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(54) **CONVECTION APPARATUS**

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(56) References cited:
EP-A2- 0 794 390
EP-A2- 1 748 255
GB-A- 855 029
GB-A- 1 470 940
JP-A- H0 968 316
JP-A- 11 325 478
JP-A- H11 325 478
JP-A- S57 155 039
KR-A- 20060 104 419
KR-A- 20070 013 077
KR-Y1- 200 224 578

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Description

Technical Field

[0001] The present embodiment relates to a convection apparatus and a cooking appliance.

Background Art

[0002] Document GB 855029 A, disclosing the features of the preamble of claim 1, refers to an oven provided with a convection heater and fans received within a convection chamber at the backside of the cavity within the oven.

[0003] EP 0 794 390 A2 refers to a fan-heater unit for a fan-assisted food cooking oven for catering or commercial applications.

[0004] EP 1 748 255 A2 discloses an electric oven with a plurality of convection systems each having a convection heater and a convection fan, and a separating tray dividing the cavity into different spaces.

[0005] JP S57 155039 A discloses a convection apparatus comprising centrifugal fans that are rotated by a driving motor, so that air heated by a heater is blown out from a compartment to a heating chamber through an air guide, which strikes a material to be heated. Then the air is rotated around the surroundings in the heating chamber and circulated from the surroundings of the heating chamber to the compartment. Through the constitution thermal efficiency and cooking performance are improved as the heated air hits directly the material to be heated.

[0006] JP H11 325478 A discloses a heating cooker supplying hot air into a heating chamber in which a fluctuation of heating is suppressed as much as possible. A hot air supply unit disposed in the rear of the rear wall of a heating chamber comprises a casing, two fans arranged side by side in the casing, a heater arranged to surround the fans, and rotary drive motors for the fans.

[0007] Generally, a cooking appliance is an appliance cooking foods using a heating source such as a gas heater or an electronic heater. A convection apparatus for cooking foods received in a cooking room by convecting high temperature air in the cooking room can be provided in such a cooking appliance.

[0008] The convection apparatus may include a convection heater installed in an inside of a convection chamber to generate heat, a convection fan circulating the high temperature air heated by the convection heater through the cooking room and the convection chamber, and a convection motor driving the convection fan.

[0009] However, in the convection apparatus according to the prior art, high temperature air heated by heat generated from the convection heater circulates the cooking room and the convection chamber by one convection fan. Therefore, a problem arises in that high temperature air is not efficiently supplied to the cooking room.

Disclosure of Invention

Technical Problem

[0010] An object of the present embodiment is to provide a convection apparatus and a cooking appliance in which high temperature air can evenly circulate inside a cooking room.

[0011] Another object of the present embodiment is to provide a convection apparatus and a cooking appliance in which a plurality of fans can be rotated by one motor.

Technical Solution

[0012] According to the present invention, there is provided a convection apparatus comprising the features of claim 1, comprising: a convection heater; at least two convection fans blowing air heated by the convection heater; and one convection motor driving the at least two convection fans.

Advantageous Effects

[0013] With the proposed embodiment, high temperature air is discharged into the cooking room by the plurality of convection fans so that the amount of high temperature air circulating the inside of the cooking room is relatively increased, making it possible to more efficiently cook foods.

[0014] Also, the air is circulated by the plurality of convection fans, having an effect that air can be evenly distributed inside the cooking room.

[0015] Also, the plurality of convection fans are rotated by one convection motor, having an advantage that costs is reduced.

Brief Description of Drawings

[0016] The above and other objects, features and advantages of the present invention will become apparent from the following description of preferred embodiments given in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view showing a state where a door of a cooking appliance according to an embodiment not representing the present invention is opened;

FIG. 2 is a front view showing a constitution where the convection apparatus according to an embodiment not representing the present invention is installed;

FIG. 3 is a cross-sectional view taken along lines A-A of FIG. 2;

FIG. 4 is a front view showing a constitution where the convection apparatus according to an embodiment not representing the present invention is installed;

FIG. 5 is a front view showing a constitution where the convection apparatus according to an embodiment not representing the present invention is installed;

FIG. 7 is a cross-sectional view taken along lines B-B of FIG. 6;

FIG. 8 is a front view showing a constitution where the convection apparatus according to an embodiment not representing the present invention is installed; and

FIG. 9 is a front view showing a constitution where the convection apparatus according to an embodiment of the present invention is installed.

Mode for the Invention

[0017] Hereinafter, preferred embodiments will be described in detail with reference to the accompanying drawings.

[0018] FIG. 1 is a perspective view showing a state where a door of a cooking appliance according to a first embodiment is opened, which does not represent the present invention.

[0019] Referring to FIG. 1, the cooking appliance 1 according to the present embodiment includes an external case 10 forming an external appearance, a cavity provided in the inside of the external case 10 and defining a cooking room 12, a door 14 selectively opening and closing the cooking room, a food supporting part 20 installed in the inside of the cavity 11 to allow food to be put, a heating source heating food put on the food supporting part 20, and a control panel 30 provided on one side of the external case 10 to enable a person to operate it.

[0020] More specifically, the heat source includes a upper heater 16 provided on the upper side of the cavity 11 and a lower heater 18 provided on the lower side of the cavity.

[0021] And, a convection apparatus 100 (see FIG. 2) allowing heated air to be circulated through the cooking room 12 and a convection chamber (see 152 of FIG. 3) is provided on external side of the cavity 11.

[0022] A plurality of inlets 31 and 41 allowing air in the cooking room 12 to be inhaled to the convection chamber 152 are formed on a rear wall 1 Ia of the cavity 11. A plurality of outlets 32, 33, 42 and 43 allowing air in the convection chamber 152 to be discharged to the cooking room 12 are formed on a rear wall 11a of the cavity 11.

[0023] The plurality of inlets 31 and 41 include a first inlet 31 formed on a left side and a second inlet 41 formed on a right side, seen from FIG. 1.

[0024] The plurality of outlets include a first upper outlet 32 formed on the upper side of the first inlet 31 and a first lower outlet 33 formed on the lower side of the first inlet 31, and a second upper outlet 42 formed on the upper side of the second inlet 41 and a second lower outlet 43 formed on the lower side of the second inlet 41.

