(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 674 798 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
28.06.2006 Bulletin 2006/26

(51) Int Cl.:
F24C 15/00 *(2006.01)*

(21) Application number: **05253733.9**

(22) Date of filing: **16.06.2005**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR LV MK YU

(30) Priority: **27.12.2004 KR 2004113104**
27.12.2004 KR 2004113105

(71) Applicant: **SAMSUNG ELECTRONICS CO., LTD.**
Suwon-si,
Gyeonggi-do (KR)

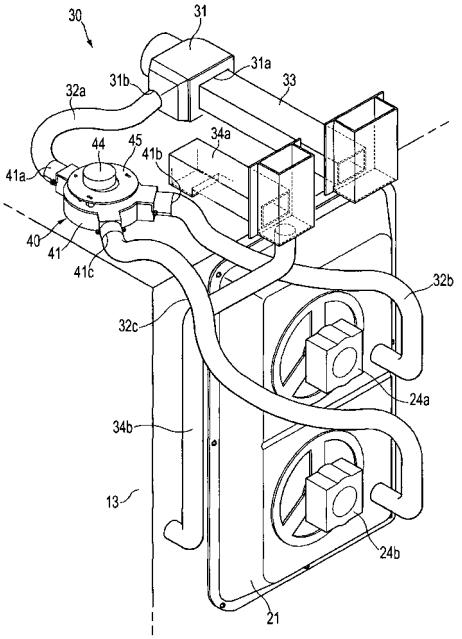
(72) Inventors:
- **Kim, Kyoung Ho**
  Yeongtong-Gu,
  Suwon-Si
  Gyeonggi-Do (KR)
- **Kim, Cheol Jin**
  Suwon-Si,
  Gyeonggi-Do (KR)
- **Ha, Yu Jeub**
  Gwonseon-Gu,
  Suwon-Si,
  Gyeonggi-Do (KR)
- **Lee, Kil Young**
  Paldal-Gu,
  Suwon-Si,
  Gyeonggi-Do (KR)
- **Yum, Suk Yoon**
  Yeongdeungpo-Gu,
  Seoul (KR)
- **Park, Sung Soo**
  Hwaseong-Si,
  Gyeonggi-Do (KR)
- **Kang, Sung Wook**
  Seocho-Ghu,
  Seoul (KR)

(74) Representative: **Sherrard-Smith, Hugh et al**
Appleyard Lees,
15 Clare Road
Halifax, HX1 2HY (GB)

(54) Heating apparatus and method for cooking

(57) A heating apparatus for cooking, which ventilates the insides of cooking chambers (11A,11B, 111,112) after the cooking of food in the cooking chambers is completed, to rapidly cool the insides of the cooking chambers, and selectively ventilates (30,300) one out of the cooking chambers. The heating apparatus for cooking includes a main body (10,110) including a plurality of cooking chambers, which are separable from each other by a partition plate; a plurality of heaters (23A, 23B,231,232) for respectively heating the cooking chambers; and a ventilating device (30,300) for ventilating the cooking chambers by introducing external air, wherein the ventilating device includes an air blowing unit (31,400) for blowing the external air to the insides of the cooking chambers, and a flow change unit (40,500) for selectively supplying air blown by the air blowing unit to one of the cooking chambers. In addition, methods to achieve the above are disclosed.

Fig 3



EP 1 674 798 A1

Description

[0001] Apparatuses and methods consistent with the present invention relate to a heating apparatus and method for cooking.

[0002] As disclosed in Japanese Patent Laid-open Publication Nos. Heisei 8-247473 and 2002-71139, a conventional heating apparatus for cooking comprises a cooking chamber provided with a door, which is opened and closed, installed at the front surface thereof, a heater chamber installed in the rear portion of the inside of the cooking chamber for heating the cooking chamber, a centrifugal circulation fan installed in the heater chamber for circulating air in the cooking chamber, and a heater for heating the air blown by the circulation fan.

[0003] When the circulation fan in the heater chamber is operated by driving a motor, the air in the cooking chamber is circulated to the inside of the heater chamber so that the air is heated by the heater and is then re-supplied to the inside of the cooking chamber. Accordingly, food placed in the cooking chamber is heated and cooked by hot air.

[0004] Since the inside of the cooking chamber of the above heating apparatus for cooking is maintained at a high temperature by residual hot air remaining for a designated time even after the cooking of the food is completed, when a user carelessly takes the food from the cooking chamber, the user may be burned by the hot air in the cooking chamber.

[0005] In one aspect of the invention there is provided a heating apparatus for cooking, which ventilates the insides of cooking chambers after the cooking of food in the cooking chambers is completed, thereby rapidly cooling the insides of the cooking chambers.

[0006] Another aspect of the invention provides a heating apparatus for cooking, which selectively ventilates one out of a plurality of cooking chambers, thereby cooling the selected cooking chamber.

[0007] In accordance with a further aspect, the present invention provides a heating apparatus for cooking comprising: a main body including a plurality of cooking chambers, which are separable from each other; a plurality of heaters for respectively heating the plurality of cooking chambers; and a ventilating device for ventilating at least one of the plurality of cooking chambers by introducing external air, wherein the ventilating device includes an air blowing unit for blowing the external air to the insides of the at least one of the plurality of cooking chambers, and a flow change unit for selectively supplying air blown by the air blowing unit to the at least one of the plurality of cooking chambers.

[0008] Preferably, the plurality of cooking chambers include a first cooking chamber and a second cooking chamber, and the heaters include a first heater for heating the first cooking chamber and a second heater for heating the second cooking chamber.

[0009] Preferably, the flow change unit includes: a housing having an inlet connected to an outlet of the air blowing unit, and first and second outlets respectively connected to the first and second cooking chambers; an adjusting member rotatably installed in the housing for selectively opening one of the first and second outlets; and a flow control motor for rotating the adjusting member.

[0010] Preferably, the housing and the adjusting member have a cylindrical structure; and the adjusting member includes an inlet having a width larger than the rotating range of the adjusting member, and a third outlet having a width corresponding to the width of the first or second outlet of the housing.

[0011] Preferably, the flow change unit further includes a sensing unit for sensing the position of the third outlet of the adjusting member.

[0012] Preferably, the sensing unit includes: a plurality of sensing switches for respectively sensing whether or not the third outlet of the adjusting member coincides with the first outlet of the housing, coincides with the second outlet of the housing, or is located between the first and second outlets of the housing; and a sensing cam connected to a shaft of the flow control motor so that the sensing cam can selectively contact one of the plurality of sensing switches.

[0013] Preferably, the ventilating device includes: a first air supply guide member connecting the air blowing unit and the inlet of the housing; a second air supply guide member connecting the first outlet of the housing and the first cooking chamber; a third air supply guide member connecting the second outlet of the housing and the second cooking chamber; and first and second air exhaust guide members for respectively exhausting air from the first and second cooking chambers.

[0014] Preferably, the first and second cooking chambers are separated from each other by installing a detachable partition, or communicate with each other by eliminating the partition.

[0015] In accordance with another aspect, the present invention provides a heating apparatus for cooking comprising: a main body including a cooking chamber; a heater for heating the inside of the cooking chamber; a ventilating device for ventilating the cooking chamber; and a control unit for controlling the ventilating device so that the ventilating device is operated when cooking of food is completed.

[0016] Preferably, the ventilating device includes: an air blowing unit for blowing external air to the inside of the cooking chamber; an air supply guide member for guiding the air blown by the air blowing unit; and an air exhaust guide member for guiding the exhaust of the air from the cooking chamber to the outside.

[0017] In accordance with yet another aspect, the present invention provides a heating apparatus for cooking comprising: a main body including a plurality of cooking chambers, which are separable from each other; a plurality of heaters for respectively heating the plurality of cooking chambers; and a ventilating device for ventilating at least one of the plurality of cooking chambers

by introducing external air, wherein the ventilating device includes an air blowing unit for blowing the external air to the insides of the at least one of the plurality of cooking chambers, and a flow change unit formed integrally with the air blowing unit for selectively supplying air blown by the air blowing unit to the at least one of the plurality of cooking chambers.

[0018] Preferably, the air blowing unit includes: a housing including an inlet formed through the central portion thereof, and a plurality of outlets formed through separated positions of the circumference thereof; an air blowing fan installed in the housing; and an air blowing motor installed outside the housing for rotating the air blowing fan.

[0019] Preferably, the flow change unit includes: a cylindrical adjusting member rotatably installed in the housing, and including an outlet selectively communicating with one of the plural outlets of the housing; and a flow control motor for rotating the adjusting member.

[0020] Preferably, the heating apparatus for cooking further comprises a connection shaft extended from the rotary center of the adjusting member to the outside of the housing, and provided with a through hole formed through the central portion thereof for passing a shaft of the air blowing motor; and a plurality of gears installed outside the housing for transmitting the rotation of the flow control motor to the connection shaft.

[0021] Other aspects of the invention include methods for achieving the above.

[0022] The present invention is defined in the claims appended hereto.

[0023] These and/or other aspects and advantages of the invention will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings in which:

Figure 1 is a perspective view of a heating apparatus for cooking in accordance with a first embodiment of the present invention;

Figure 2 is a sectional view of the heating apparatus for cooking in accordance with the first embodiment of the present invention;

Figure 3 is a perspective view of a ventilating device of the heating apparatus for cooking in accordance with the first embodiment of the present invention;

Figure 4 is an exploded perspective view of a flow change device of the heating apparatus for cooking in accordance with the first embodiment of the present invention;

Figure 5 is a sectional view of the flow change device of the heating apparatus for cooking in accordance with the first embodiment of the present invention in a state in which a first outlet of the flow change device communicates with a first cooking chamber;

Figure 6 is a sectional view of the flow change device of the heating apparatus for cooking in accordance with the first embodiment of the present invention in a state in which a second outlet of the flow change device communicates with a second cooking chamber;

Figure 7 is a sectional view of the flow change device of the heating apparatus for cooking in accordance with the first embodiment of the present invention in a state in which the first and second outlets of the flow change device are closed;

Figure 8 is a sectional view of a heating apparatus for cooking in accordance with a second embodiment of the present invention;

Figure 9 is a perspective view of a ventilating device of the heating apparatus for cooking in accordance with the second embodiment of the present invention;

Figure 10 is an exploded perspective view illustrating an air blowing device and a flow change device of the heating apparatus for cooking in accordance with the second embodiment of the present invention;

Figure 11 is a sectional view illustrating the air blowing device and the flow change device of the heating apparatus for cooking in accordance with the second embodiment of the present invention;

Figure 12 is a sectional view taken along the line A-A' of Figure 11 illustrating a state in which an outlet of an adjusting member is communicated with a first cooking chamber; and

Figure 13 is a sectional view taken along the line A-A' of Figure 11 illustrating a state in which the outlet of the adjusting member is communicated with a second cooking chamber.

[0024] Reference will now be made in detail to the embodiments of the present invention, an example of which is illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout. The embodiments are described below to explain the present invention by referring to the annexed drawings.

