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(71) Applicant: **BSH Hausgeräte GmbH**
81739 München (DE)

(72) Inventors:
- **Liu, Yun(PLC2)**
  Nanjing, 210046 (CN)
- **Chen, Lijun**
  Nanjing, 210000 (CN)
- **Lu, Fei**
  Nanjing, 210000 (CN)
- **Zhu, Yuting**
  Nanjing, 210046 (CN)
- **Zhang, Qi**
  Nanjing, 210046 (CN)

(54) LAUNDRY DRYING APPLIANCE

(57) A laundry drying appliance is provided, including a drying chamber (2) and a process air passage (5) connected to the drying chamber (2), a fan (7) being provided in the process air passage (5), so that air circulates in the drying chamber and the process air passage, and a heat exchange apparatus (10,100,200,300) being provided in the process air passage (5), the heat exchange apparatus (10,100,200,300) including a flat body (14,114,214,314), the body having a tiled fluid passage (11,110,210,310), and the fluid passage being adapted to receive a cooling medium that flows therein.

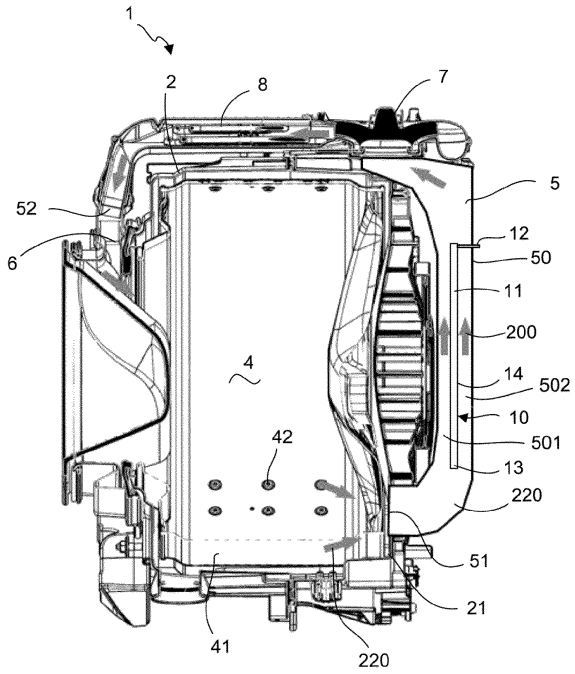

FIG. 1

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Description

[0001] The present invention belongs to the technical field of household electric appliance, and relates to a laundry drying appliance having a heat exchange apparatus.

Chinese Patent Application Publication No. CN105463804A discloses a laundry dryer having a laundry processing barrel assembly located within a cabinet, including a drum that may be driven by an electric motor to rotate and a tub sleeved outside the drum. The tub is connected to a condensing passage and space of the tub is in communication with space of the condensing passage. The condensing passage is then connected to a fan and an air heating passage successively. The other end of the air heating passage is then in communication with the space of the tub. Therefore, an air circulation path is formed among the tub, the condensing passage, the fan, and the air heating passage. In a drying process, a heater in the air heating passage heats drying air flowing through the air heating passage. Heated high-temperature drying air enters the laundry processing tub assembly under action of the fan, to heat wet laundry in the drum, thereby evaporating moisture in the laundry. The drying air carrying the evaporated moisture then enters the condensing passage, in which the moisture in the drying air is condensed to become liquid again and to be separated from the drying air. The drying air then becomes cooled and dried again, and enters the heating passage under driving of the fan, to start a new cycle circulation, so that the laundry in the drum is finally dried. A cooling water inlet pipe is connected to the condensing passage. In the drying process, cooling water flows into the condensing passage from the water inlet pipe, so that heat is exchanged with the drying air entering the condensing passage, thereby condensing the moisture in the drying air.

The present invention is intended to provide a laundry drying appliance, where a cooling medium does not enter a fan and a downstream part of the fan with process air contacting laundry.

[0002] A laundry drying appliance is provided, including a drying chamber and a process air passage connected to the drying chamber, a fan being provided in the process air passage, so that air circulates in the drying chamber and the process air passage, a heat exchange apparatus being provided in the process air passage, the heat exchange apparatus including a flat body, the body having a tiled fluid passage, and the fluid passage having an outlet and an inlet adapted to receive a cooling medium that enters the fluid passage from the inlet and leaves the fluid passage from the outlet, where the body is at least partially made of metal or a material whose thermal conductivity is not inferior to that of metal.