[0025] And, the respective inlets 31 and 41 and the outlets 32, 33, 42 and 43 are formed in a set of a plurality of holes, wherein the number and the formation position of the respective inlets 31 and 41 and the outlets 32, 33, 42 and 43 are not limited to the present embodiment.

[0026] FIG. 2 is a front view showing a constitution where the convection apparatus according to a first embodiment not representing the present invention is installed, and FIG. 3 is a cross-sectional view taken along lines A-A of FIG. 2.

[0027] Referring to FIG. 2, the convection apparatus 100 is provided on an external side of the rear wall 1 Ia of the cavity 11.

[0028] The convection apparatus 100 includes a pair of convection fans 110 and 120, a pair of convection heaters 130 and 140, a convection housing 150, one convection motor 160, a power transmission unit transmitting power of the convection motor 160 to the pair of convection fans 110 and 120.

[0029] More specifically, the convection housing 150 is formed in a flat hexahedral shape, whose front surface approximately being opened. The convection housing 150 is coupled to the external side of the rear wall 1 Ia of the cavity 11.

[0030] As the convection housing 150 is coupled to the rear wall 1 Ia of the cavity 11, a convection chamber 152 is defined between the rear wall 1 Ia of the cavity 10 and the convection housing 150.

[0031] The convection fans 110 and 120 and the convection heaters 130 and 140 are received in the convection chamber 152. The convection chamber 152 is communicated with the cooking room 12 by means of the inlets 31 and 41 and the outlets 32, 33, 42 and 43.

[0032] A partitioning member 154 partitioning the convection chamber 152 into two spaces side by side can be formed in the convection housing 150. And, the respective convection fans 110 and 120 are positioned in the partitioned spaces.

[0033] The convection heaters 130 and 140 heat air inhaled into the inside of the convection chamber 152 through the inlets 31 and 41. The convection heaters 130 and 140 are arranged to be horizontally long inside the convection chamber 152.

[0034] The pair of convection heaters 130 and 140 include a upper convection heater 130 and a lower convection heater 140. And, both ends of the respective convection heaters 130 and 140 are supported by the convection housing 150.

[0035] As the convection heaters 130 and 140, a quartz pipe heater is used. As the convection heaters 130 and 140, any heaters other than the quartz pipe heater, for example, a sheath heater, a halogen heater or a carbon heater may also be used.

[0036] The pair of convection heaters 110 and 120 are positioned between the upper convection heater 130 and the lower convection heater 140. The convection heaters 110 and 120 form the flow of air circulating through the cooking room 12 and the convection chamber 152.

[0037] In other words, if the convection fans 110 and

120 are driven, the air inside the cooking room 12 are inhaled into the inside of the convection chamber 152 through the inlets 31 and 41 to be heated by the convection heaters 130 and 140, and then is again discharged into the inside of the cooking room 12 in the convection chamber 211 through the outlets 32, 33, 42 and 43.

[0038] The convection fans 110 and 120 include a first convection fan positioned in the rear of the first inlet 31 and a second convection fan 120 positioned in the rear of the second inlet 41. And, the shafts of the respective fans 110 and 120 are spaced at a predetermined interval and are parallel to each other.

[0039] The convection motor 160 is installed on the external side of the rear wall 1 Ia of the cavity 11. And, the convection motor is positioned in the upward of the convection housing 150.

[0040] Meanwhile, the power transmission unit includes a motor pulley 172 coupled to a shaft 161 of the convection motor 160, fan pulleys 112 and 122 coupled to shafts 111 and 121 of the respective convection fans 110 and 120, and a belt 170 simultaneously surrounded in the respective pulleys 112, 122 and 162.

[0041] At this time, the shafts 111 and 121 of the respective convection fans 110 and 120 penetrate through the convection housing 150, and the fan pulleys 112 and 122 are coupled to the shafts 111 and 121 that have penetrated through the convection housing 150.

[0042] The fan pulleys 112 and 122 include a first fan pulley 112 coupled to the first convection fan 110 and a second fan pulley 122 coupled to the second convection fan 120. And, the diameters of the respective pulleys 112, 122 and 162 are identically formed.

[0043] Therefore, the rotation speed of the convection motor 160 becomes identical with that of the convection fans 110 and 120, and the rotation speeds of pair of convection fans 110 and 120 becomes identical with each other.

[0044] As the belt 170 is simultaneously surrounded in the respective pulleys 112, 122 and 162, the rotation direction of the shaft 161 of the convection motor 160 becomes identical with that of the convection fans 110 and 120.

[0045] Hooking grooves 113 and 163 for hooking the belt 170 are formed along the circumference of the respective pulleys 112, 122 and 162. At this time, a timing belt may be used as the belt 170 in order that power of the convection motor 160 can be smoothly transmitted to the respective fan pulleys 112 and 122. Here, the respective pulleys 112, 122 and 162 may be made of material having heat-resistivity.

[0046] Hereinafter, an operation of the cooking appliance 1 according to the embodiment will be described.

[0047] First, a user selects a cooking mode where a convection apparatus 100 is used, the convection heaters 130 and 140 and the convection motor 160 operate. If the convection motor 160 operates, the motor pulley 162 rotates in one direction and rotatory power of the motor pulley 162 is transmitted to the fan pulleys 112 and 122 by the belt 170. Then, the convection fans 110 and 120 connected to the fan pulleys 112 and 122 rotate in one direction (a clockwise direction in FIG.. 4).

[0048] If the convection fans 110 and 120 are driven, the air inside the cooking room 12 is inhaled into the convection chamber 152 through the inlets 31 and 41. And, the air inhaled into convection chamber 152 is heated by the convection heaters 13 and 140 and then is discharged from the convection chamber 152 to the inside of the cooking room 12 through the outlets 32, 33, 42 and 43.

[0049] And, as the high temperature air discharged into the inside of the cooking room 12 is convected through the inside of the cooking room 12, food received in the inside of the cooking room 12 is heated. At this time, the circulation of air heated by the convection heaters 130 and 140 is made by the pair of convection fans 110 and 120.

[0050] Therefore, the amount of high temperature air circulating through the inside of the cooking room 12 is relatively increased, making it possible to more efficiently cook foods. Also, the air is circulated by the plurality of convection fans, having an effect that the air can be evenly distributed in the inside of the cooking room 12.

[0051] Also, the plurality of convection fans 110 and 120 are rotated by one convection motor 160, having an advantage that the costs are reduced.