[0025] Figures 1 to 7 illustrate a heating apparatus for cooking in accordance with a first embodiment of the present invention. As shown in Figures 1 and 2, the heating apparatus for cooking of this embodiment comprises a main body 10 provided with a cooking chamber 11 installed therein. The main body 10 includes an external case 12 made of an iron plate, and an internal case 13 installed in the external case 12 for defining the cooking

chamber 11 under the condition that the internal case 13 is separated from the external case 12. The front surface of the cooking chamber 11 is opened so that food to be cooked is inserted into or taken out of the cooking chamber 11.

[0026] A door 14 vertically rotated for opening and closing the cooking chamber 11 is installed at the front surface of the main body 10, and an operating panel 15 including a display unit 15a for displaying the operating state of the heating apparatus, operating buttons 15b, and operating switches 15c is installed on the front surface of the main body 10 above the door 14.

[0027] The cooking chamber 11 is divided into a first cooking chamber 11a located at the upper portion thereof and a second cooking chamber 11b located at the lower portion thereof by a detachable partition 16. That is, the cooking chamber 11 is divided into the first cooking chamber 11a and the second cooking chamber 11b by installing the partition 16 therein, and the first cooking chamber 11a and the second cooking chamber 11b are combined into the cooking chamber 11 by eliminating the partition 16. Food racks 17a and 17b for placing food thereon are respectively installed in the first and second cooking chambers 11a and 11b, and a plurality of support rails 18a, 18b, and 18c for detachably supporting the partition 16 and the food racks 17a and 17b are formed on both side surfaces of the cooking chamber 11. After the partition 16 is separated from the cooking chamber 11, another food rack having the same shape as those of the food racks 17a and 17b of the first and second cooking chambers 11a and 11b may be installed at the position of the partition 16.

[0028] As shown in Figure 2, a heater case portion 21 for forming a heater chamber 20 is recessed in the rear surface of the internal case 13 by a designated depth. A first circulation fan 22a for circulating air in the first cooking chamber 11a is installed in the upper portion of the inside of the heater chamber 20, and a first heater 23a is installed at the outside of the first circulation fan 22a. A second circulation fan 22b for circulating air in the second cooking chamber 11b is installed in the lower portion of the inside of the heater chamber 20, and a second heater 23b is installed at the outside of the second circulation fan 22b. The upper and lower portions of the heater chamber 20 are divided by a partition member 28, and first and second motors 24a and 24b for respectively driving the first and second circulation fans 22a and 22b are installed on the rear surface of the heater case portion 21. A cover 25 for covering the heater chamber 20 is installed at the front surface of the heater chamber 20, and inlets 26a and 26b and outlets 27a and 27b communicating with the first and second cooking chambers 11a and 11b are formed through the cover 25 so that air can be circulated through the inlets 26a and 26b and the outlets 27a and 27b.

[0029] The above configuration causes the air in the first and second cooking chambers 11a and 11b to be respectively heated by the first and second heaters 23a and 23b when the air in the first and second cooking chambers 11a and 116 is circulated by the operation of the first and second circulation fans 22a and 22b. The first circulation fan 22a and the first heater 23a, or the second circulation fan 22b and the second heater 23b are selectively operated as occasion demands, thereby allowing one or all of the first and second cooking chambers 11a and 11b to be operated to cook food therein.

[0030] As shown in Figures 2 and 3, the heating apparatus for cooking of this embodiment further comprises a ventilating device 30 for selectively ventilating one of the first and second cooking chambers 11a and 11b. The ventilating device 30 includes an air blowing unit 31 installed between the internal case 13 and the external case 12 above the first cooking chamber 11a for blowing external air to the insides of the first and second cooking chambers 11a and 11b, a flow change unit 40 installed on the first cooking chamber 11a for selectively distributing the air blown by the air blown unit 31 to the first and second cooking chambers 11a and 11b, air supply guide members 32a, 32b, 32c and 33 for guiding the air to the first and second cooking chambers 11a and 11b, and air exhaust guide members 34a and 34b for guiding the air from the first and second cooking chambers 11a and 11b to the outside.

[0031] As shown in Figures 4 and 5, the flow change unit 40 includes an inlet 41a connected to an outlet 31b of the air blowing unit 31, and first and second outlets 41b and 41c respectively connected to the first and second cooking chambers 11a and 11b. As shown in Figure 3, the air supply guide members 32a, 32b, 32c and 33 include a first air supply guide member 32a having a pipe structure and connecting the outlet 31b of the air blowing unit 31 and the inlet 41a of the flow change unit 40, a second air supply guide member 32b connecting the first outlet 41b of the flow change unit 40 and the rear part of the first cooking chamber 11a, a third air supply guide member 32c connecting the second outlet 41c of the flow change unit 40 and the rear part of the second cooking chamber 11b, and a suction duct 33 for guiding the external air to an inlet 31a of the air blowing unit 31. The air exhaust guide members 34a and 34b include a first air exhaust guide member 34a for exhausting air from the first cooking chamber 11a, and a second air exhaust guide member 34b for exhausting air from the second cooking chamber 11b.

[0032] The air blown by the operation of the air blowing unit 31 is selectively supplied to one of the first and second cooking chambers 11a and 11b by the operation of the flow change unit 40, thereby rapidly cooling the corresponding one of the first and second cooking chambers 11a and 11b. Further, the air in the first and second cooking chamber 11a and 11b is exhausted to the outside through the air exhaust guide members 34a and 33b in proportion to the amount of the air supplied to the first and second cooking chamber 11a and 11b.

[0033] As shown in Figures 4 and 5, the flow change unit 40 includes a cylindrical housing 41, the upper sur-

face of which is opened, a cover 42 for covering the opened upper surface of the housing 41, a cylindrical adjusting member 43 rotatably installed in the housing 41 for adjusting the air blowing direction, a flow control motor 44 for rotating the adjusting member 43 in regular and reverse directions, and a sensing unit 50 for sensing the rotation of the adjusting member 43.

[0034] The housing 41 includes an inlet 41a formed at one side thereof and connected to the air blowing unit 31, and first and second outlets 41b and 41c formed at the other side thereof. The first and second outlet 41b and 41c are separated from each other by a designated interval. Here, the first air supply guide member 32a extended from the air blowing unit 31 is connected to the inlet 41a of the housing 41, the second air supply guide member 32b connected to the first cooking chamber 11a is connected to the first outlet 41b of the housing 41, and the third air supply guide member 32c connected to the second cooking chamber 11b is connected to the second outlet 41c of the housing 41.

[0035] The adjusting member 43 in the housing 41 includes an inlet 43a, having a width larger than the rotating range of the adjusting member 43, formed through the cylindrical side surface thereof so that the inside of the adjusting member 43 is communicated with the inlet 41a of the housing 41, and an outlet 43b, having a size corresponding to the width of the outlets 41b and 41c of the housing 41, formed through the cylindrical side surface thereof at a position corresponding to the positions of the first and second outlets 41b and 41c of the housing 41. The adjusting member 43 further includes a rotary shaft 43c extended inwardly and outwardly from the central portion of the closed upper surface thereof so that the adjusting member 43 is rotatably connected to the housing 41. The rotary shaft 43c of the adjusting member 43 is extended outwardly so that the rotary shaft 43c passes through the central portion of the cover 42, and is connected to a shaft 44a of the flow control motor 44.

[0036] The sensing unit 50 senses the rotation of the adjusting member 43, thus sensing the position of the outlet 43b of the adjusting member 43. The sensing unit 50 includes first, second, and third sensing switches 51, 52, and 53 installed on the outer surface of the cover 42 along the rotating direction of the adjusting member 43, and a sensing cam 54 installed on the shaft 44a of the flow control motor 44 so that the sensing cam 54 can selectively contact the sensing switches 51, 52, and 53. Reference numeral 45 represents a motor support plate for supporting the flow control motor 44.

[0037] The adjusting member 43 in the housing 41 of the flow change unit 40 is rotated in a regular or reverse direction by the operation of the flow control motor 44 so that the outlet 43b of the adjusting member 43 is located at a position coinciding with one of the first and second outlet 41b and 41c of the housing 41, thereby causing air introduced into the housing 41 to be exhausted to one of the first and second outlets 41b and 41c of the housing 41, or cutting off the circulation of the air.

[0038] That is, when the adjusting member 43 is rotated in the direction of the arrow A as shown in Figure 5 so that the outlet 43b of the adjusting member 43 coincides with the first outlet 41b of the housing 41, the air introduced into the inlet 41a of the housing 41 is exhausted to the first outlet 41b, and when the adjusting member 43 is rotated in the direction of the arrow B as shown in Figure 6 so that the outlet 43b of the adjusting member 43 coincides with the second outlet 41c of the housing 41, the air introduced into the inlet 41a of the housing 41 is exhausted to the second outlet 41c. Further, when the outlet 43b of the adjusting member 43 is located between the first and second outlets 41b and 41c of the housing 41 as shown in Figure 7, both the first and second outlets 41b and 41c are closed. Since the width of the inlet 43a of the adjusting member 43 is larger than the rotating range of the adjusting member 43, the inlet 43a of the adjusting member 43 communicates with the inlet 41a of the housing 41 at all times.

[0039] Since the first to third sensing switches 51, 52, and 53 sense the position of the outlet 43b of the adjusting member 43 of the flow change unit 40, the operation of the flow control motor 44 is controlled so that the flow of the air is converted based on the sensed position of the outlet 43b. That is, when the sensing cam 54 rotated together with the rotation of the adjusting member 43 contacts the first sensing switch 51 as shown in Figure 5, the outlet 43b of the adjusting member 43 is communicated with the first outlet 41b of the housing 41, when the sensing cam 54 contacts the third sensing switch 53 as shown in Figure 6, the outlet 43b of the adjusting member 43 is communicated with the second outlet 41c of the housing 41, and when the sensing cam 54 contacts the second sensing switch 52 as shown in Figure 7, the outlet 43b of the adjusting member 43 is located between the first and second outlets 41b and 41c of the housing 41.

[0040] Hereinafter, the usage and operation of the heating apparatus for cooking in accordance with the first embodiment will be described in detail.

[0041] When the quantity of food to be cooked is small, a user selects one of the two cooking chambers 11a and 11b so that the food is cooked only in the selected cooking chamber 11a or 11b. For example, when the user selects the first cooking chamber 11a, the first heater 23a and the first circulation fan 22a in the rear of the first cooking chamber 11a are operated. Here, the second heater 23b and the second circulation fan 22b in the rear of the non-selected second cooking chamber 11b are not operated. Accordingly, the user cooks the small quantity of food under the condition that consumption of energy for cooking the food is reduced.

[0042] When the user selects the second cooking chamber 11b so that food is cooked in the second cooking chamber 11b, the second heater 23b and the second circulation fan 22b are operated, and the first heater 23a and the first circulation fan 22a are not operated. Further, when the partition 16 is removed from the cooking chamber 11 so that the two cooking chambers 11a and 11b

are used, the first and second heaters 23a and 23b and the first and second circulation fans 22a and 22b are operated, thereby allowing a large quantity of food to be cooked.

[0043] During the cooking of the food, the air blowing unit 31 is not operated, and the closed states of the first and second outlets 41b and 41c of the flow change unit 40 are maintained as shown in Figure 7. This prevents the cooking chamber 11 from being ventilated during the cooking of the food, thereby reducing heat loss.