[0003] According to an embodiment of the present invention, the body of the heat exchange apparatus separates the process air passage into a first passage part and a second passage part along a direction in which air flows.

[0004] According to another embodiment of the present invention, the body includes a tiled pipe in which a fluid passage is formed, and a gap that facilitates air circulation exists between walls of the pipe.

[0005] According to an embodiment of the present invention, the body of the heat exchange apparatus is attached and fixed to a wall of the process passage.

[0006] According to an embodiment of the present invention, the fluid passage is folded and bent, and an acute angle is formed between each two adjacent bent sections.

[0007] According to an embodiment of the present invention, the fluid passage is folded and bent, and mutually bent sections are parallel to each other.

[0008] According to an embodiment of the present invention, the fluid passage is folded and bent, and has several sections mutually folded and bent, and at least partial sections of the fluid passage being inclined downward relative to a horizontal plane along a direction in which a fluid flows.

FIG. 1 is a schematic lateral view of a laundry drying appliance according to a first implementation;

FIG. 2 is a schematic lateral view of a laundry drying appliance according to a second implementation;

FIG. 3 is a front view of a heat exchange apparatus according to a first implementation;

FIG. 4 is a front view of a heat exchange apparatus according to a second implementation; and

FIG. 5 is a brief schematic diagram of another implementation of a fluid passage of a heat exchange apparatus.

[0009] As shown in FIG. 1, a laundry drying appliance 1 includes a tub 2 and a drum 4 that is located in the tub 2 and that may be driven by a motor 3 to rotate, the tub and the drum constituting a drying chamber. A wall 41 of the drum 4 has a dense hole 42, so that air circulation is suitable between an interior of the drum 4 and the tub 2.

[0010] The tub 2 is connected to a process air passage 5. An air inlet 51 of the process air passage 5 is connected to a wall 21 of the tub 2. An air outlet 52 of the process air passage 5 is connected to a washer 6 mounted on a front side of the tub 2. Therefore, space of the process air passage 5 and space of the tub 2 are in communication.

[0011] A fan 7 and a heating apparatus 8 are provided in the process air passage 5. After the fan 7 is started, air can be driven to enter the process air passage 5 from the air inlet 51 of the process air passage 5, and passes through the heating device 8, and is blown out through the air outlet 52 to enter a front portion of the tub 2, so as to enter the drum 4 to fully contact laundry and then

passes through the hole 42 on the wall 41 of the drum. Finally the air enters the process air passages 5, thereby completing a cyclic flow.

[0012] A heat exchange apparatus 10 is provided in the process air passage 5. The heat exchange apparatus 10 is mounted between the air inlet 51 and the fan 7. When wet hot process air 200 enters the process air passage 5 from the air inlet 51 and when passes through the heat exchange apparatus 10, heat is exchanged with the heat exchange apparatus 10, so that a temperature decreases, and moisture in the hot process air is condensed. The process air 200 then passes through the fan 7 to enter a mounting area of the heating apparatus 8. Due to heating of the heating apparatus 8, the temperature of the process air 200 rises again, and then the process air enters the tub 2 and the drum 4 again to contact with laundry, thereby evaporating moisture in the laundry.

[0013] The heat exchange apparatus 10 includes a flat body 14. The body 14 has a tiled fluid passage 11, and the fluid passage has an inlet 12 and an outlet 13 adapted to receive a cooling medium that enters the fluid passage 11 from the inlet 12 and leaves the fluid passage 11 from the outlet 13. Generally, the cooling medium may be water. The body 14 is at least partially made of metal or a material whose thermal conductivity is not inferior to that of metal. The inlet 12 of the fluid passage 11 passes through a wall 50 of the process passage 5, and the outlet 13 is located within the process passage 5 and at a bottom of the body 14. The body 14 of the heat exchange apparatus separates the process air passage 5 into a first passage part 501 and a second passage part 502 along a direction in which air flows.