[0052] FIG. 5 is a front view showing a constitution where the convection apparatus according to a second embodiment not representing the present invention is installed.

[0053] The present embodiment is the same as the first embodiment, except for the features that the rotation speeds of the plurality of convection fans are different. Therefore, only the characteristic features of the present embodiment will be described and the first embodiment will be cited for the same portions as the first embodiment.

[0054] Referring to FIG. 5, diameters of the fan pulleys 114 and 124 coupled to the shafts of the respective convection fans 110 and 120 are formed to have different sizes.

[0055] More specifically, a diameter D2 of the second fan pulley 124 coupled to the shaft of the second convection fan 120 is formed to be larger than a diameter Dl of the first fan pulley 114 coupled to the shaft of the first convection fan 110.

[0056] A diameter of a motor pulley 162 coupled to the shaft of the convection motor 160 is formed to be the same as the diameter of the first fan pulley 114.

[0057] Therefore, the rotation speed of the convection motor 160 becomes the same as that of the first convection fan 110. And, the rotation speed of the second convection fan 120 becomes slower than that of the first convection fan 110.

[0058] Although the present embodiment describes that the diameter of the motor pulley 162 are the same as that of the first fan pulley 114, the diameter of the motor pulley 162 may be different form that of the first

fan pulley 114 so that the rotation speeds of the convection motor 160, the first convection fan 110 and the second convection fan 120 may be different.

[0059] FIG. 6 is a front view showing a constitution where the convection apparatus according to a third embodiment not representing the present invention is installed, and FIG. 7 is a cross-sectional view taken along lines B-B of FIG. 6.

[0060] The present embodiment is the same as the first embodiment, except for a power transmission unit. Therefore, only the characteristic features of the present embodiment will be described and the first embodiment will be cited for the same portions as the first embodiment.

[0061] Referring to FIGS. 6 and 7, the power transmission unit according to the present embodiment includes a first power transmission part transmitting power of the convection motor 160 to the first convection fan 110, and a second power transmission part transmitting power of the convection motor 160 transmitted from the first power transmission part to the second convection fan.

[0062] More specifically, the first power transmission part includes a first belt 180 surrounded in the motor pulley 162 and a first fan pulley 116. The second power transmission part includes a second belt 190 surrounded in the first fan pulley 116 and a second fan pulley 126.

[0063] A first hooking groove 116a for being hooked on the first belt 180 and a second hooking groove 116b for being hooked on the second belt 190 are formed along the circumference of the first fan pulley 116. In other words, the first belt 180 and the second belt 190 are simultaneously surrounded in the first fan pulley 116.

[0064] And, the first belt 180 are surrounded in the motor pulley 172 and the first fan pulley 116 using an open belt method, and the second belt are surrounded in the first fan pulley 116 and the second fan pulley 126 using an open belt method.

[0065] Therefore, if the convection motor 160 operates, the motor pulley 162 rotates in one direction. And, if the motor pulley 162 rotates in one direction, the rotatory power of the motor pulley 162 is transmitted to the first fan pulley 116 by means of the first belt 180 so that the first fan pulley 116 rotates in one direction.

[0066] If the first fan pulley 116 rotates in one direction, the rotatory power of the first fan pulley 116 is transmitted to the second fan pulley 126 by means of the second belt 190 so that the second fan pulley 126 rotates in one direction.

[0067] In the present embodiment, power of the convection motor 170 is transmitted directly to the first fan pulley 116 by means of the first belt 180. To the contrary, power of the convection motor 160 is transmitted indirectly to the second fan pulley 126 by means of the first belt 180, the first fan pulley 116 and the second belt 190.

[0068] Although the present embodiment describes that the first belt 180 and the second belt 190 are surrounded in the first fan pulley 116, the first belt 180 and the second belt 190 may be surrounded in the second fan pulley 126.

[0069] FIG. 8 is a front view showing a constitution where the convection apparatus according to a fourth embodiment not representing the present invention is installed.

[0070] The present embodiment is the same as the third embodiment, except for the features that the respective belts are surrounded in the motor pulley. Hereinafter, only the characteristic features of the present embodiment will be described and the third embodiment will be cited for the same portions as the third embodiment.

[0071] Referring to FIG. 8, the power transmission unit according to the present embodiment includes a first power transmission part transmitting power of the convection motor 160 to the first convection fan 110, and a second power transmission part transmitting power of the convection motor 160 to the second convection fan 120.

[0072] More specifically, the first power transmission part includes a first belt 210 surrounded in the motor pulley 167 and the first fan pulley 117. The second power transmission part includes a second belt 220 surrounded in the motor pulley 167 and a second fan pulley 127.

[0073] More specifically, a pair of hooking grooves (not shown) for being hooked on the first belt 210 and the second belt 220 are formed along the circumference of the motor pulley 167.

[0074] Therefore, if the convection motor 160 operates, the motor pulley 167 rotates in one direction. And, if the motor pulley 167 rotates in one direction, the rotatory power of the motor pulley 167 is transmitted to the first fan pulley 117 by means of the first belt 210 so that the first fan pulley 117 rotates in one direction.

[0075] At the same time, if the motor pulley 167 rotates in one direction, the rotatory power of the motor pulley 167 is transmitted to the second fan pulley 127 by means of the second belt 220 so that the second fan pulley 127 rotates in one direction.

[0076] In other words, in the present embodiment, the power of the convection motor 160 is transmitted directly to the respective fan pulleys 117 and 127 by means of the respective belts 210 and 220.

[0077] Although the present embodiment describes that the first convection fan 110 and the second convection fan 120 rotate in the same direction, the first belt 210 may be surrounded in the motor pulley 167 and the first fan pulley 117 in an open belt method and the second belt 220 may surrounded in the motor pulley 167 and the second fan pulley 126 in a cross belt method so that the rotation direction of the second convection fan 120 may be the opposite to that of the first convection fan 110.

[0078] FIG. 9 is a front view showing a constitution where the convection apparatus according to a fifth embodiment is installed, which represents the present invention.

[0079] The present embodiment is the same as the third embodiment, except for the features that the rotation directions of the plurality of convection fans are different. Therefore, only the characteristic features of the present

embodiment will be described and the third embodiment will be cited for the same portions as the third embodiment.