[0044] After the cooking of the food is completed, the operations of the heaters 23a and 23b and the circulation fans 23a and 23b are terminated and the first cooking chamber 11a or the second cooking chamber 11b is ventilated by the operation of the air blowing unit 31, thereby cooling the first or second cooking chamber 11a or 11b. Accordingly, the user can take the cooked food from the first or second cooking chamber 11a or 11b without the danger of a burn. The above operations are achieved under the control of a predetermined program.

[0045] That is, when food is cooked in the first cooking chamber 11a, a control unit (not shown) of the heating apparatus for cooking terminates the operations of the first heater 23a and the first circulation fan 22a after a cooking time determined by the user has elapsed, and operates the air blowing unit 31. Further, the control unit controls the operation of the flow change unit 40 so that the blown air is introduced into the first cooking chamber 11a. Here, in the flow change unit 40, the outlet 43b of the adjusting member 43 is communicated with the first outlet 41b of the housing 41 by the operation of the flow control motor 44, thereby causing the blown air to be introduced into the first cooking chamber 11a. Since hot air in the first cooking chamber 11a in an amount corresponding to the amount of the newly introduced external air is exhausted to the outside through the first air exhaust guide member 34a, the first cooking chamber 11a is rapidly cooled.

[0046] When food is cooked in the second cooking chamber 11b, in the same manner, the control unit terminates the operations of the second heater 23b and the second circulation fan 22b after the cooking time determined by the user has elapsed, and operates the air blowing unit 31. The blown air is introduced into the second cooking chamber 11b by the operation of the flow change unit 40. Here, the control unit controls the operation of the flow control motor 44 so that the outlet 43b of the adjusting member 43 is communicated with the second outlet 41c of the housing 41, thereby causing the blown air to be introduced into the second cooking chamber 11b.

[0047] When foods in the first and second cooking chambers 11a and 11b are simultaneously cooked, even if air is introduced into one of the first and second cooking chambers 11a and 11b, the first or second cooking chamber 11a or 11b can be ventilated. Accordingly, the flow change unit 40 is controlled such that any one of the outlets 41b and 41c of the housing 41 is communicated with one of the two cooking chambers 11a and 11b. In an exemplary embodiment, the flow control motor 44 is alternately rotated in regular and reverse directions by the control of the control unit so that air is alternately blown to the two cooking chambers 11a and 11b.

[0048] Figures 8 to 14 illustrate a heating apparatus for cooking in accordance with a second embodiment of the present invention. As shown in Figure 8, the heating apparatus for cooking of the second embodiment comprises a main body 100 provided with a cooking chamber 111 installed therein. The main body 100 includes an external case 120 made of an iron plate, and an internal case 130 installed in the external case 120 for defining the cooking chamber 110 under the condition that the internal case 130 is separated from the external case 120. The front surface of the cooking chamber 110 is opened so that food to be cooked is inserted into or taken out of the cooking chamber 110.

[0049] A door 140 vertically rotated for opening and closing the cooking chamber 110 is installed at the front surface of the main body 100, and an operating panel 150 is installed on the front surface of the main body 100 above the door 140.

[0050] The cooking chamber 110 is divided into a first cooking chamber 111 located at the upper portion thereof and a second cooking chamber 112 located at the lower portion thereof by a detachable partition 160. That is, the cooking chamber 110 is divided into the first cooking chamber 111 and the second cooking chamber 112 by installing the partition 160 therein, and the first cooking chamber 111 and the second cooking chamber 112 are combined into the cooking chamber 110 by eliminating the partition 160. Food racks 171 and 172 for placing food thereon are respectively installed in the first and second cooking chambers 111 and 112, and a plurality of support rails 181, 182, and 183 for detachably supporting the partition 160 and the food racks 171 and 172 are formed on both side surfaces of the cooking chamber 110. After the partition 160 is separated from the cooking chamber 110, another food rack having the same shape as those of the food racks 171 and 172 of the first and second cooking chambers 111 and 112 may be installed at the position of the partition 160.

[0051] As shown in Figure 8, a heater case portion 210 for forming a heater chamber 200 is recessed in the rear surface of the internal case 130 by a designated depth. A first circulation fan 221 for circulating air in the first cooking chamber 111 is installed in the upper portion of the inside of the heater chamber 200, and a first heater 231 is installed at the outside of the first circulation fan 221. A second circulation fan 222 for circulating air in the second cooking chamber 112 is installed in the lower portion of the inside of the heater chamber 200, and a second heater 232 is installed at the outside of the second circulation fan 222. The upper and lower portions of the heater chamber 200 are divided by a partition member 280, and first and second motors 241 and 242 for respectively driving the first and second circulation fans 221 and

222 are installed on the rear surface of the heater case portion 210. A cover 250 for covering the heater chamber 200 is installed at the front surface of the heater chamber 200, and inlets 261 and 262 and outlets 271 and 272 communicated with the first and second cooking chambers 111 and 112 are formed through the cover 250 so that air can be circulated through the inlets 261 and 262 and the outlets 271 and 272.

[0052] The above configuration causes the air in the first and second cooking chambers 111 and 112 to be respectively heated by the first and second heaters 231 and 232 when the air in the first and second cooking chambers 111 and 112 is circulated by the operation of the first and second circulation fans 221 and 222. The first circulation fan 221 and the first heater 231, or the second circulation fan 222 and the second heater 232 are selectively operated as occasion demands, thereby allowing one or all of the first and second cooking chambers 111 and 112 to be operated to cook food therein.

[0053] As shown in Figures 8 and 9, the heating apparatus for cooking of the second embodiment further comprises a ventilating device 300 for selectively ventilating one of the first and second cooking chambers 111 and 112. The ventilating device 300 includes an air blowing unit 400 installed between the internal case 130 and the external case 120 above the first cooking chamber 111 for blowing external air to the insides of the first and second cooking chambers 111 and 112, a flow change unit formed integrally with the air blowing unit 400 for selectively distributing the air blown by the air blown unit 400 to the first and second cooking chambers 111 and 112, air supply guide members 321, 322, and 323 for guiding the air to the first and second cooking chambers 111 and 112, and air exhaust guide members 331 and 332 for guiding the air from the first and second cooking chambers 111 and 112 to the outside.

[0054] As shown in Figures 10 and 11, the air blowing unit 400 includes a housing 410, the upper surface of which is opened, having an inlet 411 formed through the central portion thereof and first and second outlets 412 and 413 formed through separated positions of the circumference thereof, a cover 420 for covering the opened upper surface of the housing 410, a centrifugal air blowing fan 430 rotatably installed in the housing 410, and an air blowing motor 440 installed outside the housing 410 for rotating the air blowing fan 430. The air blowing fan 430 is rotated by the operation of the air blowing motor 440, thereby causing the air inhaled through the inlet 411 to be blown to the two outlets 412 and 413.

[0055] As shown in Figure 9, the air supply guide members 321, 322, and 323 include a first air supply guide member 321 connected to the inlet 411 of the housing 410 of the air blowing unit 400 for introducing external air, a second air supply guide member 322 connecting the first outlet 412 of the housing 410 and the rear part of the first cooking chamber 111, and a third air supply guide member 323 connecting the second outlet 413 of the housing 410 and the rear part of the second cooking chamber 112. The air exhaust guide members 331 and 332 include a first air exhaust guide member 331 for exhausting air from the first cooking chamber 111, and a second air exhaust guide member 332 for exhausting air from the second cooking chamber 112.

[0056] The air blown by the operation of the air blowing unit 430 is selectively supplied to one of the first and second cooking chambers 111 and 112, thereby rapidly cooling the corresponding one of the first and second cooking chambers 111 and 112. Further, the air in the first and second cooking chambers 111 and 112 is exhausted to the outside through the air exhaust guide members 331 and 332 in proportion to the amount of the air supplied to the first and second cooking chambers 111 and 112.

[0057] As shown in Figures 10 and 11, the flow change unit formed integrally with the air blowing unit 400 includes a cylindrical adjusting member 500 rotatably installed outside the air blowing fan 430 in a housing 410, a flow control motor 510 for rotating the adjusting member 500 in regular and reverse directions, and a driving gear 520 and a driven gear 530 for transmitting the rotation of the flow control motor 510 to the adjusting member 500.

[0058] The adjusting member 500 has a cylindrical structure having the inner diameter larger than the outer diameter of the air blowing fan 430 so that the air blowing fan 430 is contained in the adjusting member 500, and the outer surface of the adjusting member 500 is guided by the inner surface of the housing 410 and rotated. The adjusting member 500 includes an outlet 501 formed through the circumference thereof so that the inside of the adjusting member 500 is selectively communicated with one of the first and second outlets 412 and 413 of the housing 410. The adjusting member 500 further includes a connection shaft 502 extended from the rotary center thereof to the outside through the cover 420 of the housing 410 and provided with a through hole 503 formed through the central portion thereof for passing a shaft 441 of the air blowing motor 440. As shown in Figure 5, the shaft 441 extended from the air blowing motor 440 passes through the through hole 503 of the connection shaft 502 of the adjusting member 500, and is connected to the air blowing fan 430.

[0059] The flow control motor 510 is installed at one side of the air blowing motor 440 such that the flow control motor 510 is not interfered with the air blowing motor 440, and a shaft 511 of the flow control motor 510 and the connection shaft 502 of the adjusting member 500 are connected by the driving gear 520 and the driven gear 530 so that the rotation of the flow control motor 510 is transmitted to the adjusting member 500. That is, the driving gear 520 is installed on the shaft 511 of the flow control motor 510, and the driven gear 530 is installed on the connection shaft 502 under the condition that the driven gear 530 is engaged with the driving gear 520. The above structure transmits the rotation of the flow control motor 510 to the adjusting member 500 through the driving gear 520 and the driven gear 530, thus allow-

ing the adjusting member 500 to be rotated. The direction of the air exhausted by the above procedure is adjustable. That is, when the adjusting member 500 is rotated in the direction of the arrow A as shown in Figure 12 so that the outlet 501 of the adjusting member 500 coincides with the first outlet 412 of the housing 410, the air introduced into the inlet 411 of the housing 410 is exhausted to the first outlet 412, and when the adjusting member 500 is rotated in the direction of the arrow B as shown in Figure 13 so that the outlet 501 of the adjusting member 500 coincides with the second outlet 413 of the housing 410, the air introduced into the inlet 411 of the housing 410 is exhausted to the second outlet 413.

[0060] Hereinafter, the usage and operation of the heating apparatus for cooking in accordance with the second embodiment will be described in detail.

[0061] When the quantity of food to be cooked is small, a user selects one of the two cooking chambers 111 and 112 so that the food is cooked only in the selected cooking chamber 11 or 112. For example, when the user selects the first cooking chamber 111, the first heater 231 and the first circulation fan 221 in the rear of the first cooking chamber 111 are operated. Here, the second heater 232 and the second circulation fan 222 in the rear of the non-selected second cooking chamber 112 are not operated. Accordingly, the user cooks the small quantity of food under the condition that consumption of energy for cooking the food is reduced.

[0062] When the user selects the second cooking chamber 112 so that food is cooked in the second cooking chamber 112, the second heater 232 and the second circulation fan 222 are operated, and the first heater 231 and the first circulation fan 221 are not operated. Further, when the partition 160 is removed from the cooking chamber 110 so that the two cooking chambers 111 and 112 are used, the first and second heaters 231 and 232 and the first and second circulation fans 221 and 222 are operated, thereby allowing a large quantity of food to be cooked.