[0014] In a working process, a cooling medium is supplied to the fluid passage 11 from the inlet 12 of the fluid passage 11. Heat is exchanged between the cooling medium and the process air 200 contacting the heat exchange device 10 using a thermally conductive passage wall, to reduce the temperature of the process air. The cooling medium with an increased temperature enters the tub 2 from the air inlet 51 of the process air passage 5 and is discharged. The fluid passage 11 can continuously provide a cooling medium to the heat exchange apparatus 10. In addition, the cooling medium flows in the fluid passage 11, and heat can be sufficiently exchanged with the process air through the passage wall, so that the cooling medium can be fully utilized. In addition, because the cooling medium flows in the fluid passage 11, the cooling medium does not splash under blowing of airflow, and therefore is not inhaled by the fan 7.

[0015] In another implementation shown in FIG. 2, the body 14 of the heat exchange apparatus 10 is attached and fixed to a wall 50 of the process passage 5. For example, two heat exchange apparatuses 10 may be respectively fixed to two opposite walls 50 of the process passage 5.

[0016] The process air 200 flows between two heat exchange apparatuses 10.

[0017] In an embodiment shown in FIG.3, the heat exchange apparatus 100 includes a flat body 140. The body 140 includes a tiled pipe 160 in which a fluid passage 110 is formed. The pipe 160 is formed through deformation in a sheet wall 1601.

[0018] In another embodiment shown in FIG. 4, a body 240 of a heat exchange apparatus 200 is directly formed through folding and bending of tiled pipes 260. The pipe 260 defines a fluid passage 210. A gap 270 that facilitates air circulation exists between walls 261 of the pipe.

[0019] In the embodiments shown in FIG. 3 and FIG. 4, the fluid passages 110, 210 are folded and bent, and mutually bent sections 1100 and 2100 are parallel to each other.

[0020] In an embodiment shown in FIG. 5, the heat exchange apparatus 300 includes a plurality of fluid passages 310. The fluid passages 310 each has a bent section 3100. An acute angle is formed between each two adjacent bent sections 3100. The bent section 3100 of the fluid passage 310 is inclined downward relative to a horizontal plane along a direction in which a fluid flows. Generally, the cooling medium is tap water. The cooling water can generate relatively large potential energy in an inclined bent area, and a relatively large turbulence is generated in a bent section. Therefore, precipitation and accumulation of sediments in water in the bent section are reduced, so that a water flow in the fluid passage is smoother, thereby avoiding blockage of the fluid passage.

The specific implementations described above and shown in the accompanying drawings are merely used for describing the present invention. Any form of change made by persons of ordinary skill in the art to the present invention within the scope of basic technical ideas of the present invention shall fall within the protection scope of the present invention.

Claims

1. A laundry drying appliance is provided, comprising a drying chamber (2) and a process air passage (5) connected to the drying chamber, a fan (7) being provided in the process air passage, so that air circulates in the drying chamber and the process air passage, **characterized in that** a heat exchange apparatus (10, 100, 200, 300) is provided in the process air passage, the heat exchange apparatus comprising a flat body (14, 140, 240), the body having a tiled fluid passage(11, 110, 210, 310), and the fluid passage having an inlet (12) and an outlet (13) adapted to receive a cooling medium that enters the fluid passage from the inlet and leaves the fluid passage from the outlet, wherein the body is at least partially made of metal or a material whose thermal conductivity is not inferior to that of metal.

2. The laundry drying appliance according to claim 1,

characterized in that the body of the heat exchange apparatus separates the process air passage into a first passage part (501) and a second passage part (502) along a direction in which air flows.

3. The laundry drying appliance according to claim 2, **characterized in that** the body comprises a tiled pipe (260) in which a fluid passage is formed, and a gap (270) that facilitates air circulation exists between walls (261) of the pipe.

4. The laundry drying appliance according to claim 1, **characterized in that** the body (14) of the heat exchange apparatus is attached and fixed to a wall (50) of a process passage.

5. The laundry drying appliance according to claim 1, **characterized in that** the fluid passage (310) is folded and bent, and an acute angle is formed between each two adjacent bent sections (3100).

6. The heat exchange apparatus according to claim 1, **characterized in that** fluid passages (110, 210) are folded and bent, and mutually bent sections (1100, 2100) are parallel to each other.

7. The heat exchange apparatus according to claim 1, **characterized in that** the fluid passage (310) is folded and bent, the fluid passage having several mutually bent sections (3100), and at least partial sections of the fluid passage being inclined downward relative to a horizontal plane along a direction in which a fluid flows.