[0080] Referring to FIG. 9, the power transmission unit according to the present embodiment includes a first power transmission part transmitting power of the convection motor 160 to the first convection fan 110, and a second power transmission part transmitting power of the convection motor 160 to the second convection fan.

[0081] More specifically, the first power transmission part includes a first belt 230. The first belt 230 is surrounded in the motor pulley 167 and the first fan pulley 118 and allows the first fan pulley 118 to be rotated in the same direction as the rotation direction of the convection motor 160.

[0082] In other words, the first belt 230 is surrounded in the motor pulley 162 and the first fan pulley 118 using an open belt method.

[0083] The second power transmission part includes a second belt 240. The second belt 240 is surrounded in the first fan pulley 118 and the second fan pulley 128 and allows the second fan pulley 128 to be rotated in the opposite direction to the rotation direction of the first fan pulley 118.

[0084] In other words, the second belt 240 is surrounded in the first fan pulley 118 and the second fan pulley 128 using a cross belt method.

[0085] Therefore, if the convection motor 160 operates, the motor pulley 162 operates in one direction. And, in if the motor pulley 162 rotates in one direction, the rotatory power of the motor pulley 162 is transmitted to the first fan pulley 118 by means of the first belt 230 so that the first fan pulley 118 rotates in one direction.

[0086] If the first fan pulley 118 rotates in one direction, the rotatory power of the first fan pulley 118 is transmitted to the second fan pulley 128 by means of the second belt 240. At this time, while the second belt 240 rotates, the rotation direction is changed so that the second fan pulley 128 rotates in a different direction.

[0087] Therefore, according to the present embodiment, the pair of convection fans 110 and 120 rotate in opposite directions to each other. With the embodiment as described above, the high temperature air inside the cooking room 12 can be more evenly distributed by means of the convection fans rotating in opposite directions to each other.

[0088] At this time, the portioning member 154 is provided in the convection housing 150 as described above, such that vortex of air in the convection chamber 152 is prevented.

[0089] Although the embodiments as above describe that the pair of convection fans are driven by one convection motor, three or more convection fans may also be driven by one convection motor.

[0090] Also, although the pulleys and belts are proposed as the power transmission unit, power transmission may be made by coupling gears to the convection motor and the respective fans, respectively, and allowing the gears to be engaged. Also, an additional gear for transmitting power in addition to the gears coupled to the motor and the fans may be provided, having no limit in the sort and number of gears. Furthermore, the rotation direction of the respective fans may be varied according to the number of gears and the rotation speed of the respective fans may be varied according to the size of the gears.

[0091] Here, the pulley and the gear are coupled to the motor and fans to be rotated, such that the pulley and the gear may be named as rotation members. And, the rotation member coupled to the motor may be named as a first rotation member, the rotation member coupled to the first convection fan may be named as a second rotation member, and the rotation member coupled to the second convection fan may be named as a third rotation member.

Claims

1. A convection apparatus comprising:

a convection housing (150) coupled to a rear wall (11a) of a cavity (11),
a convection chamber (152) being defined between the rear wall (11a) of the cavity (11) and the convection housing (150),
a convection heater (130,140) received in the convection chamber (152);
at least two convection fans (110,120) blowing air heated by the convection heater (130,140) and received in the convection chamber (152); and
one convection motor (160) driving the at least two convection fans (110,120), and
a power transmission unit transmitting power of the convection motor (160) to the respective convection fans (110,120),
wherein a partitioning member (154) partitioning the convection chamber (152) into two spaces side by side is formed in the convection housing (152), and the respective convection fans (110,120) are positioned in the partitioned spaces,
characterized in that the at least two convection fans (110,120) include a first convection fan (110) and a second convection fan (120),
the power transmission unit includes: a first rotation member (162) coupled to the convection motor (160); a second rotation member (112) coupled to the first convection fan (110) to receive power of the convection motor (160); a third rotation member (128) coupled to the second convection fan (122) to receive power of the convection motor (160),
a first power transmission part transmitting power of the convection motor (160) to the first con-

vection fan (110) and surrounded in the first rotation member (162) and the second rotation member (112); and
a second power transmission part transmitting power of the convection motor (160) to the second convection fan (120) and surrounded in the second rotation member and the third rotation member (128),
wherein the rotation direction of at least one of the at least two convection fans (110,120) is opposite to the rotation direction of the convection motor (160).

2. The convection apparatus according to claim 1, wherein the shafts (111,121) of the at least two convection fans (110,120) are spaced at a predetermined distance.

3. The convection apparatus according to claim 1, wherein the at least two convection fans (110,120) have different rotation speeds.

4. The convection apparatus according to claim 1, wherein the diameter of the second rotation member (112) is the same as that of the third rotation member (122).

5. The convection apparatus according to claim 1, wherein the diameter of the second rotation member (112) is different from that of the third rotation member (122).

6. The convection apparatus according to claim 1, wherein one of the power transmission parts is surrounded in the pair of rotation members using an open belt method, and the other of the transmission parts is surrounded in the pair of rotation members using a cross belt method.

Patentansprüche

1. Umluftvorrichtung, die Folgendes umfasst:

ein Umluftgehäuse (150), das mit einer Rückwand (11a) eines Hohlraums (11) gekoppelt ist, eine Umluftkammer (152), die zwischen der Rückwand (11a) des Hohlraums (11) und dem Umluftgehäuse (150) definiert ist,
ein Umluft-Heizelement (130, 140), das in der Umluftkammer (152) aufgenommen ist;
wenigstens zwei Umluftgebläse (110, 120), die Luft blasen, die durch das Umluft-Heizelement (130, 140) geheizt wurde, und die in der Umluftkammer (152) aufgenommen sind; und
einen Umluftmotor (160), der die wenigstens zwei Umluftgebläse (110, 120) antreibt, und
eine Kraftübertragungseinheit, die die Kraft des Umluftmotors (160) auf die jeweiligen Umluftgebläse (110, 120) überträgt,
wobei ein Trennelement (154), das die Umluftkammer (152) in zwei nebeneinanderliegende Räume trennt, in dem Umluftgehäuse (152) ausgebildet ist und wobei die jeweiligen Umluftgebläse (110, 120) in den getrennten Räumen positioniert sind,
dadurch gekennzeichnet, dass die wenigstens zwei Umluftgebläse (110, 120) ein erstes Umluftgebläse (110) und ein zweites Umluftgebläse (120) umfassen,
wobei die Kraftübertragungseinheit Folgendes umfasst:

ein erstes Rotationselement (162), das mit dem Umluftmotor (160) gekoppelt ist; ein zweites Rotationselement (112), das mit dem ersten Umluftgebläse (110) gekoppelt ist, um die Kraft des Umluftmotors (160) aufzunehmen; ein drittes Rotationselement (128), das mit dem zweiten Umluftgebläse (122) gekoppelt ist, um die Kraft des Umluftmotors (160) aufzunehmen,
ein erstes Kraftübertragungsteil, das die Kraft des Umluftmotors (160) auf das erste Umluftgebläse (110) überträgt und von dem ersten Rotationselement (162) und dem zweiten Rotationselement (112) umgeben ist; und
ein zweites Kraftübertragungsteil, das die Kraft des Umluftmotors (160) auf das zweite Umluftgebläse (120) überträgt und von dem zweiten Rotationselement (162) und dem dritten Rotationselement (128) umgeben ist,
wobei die Rotationsrichtung wenigstens eines der wenigstens zwei Umluftgebläse (110, 120) entgegengesetzt zu der Rotationsrichtung des Umluftmotors (160) ist.

2. Umluftvorrichtung nach Anspruch 1, wobei die Wellen (111, 121) der wenigstens zwei Umluftgebläse (110, 120) um eine vorgegebene Strecke beabstandet sind.

3. Umluftvorrichtung nach Anspruch 1, wobei die wenigstens zwei Umluftgebläse (110, 120) unterschiedliche Drehzahlen haben.

4. Umluftvorrichtung nach Anspruch 1, wobei der Durchmesser des zweiten Rotationselements (112) und des dritten Rotationselements (122) gleich sind.

5. Umluftvorrichtung nach Anspruch 1, wobei sich der Durchmesser des zweiten Rotationselements (112) von dem des dritten Rotationselements (122) unterscheidet.

6. Umluftvorrichtung nach Anspruch 1, wobei eines der Kraftübertragungsteile durch das Paar Rotationselemente unter Verwendung einer Open-Belt-Technik umgeben ist und das andere der Übertragungsteile durch das Paar Rotationelemente unter Verwendung einer Cross-Belt-Technik umgeben ist.

Revendications

1. Appareil de convection comprenant :

un logement de convection (150) couplé à une paroi arrière (11a) d'une cavité (11),
une chambre de convection (152) définie entre la paroi arrière (11a) de la cavité (11) et le logement de convection (150),
un élément chauffant de convection (130, 140) reçu dans la chambre de convection (152) ;
au moins deux ventilateurs de convection (110, 120) soufflant de l'air chauffé par l'élément chauffant de convection (130, 140) et reçus dans la chambre de convection (152) ; et
un moteur de convection (160) entraînant les au moins deux ventilateurs de convection (110, 120), et
une unité de transmission de puissance transmettant une puissance du moteur de convection (160) aux ventilateurs de convection respectifs (110, 120),
dans lequel un organe de séparation (154) séparant la chambre de convection (152) en deux espaces côte à côte est formé dans le logement de convection (152), et les ventilateurs de convection respectifs (110, 120) sont positionnés dans les espaces séparés,
caractérisé en ce que les au moins deux ventilateurs de convection (110, 120) incluent un premier ventilateur de convection (110) et un deuxième ventilateur de convection (120),
l'unité de transmission de puissance inclut : un premier organe de rotation (162) couplé au moteur de convection (160) ; un deuxième organe de rotation (112) couplé au premier ventilateur de convection (110) pour recevoir une puissance du moteur de convection (160) ; un troisième organe de rotation (128) couplé au deuxième ventilateur de convection (122) pour recevoir une puissance du moteur de convection (160),
une première partie de transmission de puissance transmettant une puissance du moteur de convection (160) au premier ventilateur de convection (110) et entourée par le premier organe de rotation (162) et le deuxième organe de rotation (112) ; et
une deuxième partie de transmission de puissance transmettant une puissance du moteur de convection (160) au deuxième ventilateur de convection (120) et entourée par le deuxième organe de rotation et le troisième organe de rotation (128),
dans lequel le sens de rotation d'au moins l'un des au moins deux ventilateurs de convection (110, 120) est opposé au sens de rotation du moteur de convection (160).

2. Appareil de convection selon la revendication 1, dans lequel les arbres (111, 121) des au moins deux ventilateurs de convection (110, 120) sont espacés d'une distance prédéterminée.

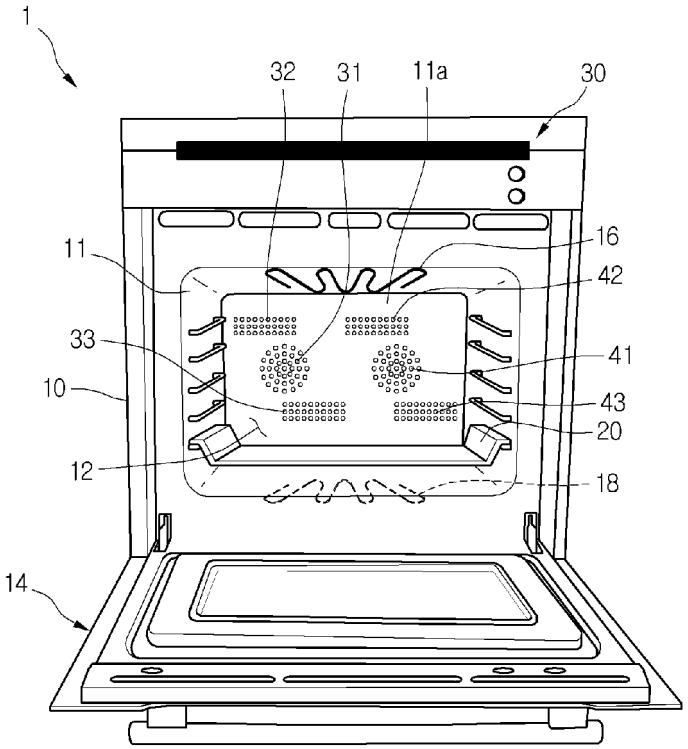
3. Appareil de convection selon la revendication 1, dans lequel les au moins deux ventilateurs de convection (110, 120) ont des vitesses de rotation différentes.