[0063] After the cooking of the food is completed, the operations of the heaters 231 and 232 and the circulation fans 231 and 232 are terminated and the first cooking chamber 111 or the second cooking chamber 112 is ventilated by the operation of the air blowing unit 400, thereby cooling the first or second cooking chamber 111 or 112. Accordingly, the user can take the cooked food from the first or second cooking chamber 111 or 112 without the danger of a burn. The above operations are achieved under the control of a predetermined program.

[0064] That is, when food is cooked in the first cooking chamber 111, a control unit (not shown) of the heating apparatus for cooking terminates the operations of the first heater 231 and the first circulation fan 221 after a cooking time determined by the user has elapsed, and operates the air blowing unit 400. Further, the control unit controls the operation of the flow change unit so that the blown air is introduced into the first cooking chamber 111. Here, in the flow change unit, the outlet 501 of the adjusting member 500 is communicated with the first outlet 412 of the housing 410 by the operation of the flow control motor 510, thereby causing the blown air to be introduced into the first cooking chamber 111. Since hot air in the first cooking chamber 111 in an amount corresponding to the amount of the newly introduced external air is exhausted to the outside through the first air exhaust guide member 331, the first cooking chamber 111 is rapidly cooled.

[0065] When food is cooked in the second cooking chamber 112, in the same manner, the control unit terminates the operations of the second heater 232 and the second circulation fan 222 after the cooking time determined by the user has elapsed, and operates the air blowing unit 400. The blown air is introduced into the second cooking chamber 112 by the operation of the flow change unit. Here, the control unit controls the operation of the flow control motor 510 so that the outlet 501 of the adjusting member 500 is communicated with the second outlet 413 of the housing 410, thereby causing the blown air to be introduced into the second cooking chamber 112.

[0066] When foods in the first and second cooking chambers 111 and 112 are simultaneously cooked, even if air is introduced into one of the first and second cooking chambers 111 and 112, the first or second cooking chamber 111 or 112 can be ventilated. Accordingly, the flow change unit is controlled such that the outlet 510 of the adjusting member 500 is communicated with one of the two cooking chambers 111 and 112. In an exemplary embodiment, the flow control motor 510 is alternately rotated in regular and reverse directions by the control of the control unit so that air is alternately blown to the two cooking chambers 111 and 112.

[0067] As apparent from the above description, the present invention provides a heating apparatus for cooking, which ventilates the insides of cooking chambers after the cooking of food in the cooking chambers is completed, thereby rapidly cooking the insides of the cooking chambers.

[0068] Further, the heating apparatus for cooking adjusts the direction of blown air using a flow change unit to selectively ventilate one out of a plurality of cooking chambers, thereby cooling the selected cooking chamber

[0069] Attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

[0070] All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

[0071] Each feature disclosed in this specification (in-

cluding any accompanying claims, abstract and drawings) may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

[0072] The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

Claims

1. A heating apparatus for cooking comprising:

a main body (10,100) comprising a plurality of cooking chambers (11a,11b,111,112) which are separable (16,160) from each other;
a plurality of heaters (23a,23b,231,232) for respectively heating the plurality of cooking chambers; and
a ventilating device (30,300) for ventilating at least one of the plurality of cooking chambers by introducing external air,

wherein the ventilating device (30,300) comprises an air blowing unit (31,400) for blowing the external air to insides of the at least one of the plurality of cooking chambers, and a flow change unit (40,500) for selectively supplying air blown by the air blowing unit to the at least one of the plurality of cooking chambers.

2. The heating apparatus as set forth in claim 1, wherein the plurality of cooking chambers comprises a first cooking chamber (11a,111) and a second cooking chamber (11b,112), and the plurality of heaters comprises a first heater (23a,231) for heating the first cooking chamber and a second heater (23b,232) for heating the second cooking chamber.

3. The heating apparatus as set forth in claim 1 or 2, wherein the flow change unit (40) comprises:

a housing (41) having an inlet (41a) connected to an outlet (31b) of the air blowing unit (31), and a first outlet (41b) and a second outlet (41c) respectively connected to the first (11a) and the second (11b) cooking chambers;
an adjusting member (43) rotatably installed in the housing for selectively opening one of the first and the second outlets; and
a flow control motor (44) for rotating the adjusting member.

4. The heating apparatus as set forth in claim 3, wherein:

the housing (41) and the adjusting member (43) have a cylindrical structure; and
the adjusting member comprises an inlet (43a) having a width larger than a rotating range of the adjusting member, and a third outlet (43b) having a width corresponding to the width of the first or the second outlet of the housing.

5. The heating apparatus as set forth in claim 4, wherein the flow change unit further comprises a sensing unit (50) for sensing a position of the third outlet of the adjusting member.

6. The heating apparatus as set forth in claim 5, wherein the sensing unit comprises:

a plurality of sensing switches (51,52,53) for respectively sensing whether or not the third outlet (43b) of the adjusting member coincides with the first outlet (41b) of the housing coincides with the second outlet (41c) of the housing, or is located between the first and the second outlets of the housing; and
a sensing cam (54) connected to a shaft (44a) of the flow control motor so that the sensing cam can selectively contact one of the plurality of sensing switches.

7. The heating apparatus as set forth in any of claims 3 to 6, wherein the ventilating device comprises:

a first air supply guide member (32a) connecting the air blowing unit and the inlet of the housing;
a second air supply guide member (32b) connecting the first outlet of the housing and the first cooking chamber;
a third air supply guide member (32c) connecting the second outlet of the housing and the second cooking chamber; and
a first air exhaust guide member (34a) and a second air exhaust guide member (34b) for respectively exhausting air from the first and the second cooking chambers.

8. The cooking chamber as set forth in claim 2 or any claim when dependent on claim 2, wherein the first and second cooking chambers are separated from each other by installing a detachable partition (16,160), or communicate with each other by eliminating the partition.

9. A heating apparatus for cooking comprising:

a main body (10,110) comprising a cooking chamber (11a,11b,111,112);

a heater (23a,23b,231,232) for heating an inside of the cooking chamber;
a ventilating device (30,300) for ventilating the cooking chamber; and
a control unit (40,500) for controlling the ventilating device so that the ventilating device is operated when cooking of food is completed.

10. The heating apparatus as set forth in claim 9, wherein the ventilating device comprises:

an air blowing unit (31,400) for blowing external air to the inside of the cooking chamber;
an air supply guide member (32a,322,323) for guiding air blown by the air blowing unit; and
an air exhaust guide member (34a,34b, 331,332) for guiding air exhausted from the cooking chamber to the outside.

11. A heating apparatus for cooking comprising:

a main body (110) comprising a plurality of cooking chambers (111,112) which are separable from each other;
a plurality of heaters (231,232) for respectively heating the plurality of cooking chambers; and
a ventilating device (300) for ventilating at least one of the plurality of cooking chambers by introducing external air,

wherein the ventilating device (300) comprises an air blowing unit (400) for blowing the external air to insides of the at least one of the plurality of cooking chambers, and a flow change unit (500) formed integrally with the air blowing unit for selectively supplying air blown by the air blowing unit to the at least one of the plurality of cooking chambers.

12. The heating apparatus as set forth in claim 11, wherein the air blowing unit (400) comprises:

a housing (410) comprising an inlet (411) formed through a central portion thereof, and a plurality of outlets (412,413) formed through separated positions of a circumference thereof;
an air blowing fan (430) installed in the housing (410); and
an air blowing motor (440) installed outside the housing (410) for rotating the air blowing fan (430).

13. The heating apparatus as set forth in claim 12, wherein the flow change unit (500) comprises:

a cylindrical adjusting member (500) rotatably installed in the housing, and comprising an outlet (501) selectively communicating with one of the plurality of outlets (412,413) of the housing; and
a flow control motor (510) for rotating the adjusting member.

14. The heating apparatus as set forth in claim 13, further comprising:

a connection shaft (502) extended from a rotary center of the adjusting member (500) to an outside of the housing (410), and provided with a through hole (503) formed through the central portion thereof for passing a shaft (441) of the air blowing motor; and
a plurality of gears (520,530) installed outside the housing for transmitting a rotation of the flow control motor to the connection shaft.

15. The heating apparatus as set forth in any of claims 12 to 14, further comprising:

a plurality of air supply guide members (322,323) for respectively connecting the plurality of outlets (412,413) of the housing and the plurality of cooking chambers; and
a plurality of air exhaust guide members (331,332) for exhausting air from the plurality of cooking chambers.

16. A method for cooking comprising:

receiving external air (33,321);
selectively supplying (40,500) the external air to one of a plurality of air supply guides (32a,32b, 32c,322,323) to generate guided air;
introducing the guided air into one of a plurality of cooking chambers (11a,11b,111,112), the one of the plurality of cooking chamber having heated air; and
cooling the heated air in the one of the plurality of cooking chambers.

17. The method of claim 16, wherein the operation of selectively supplying the external air comprises:

communicating one of the plurality of air supply guides to the received external air if the one of the plurality of cooking chambers is to be cooled; and
alternatingly communicating two of the plurality of air supply guides to the received external air if two of the plurality of cooking chambers are to be cooled.