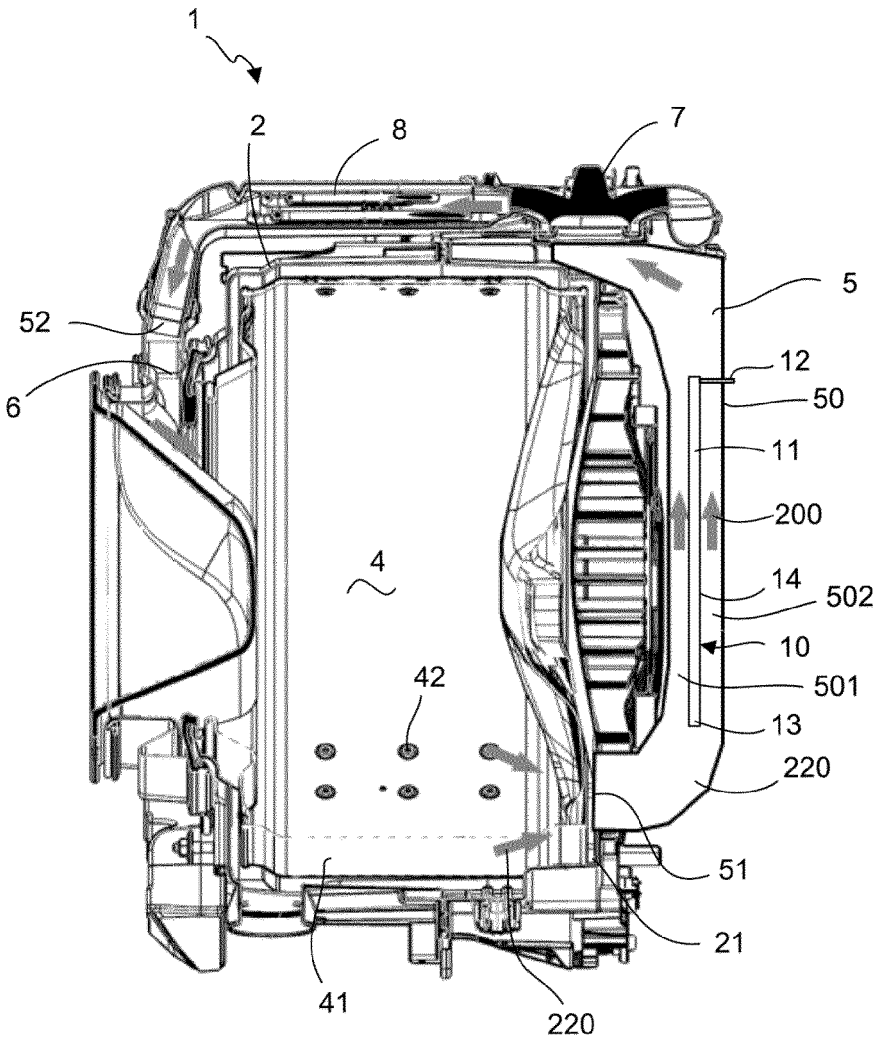

FIG. 1

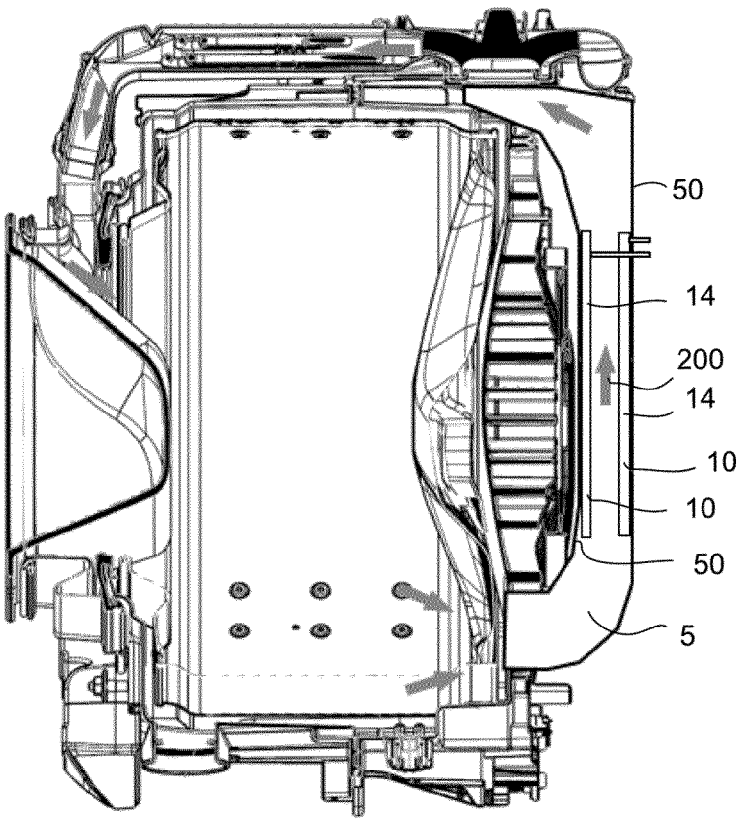

FIG. 2

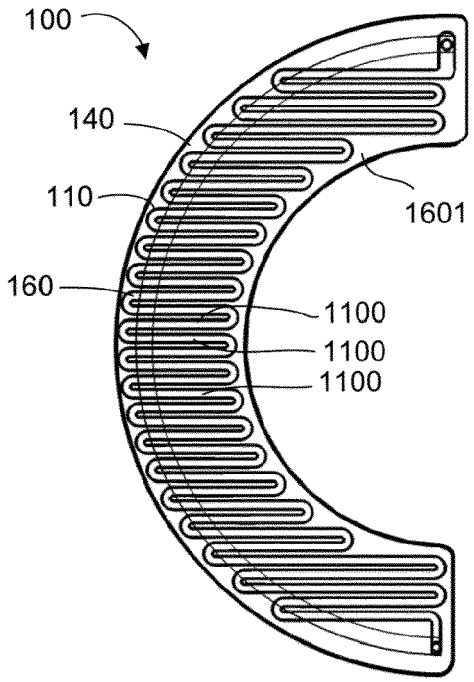

FIG. 3

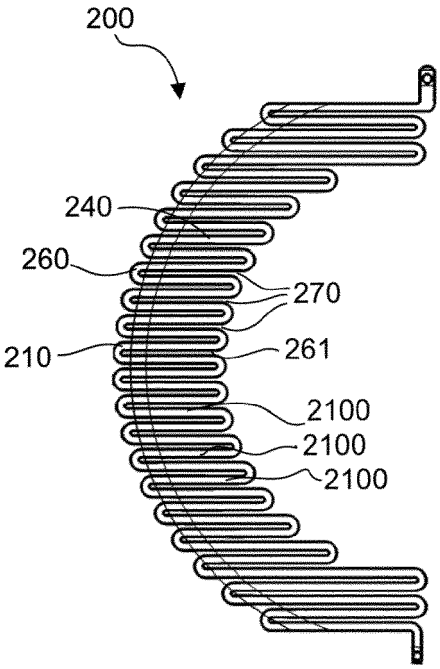

FIG. 4

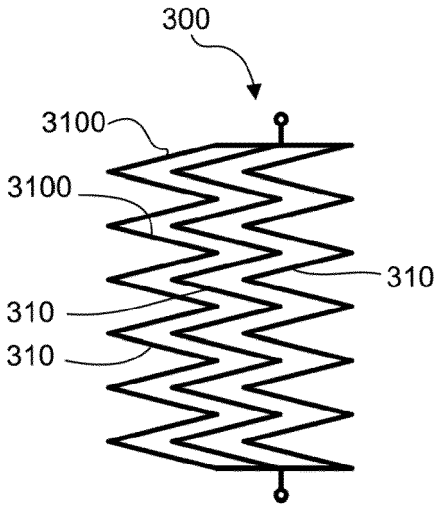

FIG. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 19 20 8799

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	EP 3 330 432 A1 (BSH HAUSGERAETE GMBH [DE]) 6 June 2018 (2018-06-06) * paragraphs [0020] - [0023]; figures 1-3 * -----	1-7 2,3	INV. D06F58/24 D06F25/00 D06F58/02
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TECHNICAL FIELDS SEARCHED (IPC)

D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	22 January 2020	Kising, Axel

CATEGORY OF CITED DOCUMENTS

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