4. Appareil de convection selon la revendication 1, dans lequel le diamètre du deuxième organe de rotation (112) est égal à celui du troisième organe de rotation (122).

5. Appareil de convection selon la revendication 1, dans lequel le diamètre du deuxième organe de rotation (112) est différent de celui du troisième organe de rotation (122).

6. Appareil de convection selon la revendication 1, dans lequel l'une des parties de transmission de puissance est entourée par la paire d'organes de rotation en utilisant un procédé de courroie ouverte, et l'autre des parties de transmission est entourée par la paire d'organes de rotation en utilisant un procédé de courroie transversale.

[Fig. 1]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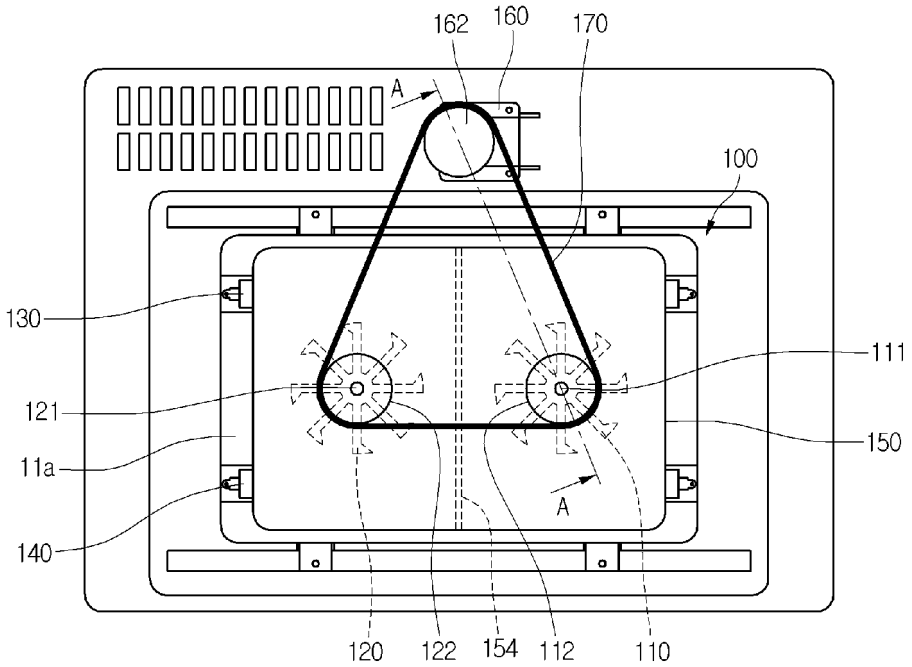
31
11a
30
11
16
42
33
41
10
43
20
12
18
14

[Fig. 2]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111
121
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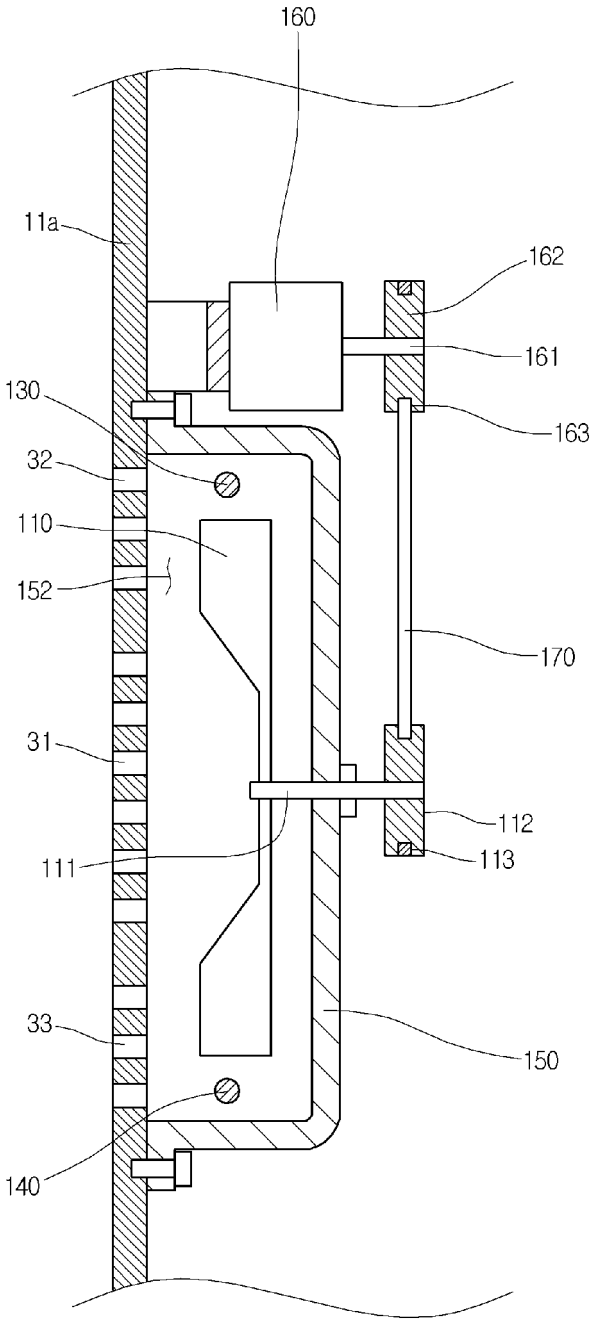
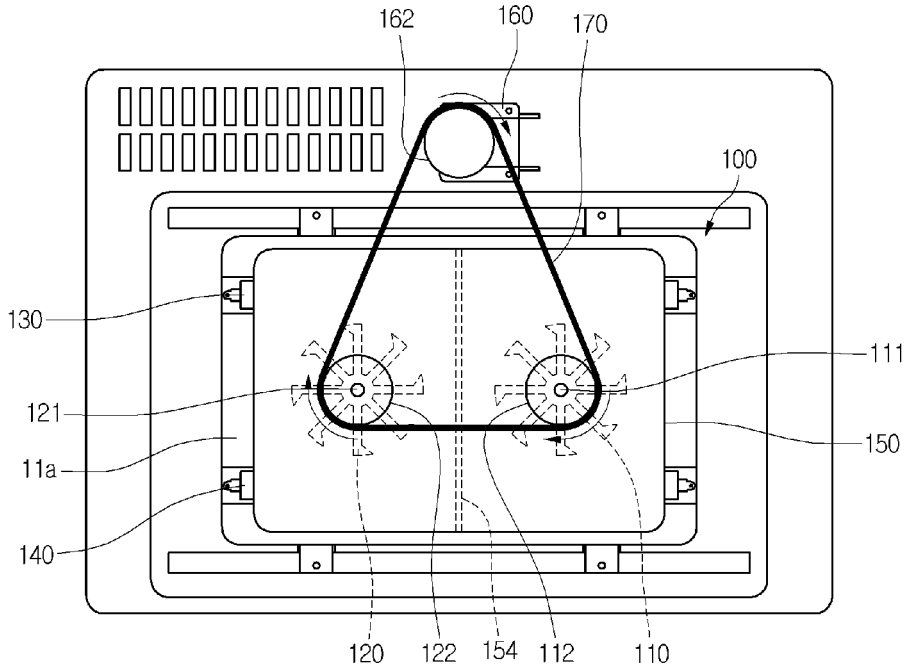
11a
A
140
120
122
154
112
110