Fig 1

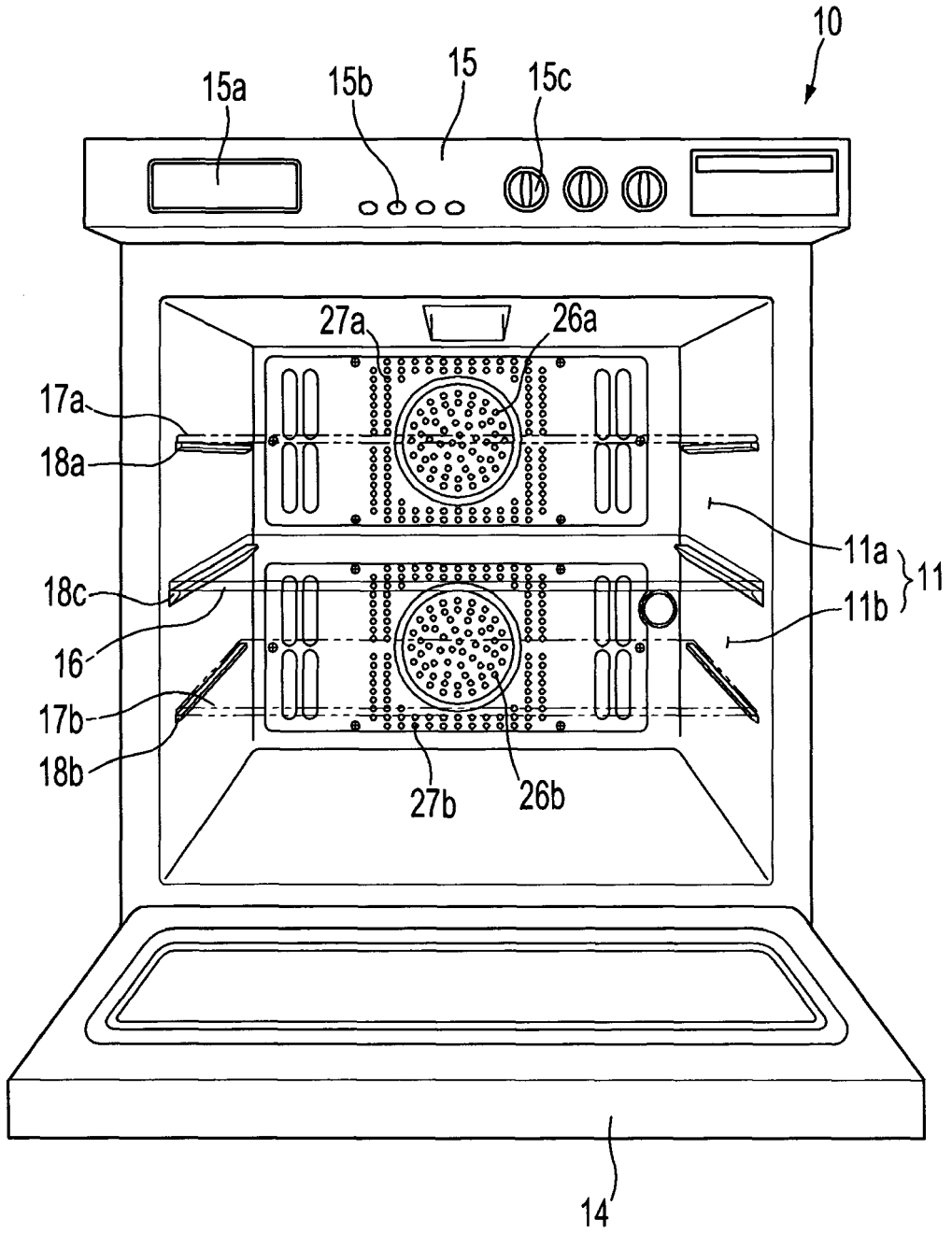

10
15a
15b
15
15c
27a
26a
17a
18a
11a
11
18c
11b
16
17b
18b
27b
26b
14

Fig 2

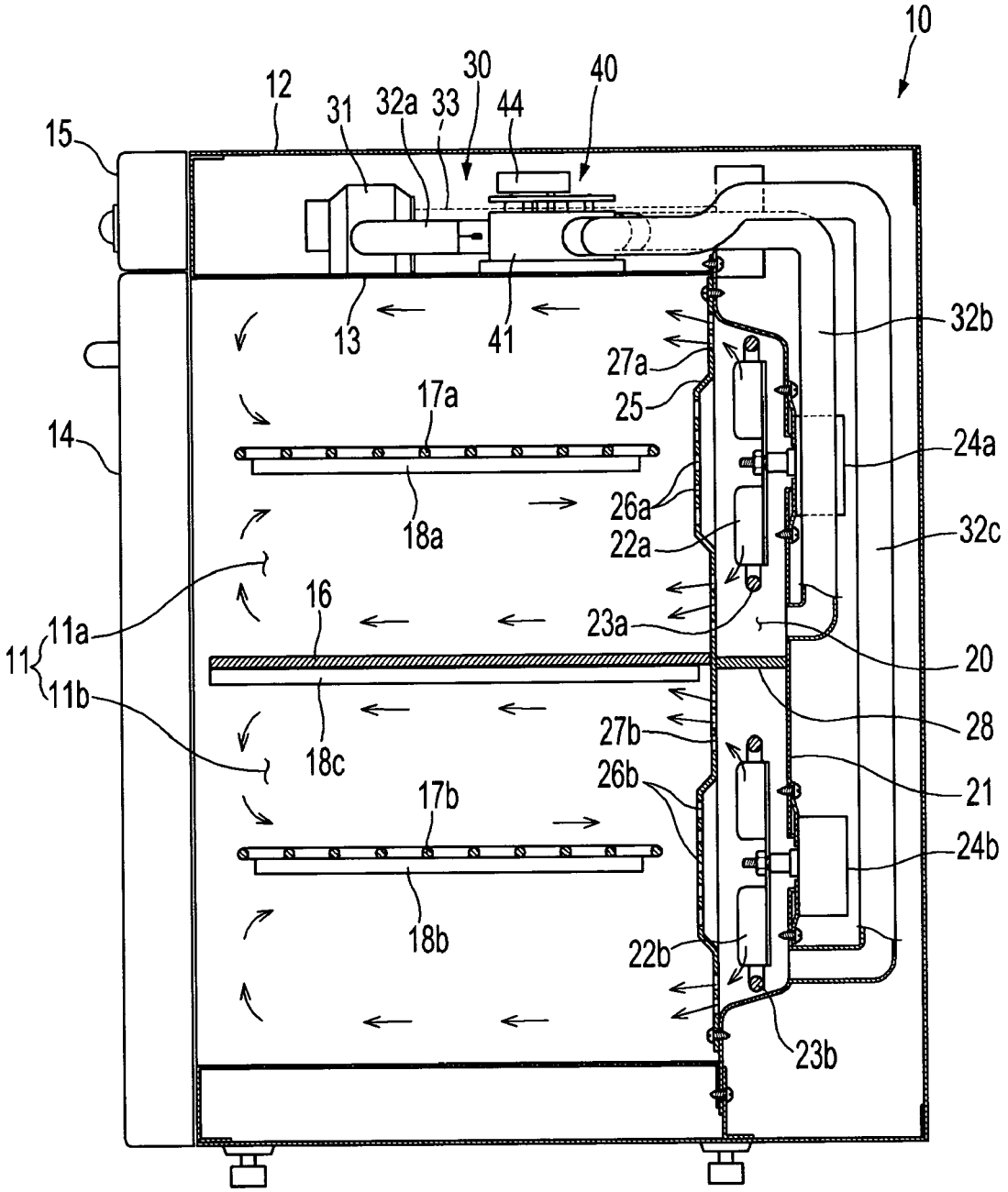

10
12
30
40
31
32a
33
44
15
13
41
32b
27a
25
17a
14
24a
26a
18a
22a
32c
16
11a
23a
11
20
11b
18c
27b
28
26b
17b
21
24b
18b
22b
23b

