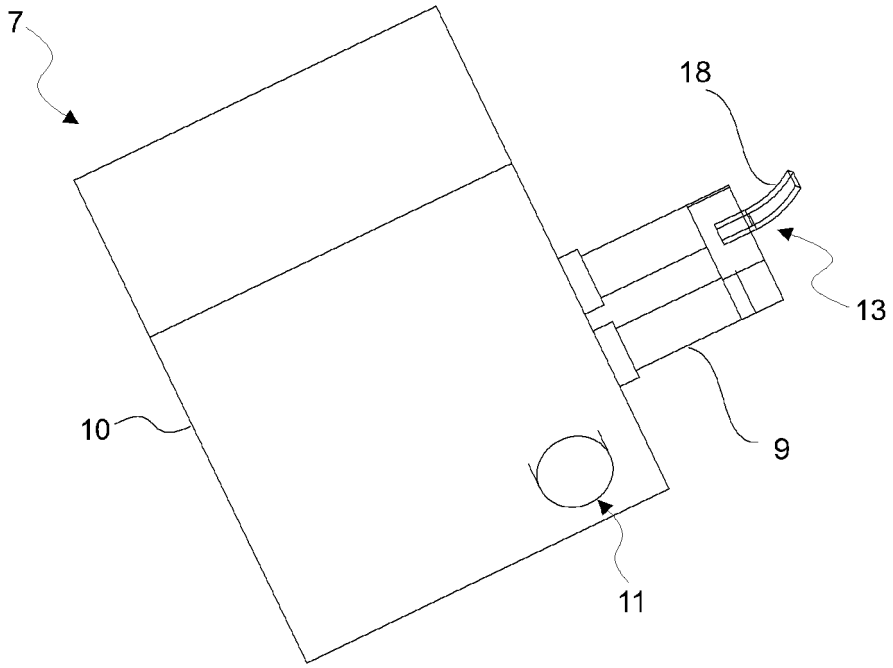


Figure 5

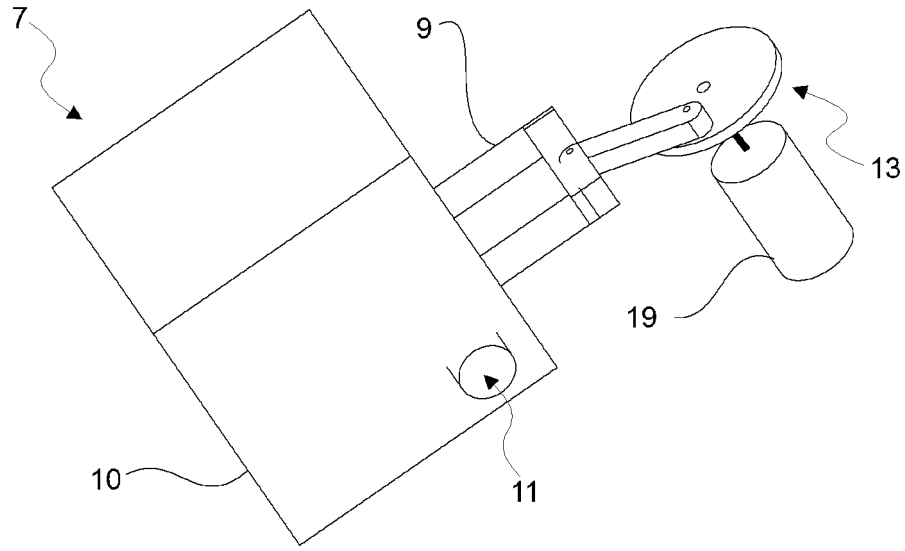
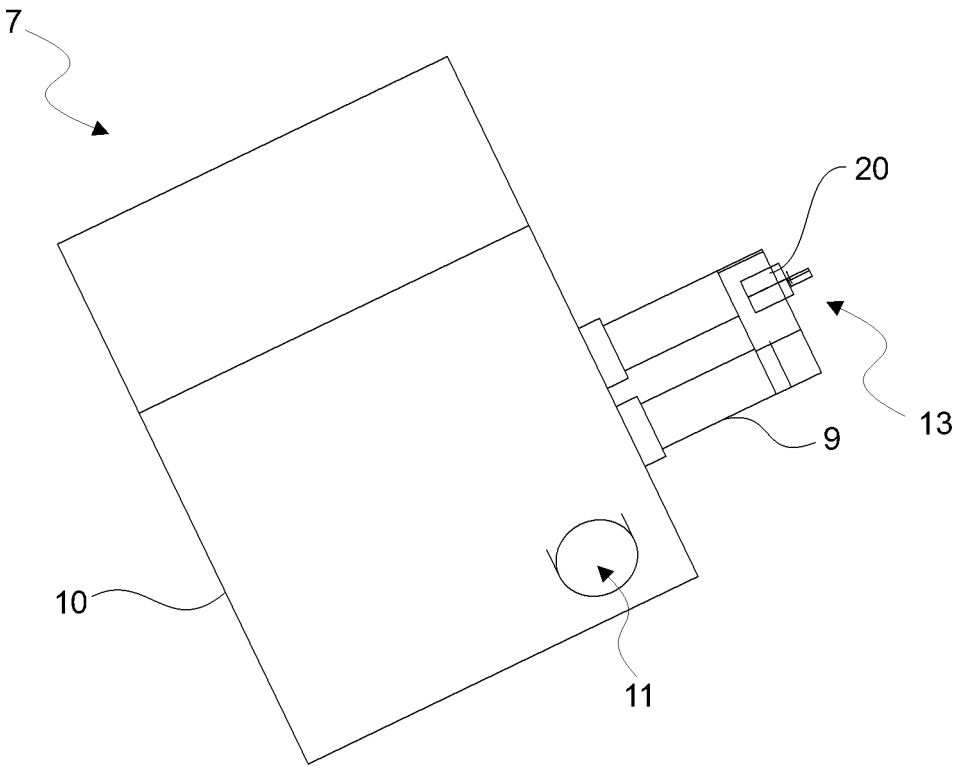


Figure 6



REFERENCES CITED IN THE DESCRIPTION

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