[Fig. 3]



[Fig. 4]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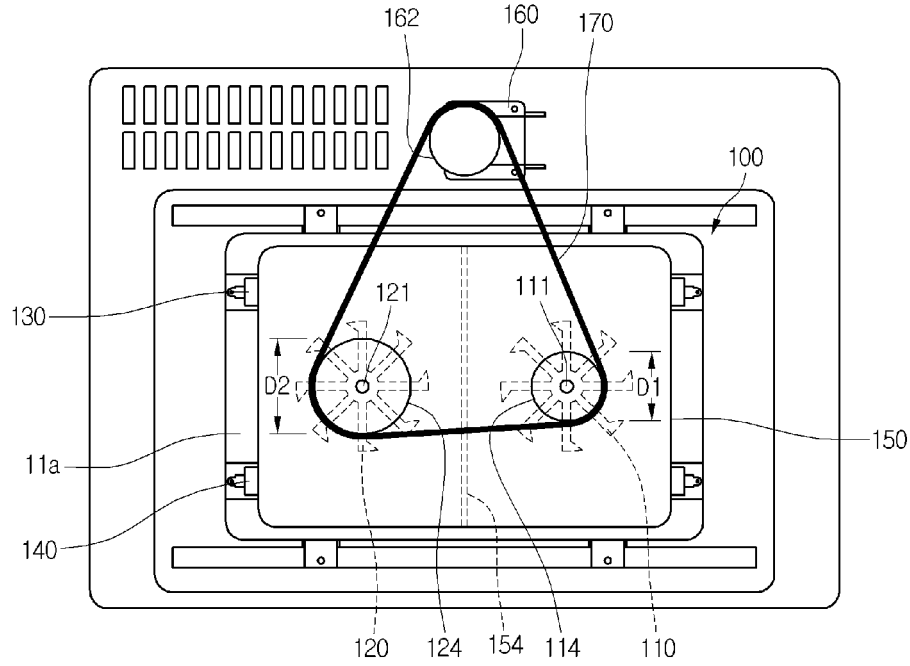
130
111
121
150
11a
140
120
122
154
112
110

[Fig. 5]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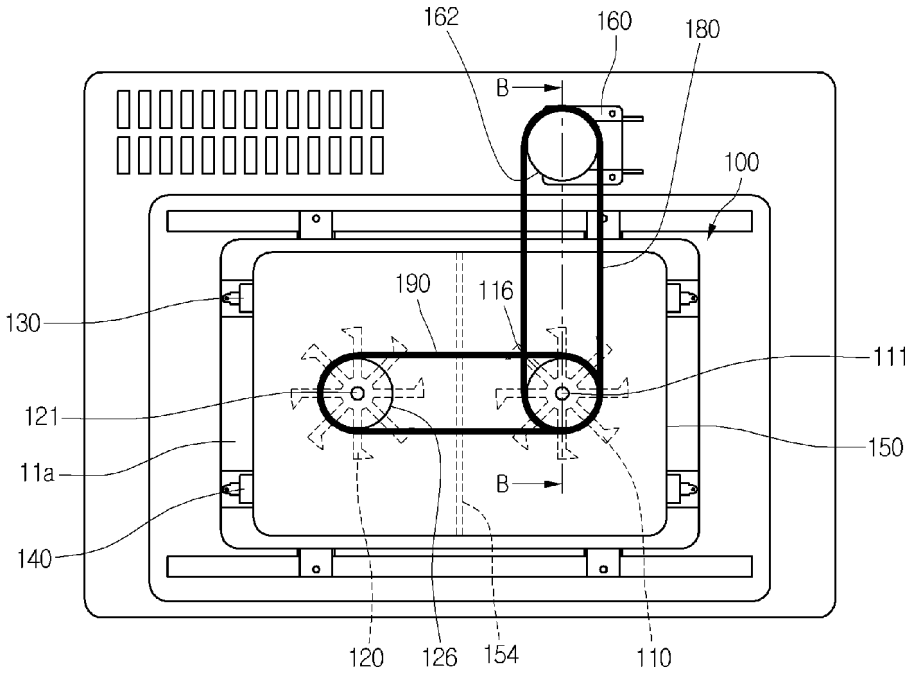
121
111
130
D2
D1
150
11a
140
120
124
154
114
110