Fig 3

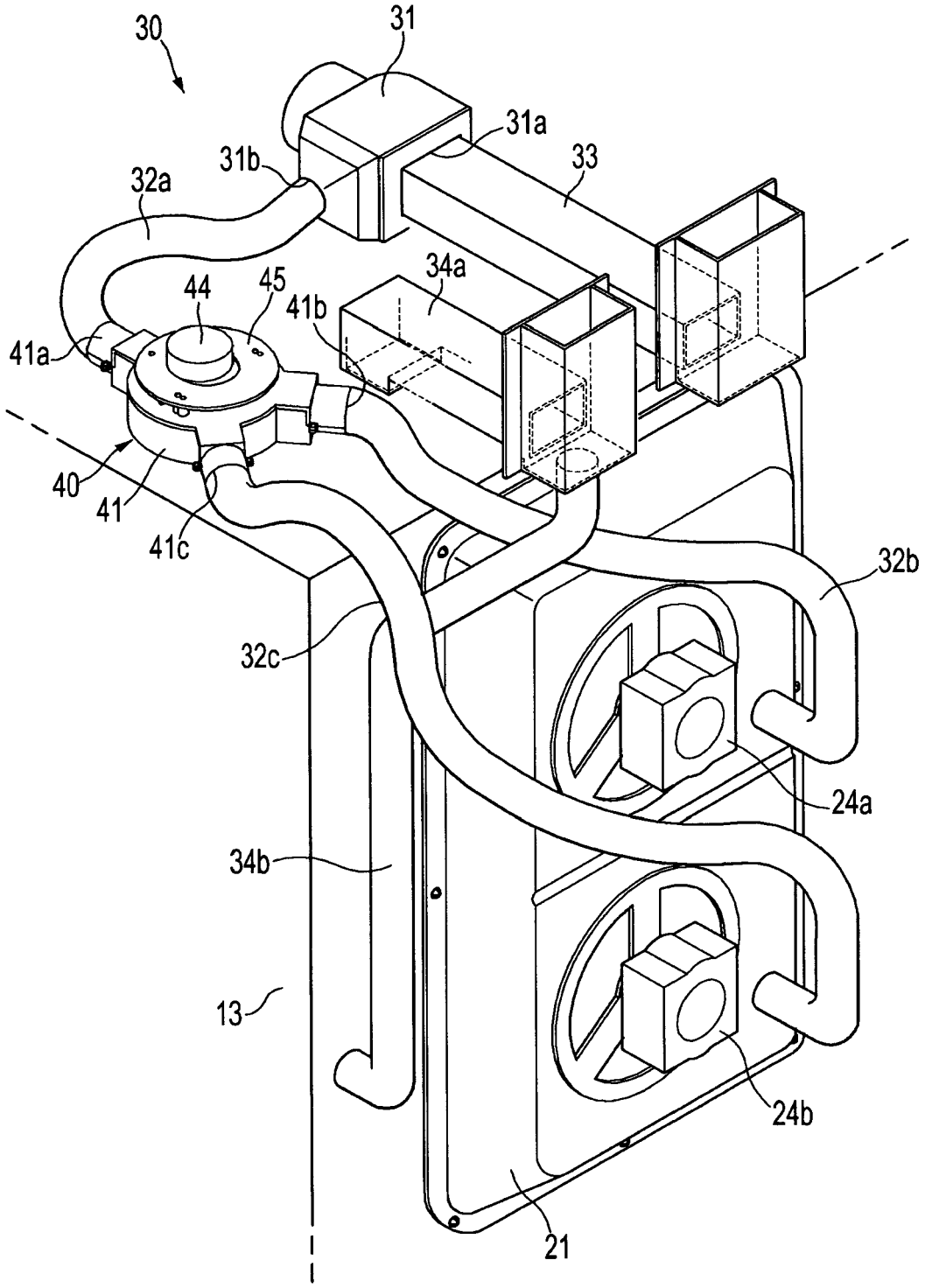

30
31
31a
31b
32a
33
34a
44
45
41b
41a
40
41
41c
32b
32c
24a
34b
13
24b
21

Fig 4

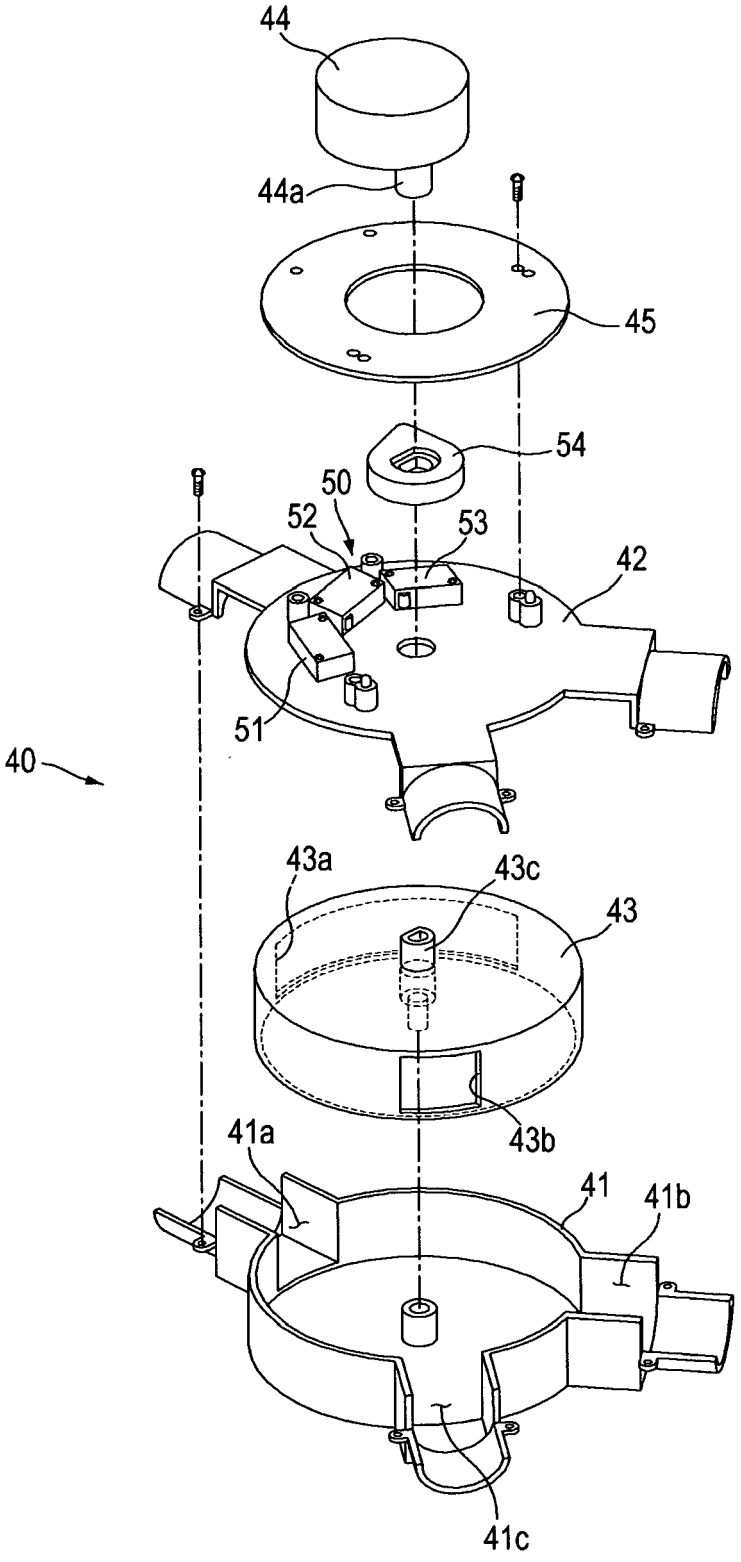


Fig 5

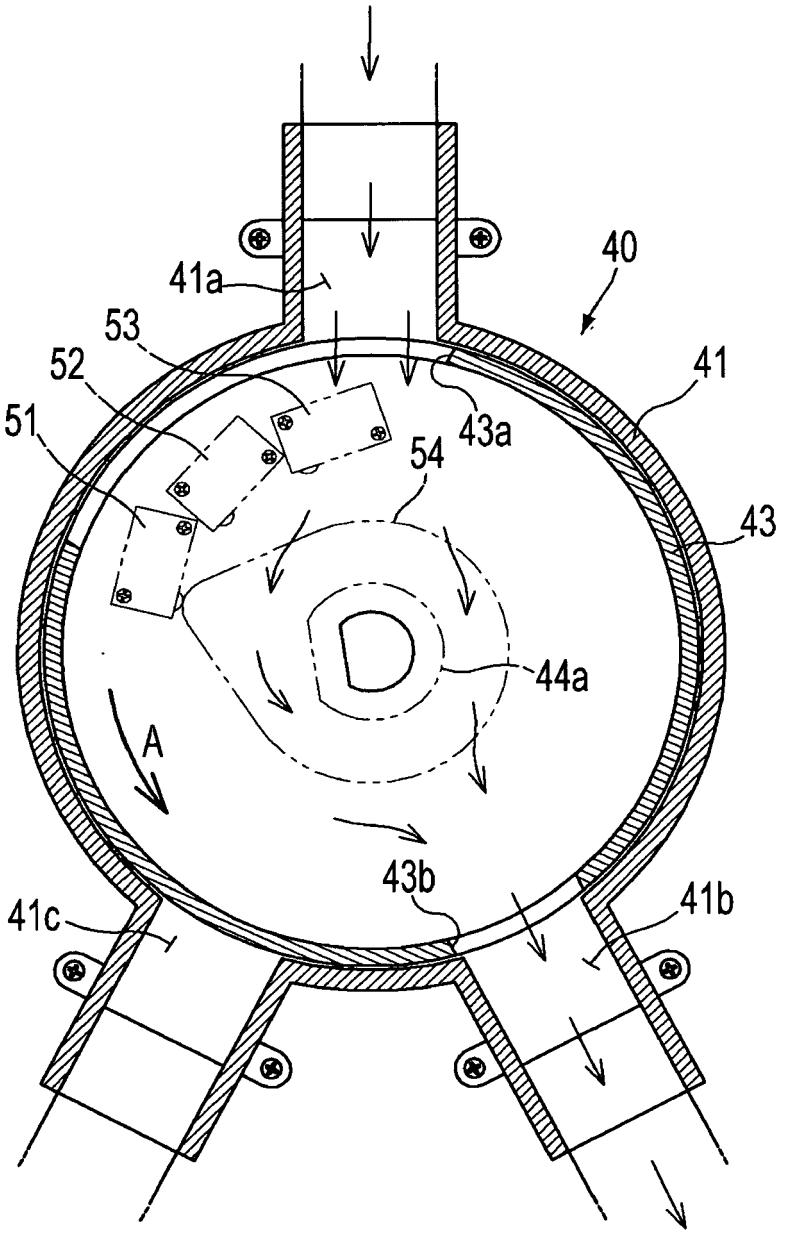


Fig 6

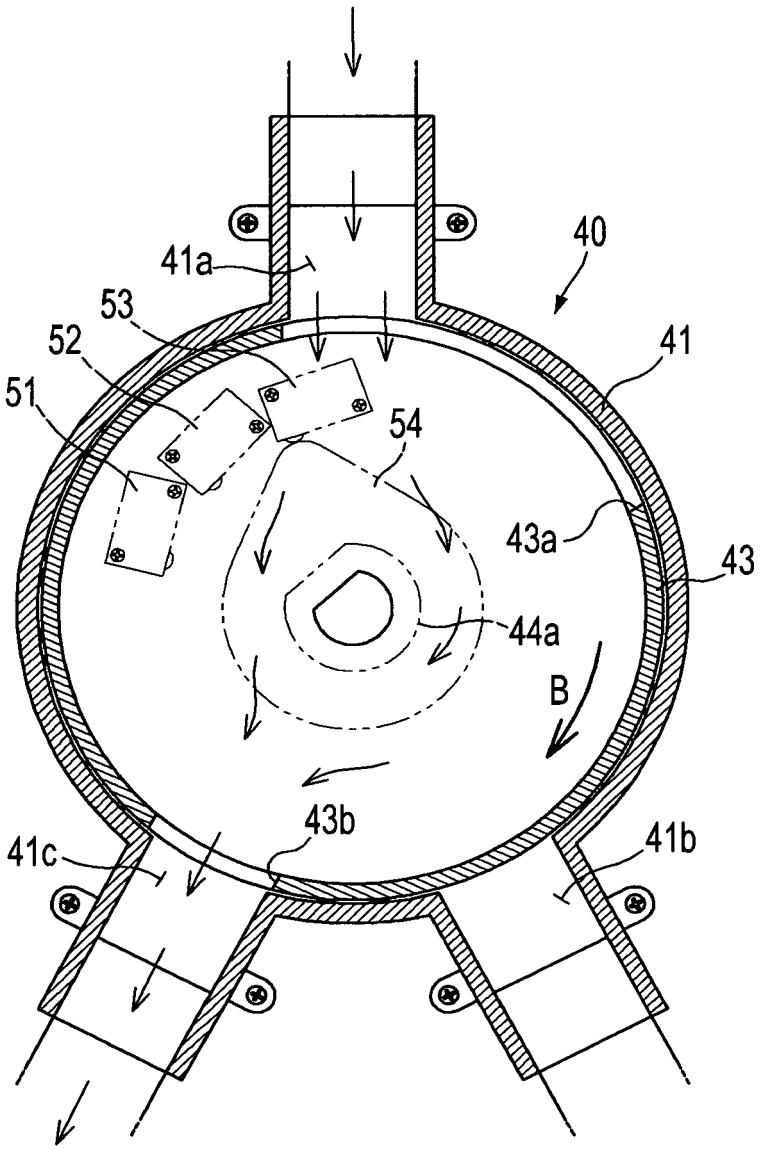


Fig 7

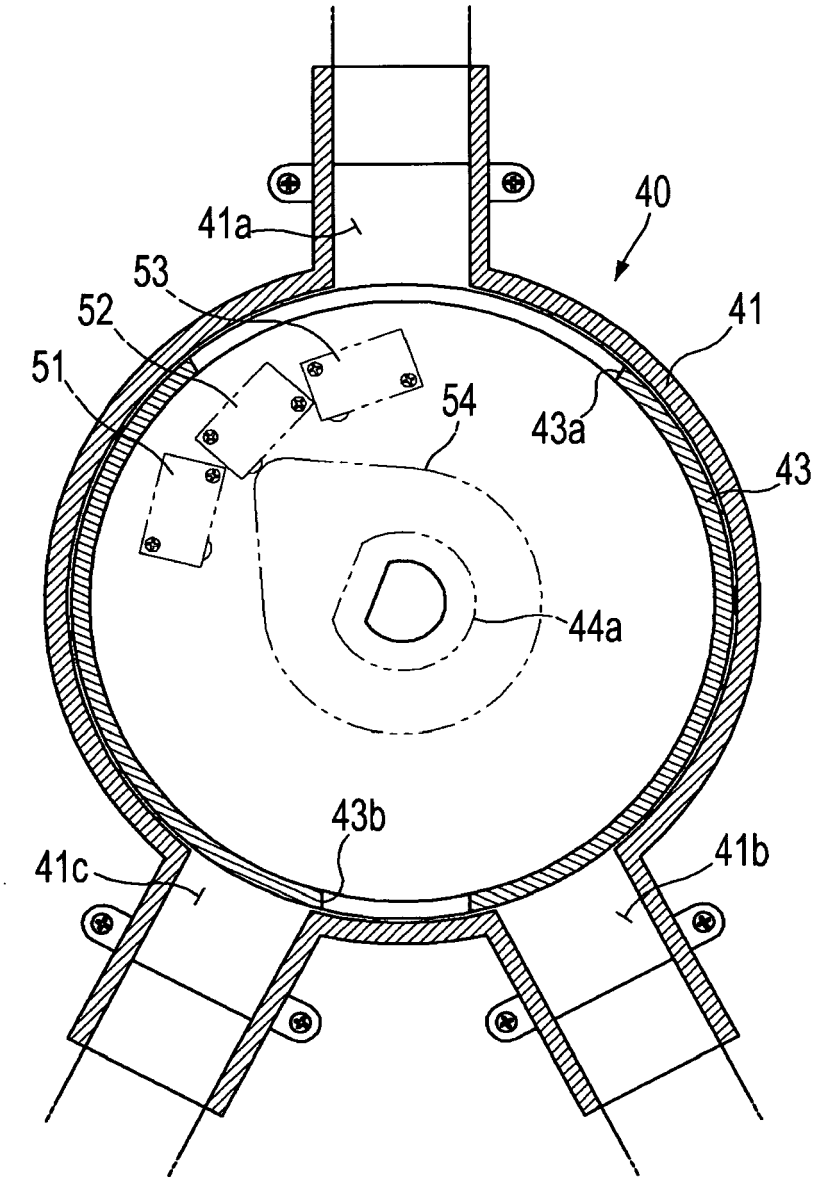


Fig 8

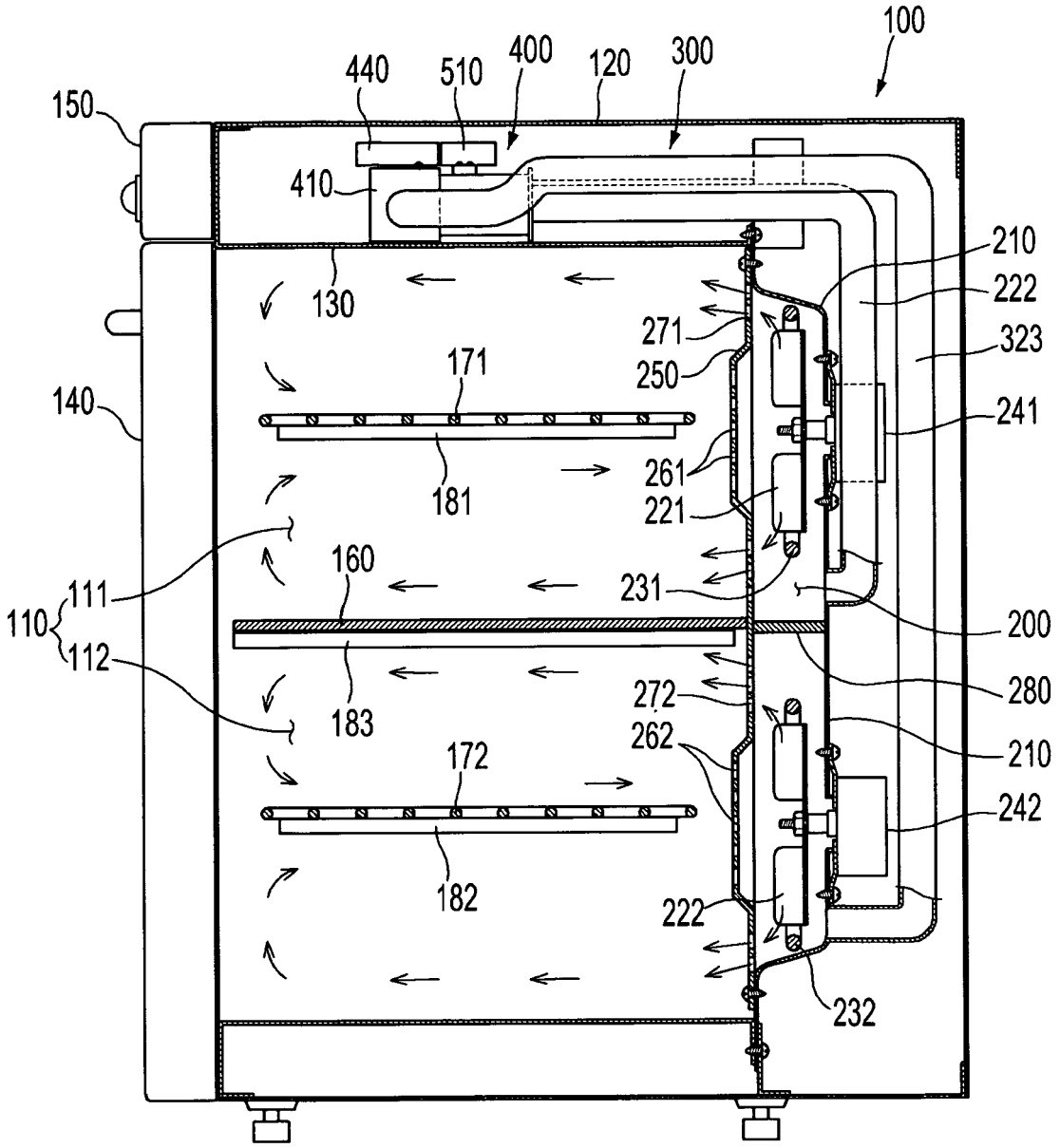

100
440
510
400
120
300
150
410
130
210
222
271
323
250
171
140
241
261
181
221
160
111
231
200
110
112
280
272
183
262
210
172
242
182
222
232