[Fig. 6]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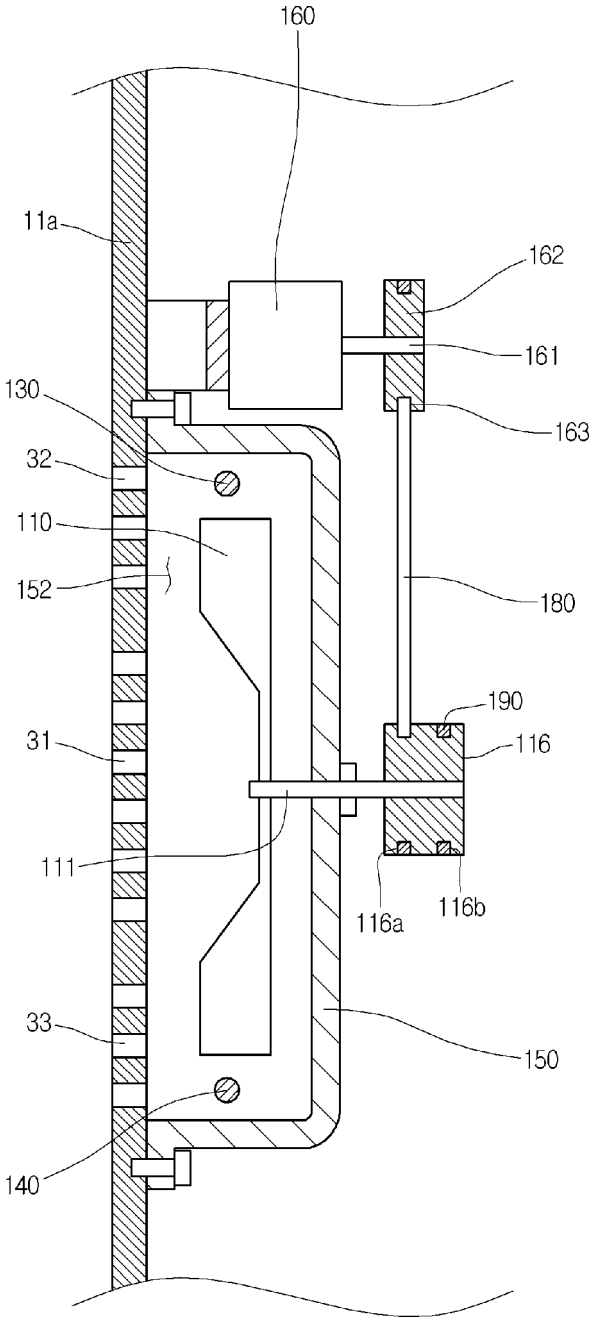
160
180
B
100
190
116
130
111
121
150
11a
B
140
120
126
154
110

[Fig. 7]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11a
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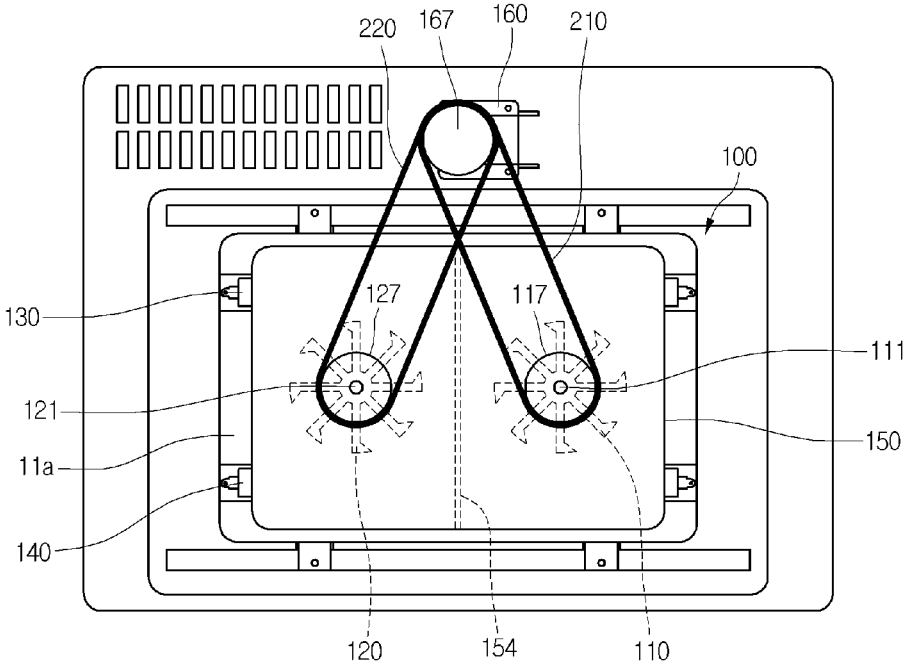
163
32
110
152
180
190
31
116
111
116a
116b
33
150
140

[Fig. 8]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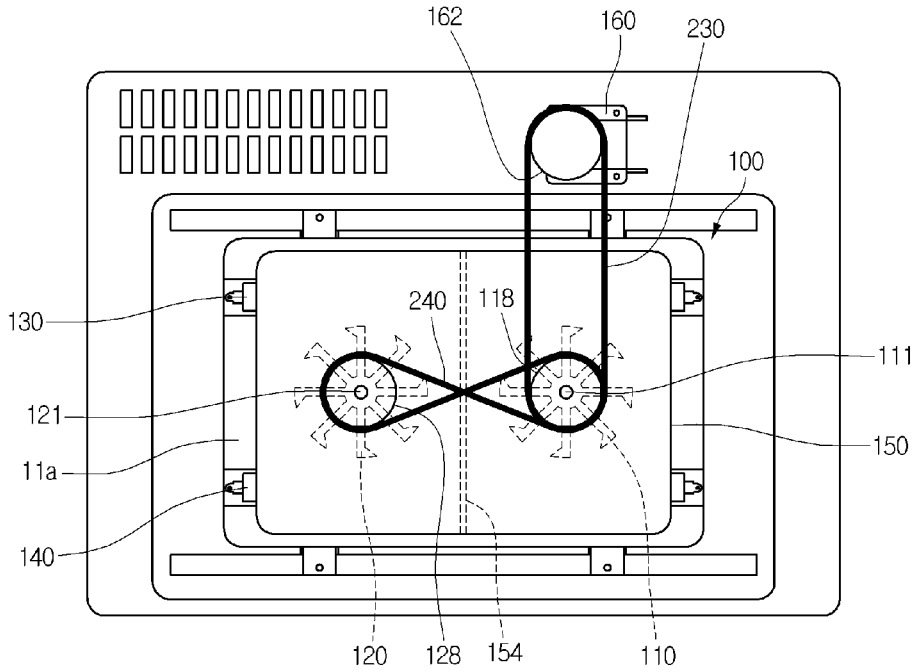
127
117
111
121
150
11a
140
120
154
110

[Fig. 9]


162
160
230
100
130
240
118
111
121
150
11a
140
120
128
154
110

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- GB 855029 A **[0002]**
- EP 0794390 A2 **[0003]**
- EP 1748255 A2 **[0004]**
- JP S57155039 A **[0005]**
- JP H11325478 A **[0006]**