Fig 9

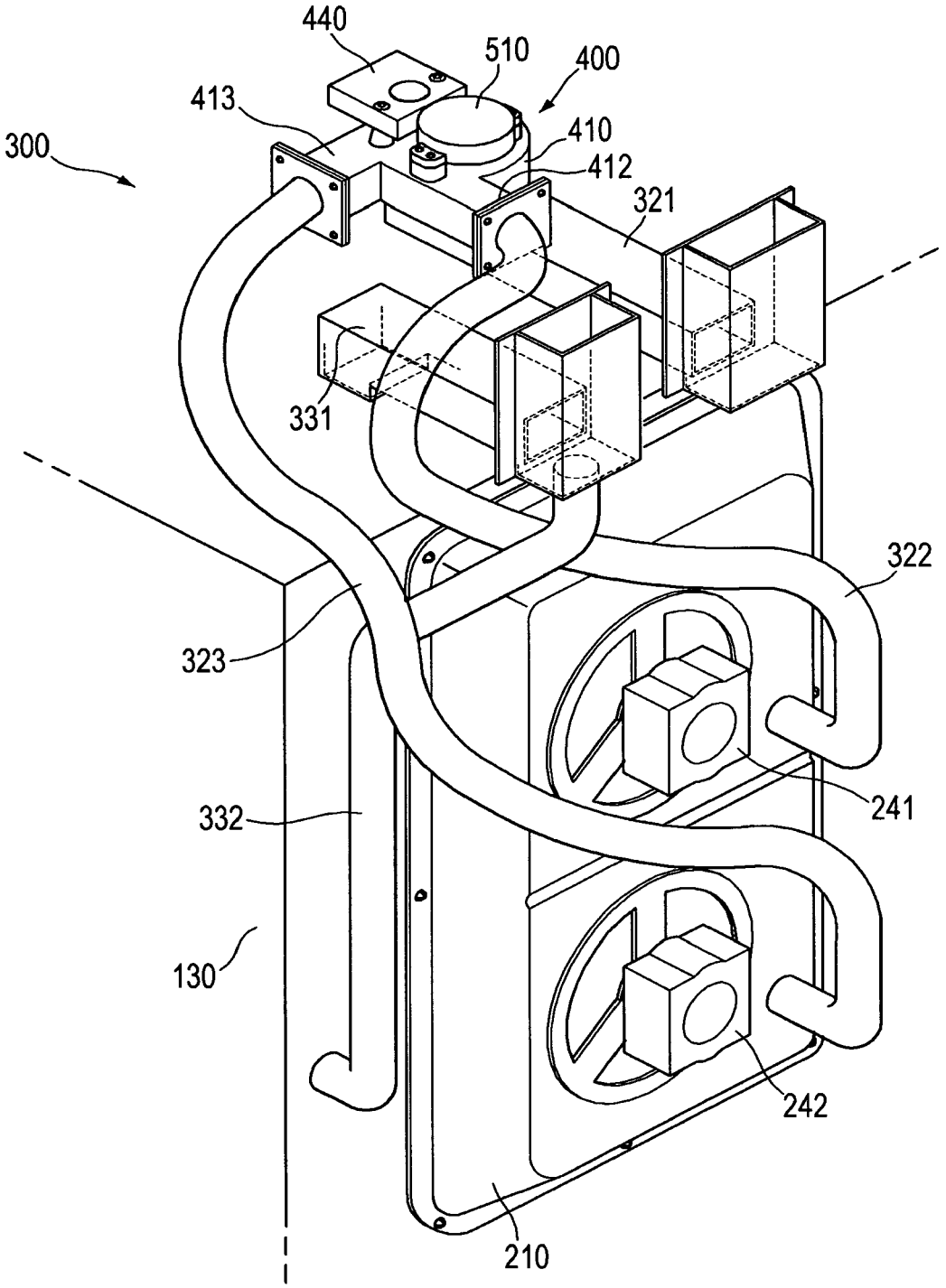


Fig 10

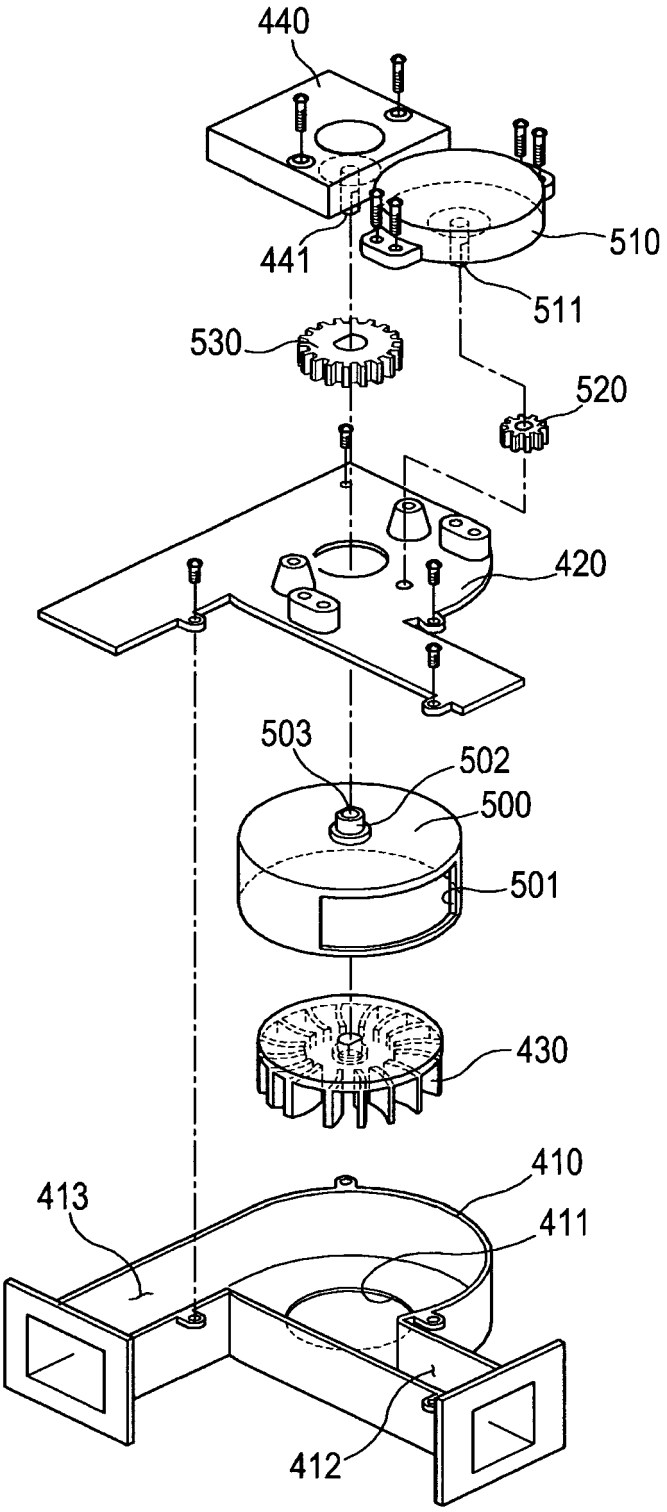


Fig 11

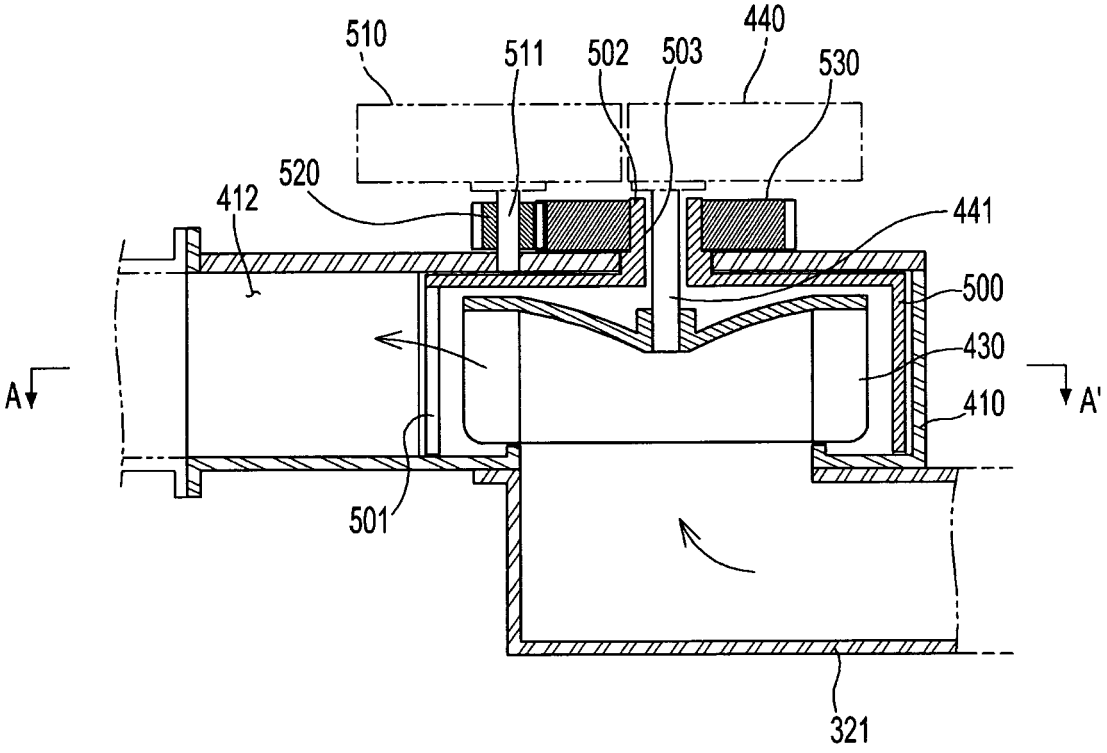


Fig 12

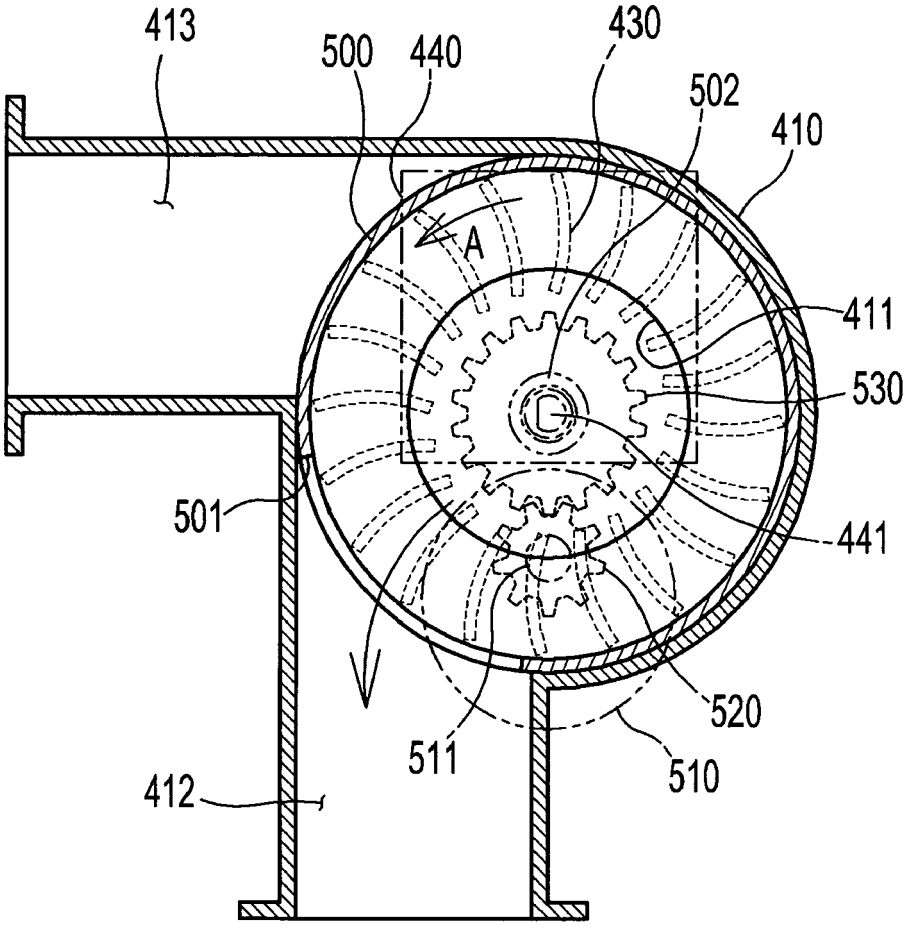
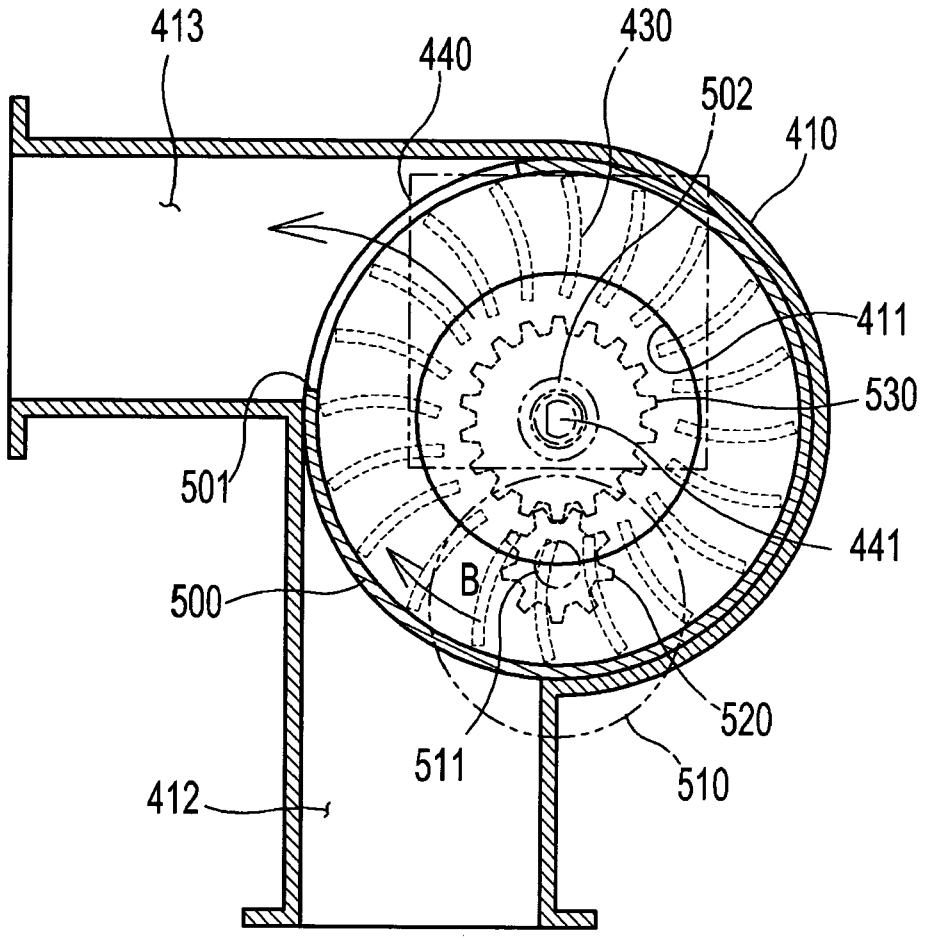


Fig 13



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 25 3733

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2004/079355 A1 (DIVETT TIMOTHY ANDREW ET AL) 29 April 2004 (2004-04-29) * paragraphs [0025] - [0027]; figures 2,6 * -----	1,9,11, 16	F24C15/00
A	US 4 354 084 A (HUSSLEIN ET AL) 12 October 1982 (1982-10-12) * column 4, lines 57-61; figures * -----	1,9,11, 16	
L	DE 10 2004 008465 A1 (ELECTROLUX HOME PRODUCTS CORPORATION N.V., ZAVENTEM) 8 September 2005 (2005-09-08) * paragraphs [0032], [0037]; figure 3 * -----	1,9,11, 16	
A	WO 2004/057240 A (PREMARK FEG L.L.C; BUJEAU, ROBERT, FERNAND; FORAY, MICHEL, GEORGES) 8 July 2004 (2004-07-08) * page 4, lines 12-14; figures 2,13,16 * * page 6, lines 4-19 * * page 9, lines 3-9 * * page 33, lines 10-12 * * page 34, lines 10-13 * * page 36, lines 2-16 * -----	1,9,11, 16	TECHNICAL FIELDS SEARCHED (IPC) F24C
A	DE 197 24 455 A1 (RATIONAL GMBH, 86899 LANDSBERG, DE) 24 December 1998 (1998-12-24) * columns 1-2 * -----	16	
A	US 6 244 165 B1 (TROMBLEY JOSEPH S ET AL) 12 June 2001 (2001-06-12) * column 2, lines 29-36 * -----	16	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	28 March 2006	von Mittelstaedt, A

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 05 25 3733

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

28-03-2006

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004079355 A1	29-04-2004	AU 2003203444 A1	13-05-2004
		CA 2424326 A1	25-04-2004
US 4354084 A	12-10-1982	AU 522608 B2	17-06-1982
		AU 4698479 A	13-12-1979
		CA 1138534 A1	28-12-1982
		DE 2825461 A1	13-12-1979
		JP 55000900 A	07-01-1980
DE 102004008465 A1	08-09-2005	EP 1589287 A1	26-10-2005
WO 2004057240 A	08-07-2004	AU 2003302713 A1	14-07-2004
		BR 0317635 A	29-11-2005
		EP 1583923 A2	12-10-2005
		US 2006054155 A1	16-03-2006
DE 19724455 A1	24-12-1998	NONE	
US 6244165 B1	12-06-2001	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82